OFFICE OF THE
ASANSOL MUNICIPAL CORPORATION
ASANSOL :: BURDWAN

TEL-FAX : (0341)2302491 e-mail ID – mayor.amc@gmail.com

Memo No. :- 90/PW/Eng/2017 Dated: 10/04/2017

NOTICE INVITING e-BID

BID NO. :- . 06 / WS/Eng/AMRUT/17.

The Secretary, Asansol Municipal Corporation, on and for behalf of the Board of Councillors of Asansol Municipal Corporation invites sealed competitive Bid on Turnkey Basis (Two part System) from reliable and resourceful Companies/Firms/Contractors having experience and acumen in construction work as noted below the eligibility and depicted hereunder for participating in the e-Bid.

1.	Name of Work:		Planning, Designing, Construction and Commissioning of 3620 Cum. capacity **G**round **L**evel **R**eservoir-2 with Pumping station along with1250 KVA HT Sub Station and all other allied works complete in all respect on turnkey basis under AMRUT Programme.
2.	Scope of Work		Planning, Designing & Construction of 3620 Cum. **G**round **L**evel **R**eservoir **(GLR)-2** with pumping stationalong with 1250 KVA HT Sub Station for Asansol Municipal Corporation WSS with necessary civil, electrical (according to I/E rules) & mechanical works related to the project complete in all respect with Retaining wall / boundary wall and other allied works, including electrical works with the provisions for receiving power from WBSEDCL and after satisfactory completion, 3 (three) months trial run and necessary training of maintenance staff & thereafter (subsequently) 5 (five) year operation and maintenance with guarding arrangement on turnkey basis under AMRUT.

3.	Location of Work:		Khatian No. 01, JL no- 53, Plot No- 49, 50, Mouza- Bamandiha, Village & P.O. – Radhanagar, P.S. :- Kulti, P.S:-Asansol, Dist.:- Burdwan (W.B.)
4.	Eligibility to participate in the Bid		Having experience and technical acumen in Executing, Construction & Completion of Clear water reservoir with Pumping Station of minimum 1450 cum capacity along with 500 KVA HT Sub Station including its civil & electromechanical works for both CWR & Sub Station in a single or separate contract during last five financial years in any Government Department /Board / Semi-Govt. / Corporation / Statutory Authority / Undertaking etc. AND Having sufficient qualified technical personnel (to be employed under the firm for at least 2 consecutive years) with sound knowledge and experience in execution of similar nature of works. AND Having annual turnover of at least Rs. 3.00 Core or above in any one year of last three Financial years. AND Having valid electrical license(Both HT & LT), VAT / ST, P. Tax clearance Certificates, PAN Card, Certificate and Electrical supervisory license etc.
			Note: a) Only works of nature depicted above completed successfully will be treated as credential.
5.	Documents to be produced in support of Credential for Bid Part-I (Prequalification Documents)		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:
		a.	Particulars of ownership /partnership or Board of Directors pertaining to the Organization / Company / Firm

		b.	Copies of valid PAN Card, Sales Tax clearance, Electrical Supervisory license Certificate, Professional Tax clearance Certificate, Valid Electrical Licence (HT & LT).
		c.	Bank solvency Certificate not less than Rs 3 cores and
		d.	Valid documents in support of annual Turnover.
		e.	List of machines and equipment's necessary for field as well as laboratory test for all materials.
		f.	Experience and address, fax & telephone nos. , mobile no., & E-mail ID nos. of the firm.
			All documents in original to be produced in due course of time as & when asked by the Bid inviting authority.
6.	Earnest Money		2% of the Quoted Bid price in two parts, vise
		a.	Rs. 3,00,000.00 (Rupees Three Lakh only) as an initial Earnest Money Deposit shall accompany with Bid Proposal, in favour of the "**The Secretary, Asansole Municipal Corporation,**"
		b.	Earnest Money Deposit i.e. 2% of bid amount beyond Rs.3,00,000.00 (if any) shall have to be deposited after acceptance of Bid Proposal.
			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) dated 28.07.2016 of Finance Department Govt. of West Bengal). Every such Transfer shall be done on or after the date of publish of NIeB. Any Bid without such Transfer of EM (Except exemption as per G.O.) shall be treated as informal and shall be automatically cancelled. Online transfer of Earnest Money receipt (Scanned copy) shall be uploaded as Statutory document.
			Earnest Money Should be deposited Only at ICICI Bank Ltd., Asansol Branch, and Murgasole by RTGS / NEFT in favour of Asansol Municipal Corporation for EMD in Account No. 029101004152 with IFSC Code ICIC0000291.
7.	Cost price of Bid documents		Nil

8. Date and Time Schedule:-

Sl. No.	Particulars	Date and Time
a)	Date of uploading of NIeB. and Bid Documents online) (Publishing Date)	18/04/2017
b)	Documents download/sell start date (Online).	18/04/2017 at 15:00 Hrs.
c)	Date of Pre Bid Meeting with the intending bidders In the office of the Superintending Engineer, West Circle, M.E. Dte., at the address of G.R. Mitra Sarani, Asansol Municipal Corporation, Asansol: Burdwan Pin 713301.	02/05/2017 at 16:00 Hrs.
d)	Bid submission start date (On line)	18/04/2017 at 15:00 Hrs.
e)	Bid Submission closing (On line)	12/05/2017 at 15:00 Hrs.
f)	Bid opening date for Technical Proposals (Online)	15/05/2017 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 during uploading of Technical Evaluation Sheet of Bidders.
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.

9.	Time of completion		Time of completion of the Contract is 365 (Three Hundred and Sixty five) calendar days from the date of issueof Work Order.
10.	Site inspection & general information		Intending Bidders are required to inspect the site of the Project with particular reference to location and infrastructure facilities. 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 are also acquainted with relevant IS specifications with latest amendments, IE Rules, CPHEEO manuals, Clauses & Sub Clauses of the Bid

			documents and to have fully acquainted with all details of work front, communications, underground utility services, seasonal weather and its variation, labours, water supply, existing & proposed site levels, position and diversion of transportation and barricading , if required, electricity and any other general information including topological condition & existing level and level pertaining to and needed for the work to be completed in time properly.
11.	Bid documents		A full set of Bid documents consists of 2 Parts. These are **PART I :-** Containing all documents in relation to the name of the firm applied for and credential possessed along with all documents as depicted in Sl. No. **4** along with this NIeB and its all corrigenda's. **And** Section A: Description of the Project. Section B: Conditions & requirements fore-Bidding. Section C: General conditions of theContract. Section D: General specifications ofWorkmanship and materials for Civil Works. Section E: Detailed technical specificationsfor Civil works. Section F: Technical specifications Electro Mechanical works. Section G: Power Transformer. Section H: High Tension panel **And** Section I: ANNEXURES i. List of tools for Electrical equipment ii. Site Plan iii. List Of vendors iv. Soil Investigation Report v. Tentative Lay Out Drawing for Sub Station building **And** **PART II** :-Containing the Following Document. Bid Price / Price Schedule (.xls format).

12.	Validity of Bid		A Bid submitted shall remain valid for a period of 120 calendar days from the date set for opening of Bids. Any extension of this validity period if required wills besubject to concurrence of the Bidders.
13.	Withdrawal of Bid		A Bid once submitted shall not be withdrawn within thevalidity period. If any Bidder / Bidders withdraw his / their Bid(s) within the validity period then Earnest Money asdeposited by him / them will be forfeited.
14.	Acceptance of Bid		The "Secretary, Asansol Municipal Corporation" 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.
15.	Intimation		The successful Bidder will be notified in writing of theacceptance of his Bid. The Bidder then becomes the “Contractor” and he shall forthwith take steps toexecute Formal Contract Agreement in appropriate **Asansol Municipal Corporation Tender Form** with the "The Secretary, Asansol Municipal Corporation,"and fulfil all his obligations asrequired by the Contract.After the Bid is provisionally accepted, the Bidder shallsubmit detail Design, Drawing and workingspecifications phase wise based on existing sitecondition & proposed levels at site. If it is foundtechnically correct and acceptable with properexamination by the Superintending Engineer, West Circle, M.E. Directorate, and provisional approval ofthe submitted drawings will be accorded phase wise forexecution. Even after approval from the competent authority, if it is necessary to rectify anything at site, it is the sole responsibility of the contractor to reconstruct the same at his own cost at site after necessary approval from competent authority. Eventually, all the parts, Design, Drawings etc. of thesuccessful Bidder shall be taken as a part of the agreement.
16.	Escalation of Cost		There will be no escalation in cost for materials or labour and the contract price mentioned in the contract stands valid till completion of the O & M of the contract, and other obligation, if any.

17.	Name & address of engineer-In-charge (EIC) of the Work		Executive Engineer, Asansol Division, Municipal Engineering Directorate, Vivekananda Pally, Ismile, Asansol.
18.	Execution of Work		The Contractor is liable to execute the whole work as per direction and instruction of the Executive Engineer, Asansol Division of Municipal Engineering Directorate who is the "Engineer in Charge" of the work after due approval of “Superintending Engineer, West Circle, M.E. Directorate.”
19.	Payment		Payment will be made to the successful Bidder by the "Secretary, Asansol Municipal Corporation" periodically only on receipt of written recommendation from the Executive Engineer, Asansol Division of Municipal Engineering Directorate. Payment for all Electro-mechanical works will be recommended by the Technical Advisor, (E/M) M.E.Dte.
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 Secretary, Asansol Municipal Corporation", 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 Secretary, Asansol Municipal Corporation", 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 thecontents 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 Secretary, Asansol Municipal Corporation".
26.	In case of any dispute arising from any clauses of similar nature between bid documents and Asansol Municipal Corporation Tender Form, the decision of the Superintending Engineer, West Circle, M.E. Directorate, Burdwan will be final and binding.
27.	All usual deductions for taxes as applicable i.e. ST, 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.	Successful Bidder will have to submit the break-up supported with analysis of the costof Civil Works (viz. Foundations, Sub Structures, Super structures, Finishing etc.), Electrical work, Mechanical work and Testing/commissioning work as %wise with reference of clause 57 of Section C in order toassess the value of Work done and make payment thereof before acceptance of bidagainst each item of work. In case of any dispute arising in the breakup and analysis thereof, decision of Superintending Engineer, West circle, M.E. Dte. Will be binding andfinal. Payment will make to the agency on the basis of approved breakup by SE (West Circle), M.E.Dte. as stated above.
30.	In the event of e-Filing intending bidder may download the Bid document from thewebsite 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/ payorder issued from any nationalized bank in favour of "The Secretary, Asansol Municipal Corporation", payable at Asansol& same may be documented along with earnest money Deposit through e-Filling, (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 inthe Website http://etender.wb.nic.in. Bid document may be downloaded fromwebsite & submission of Technical Bid/Financial Bid as per Bid Schedule.
31.	The requisite cost of Bid documents (if any, in this tender no tender paper cost required) as specified in this NIeB. shall be paid by drawing a Demand Draft/Pay order on any Nationalized Bank / Scheduled Bank in favour of the “The Secretary,

	Asansol Municipal Corporation," payable at Asansol. Every such Demand Draft /pay order shall be drawn on or after the date of publish of NIeB. At the time of uploading the Bid, the intending Bidder shall upload a scanned copy of such Demand Draft/pay order along with his/her Bid. Any Bid without such Demand Draft/Pay order (Except exemption as per G.O.) shall be treated as informal and shall be automatically cancelled.
32.	The Bidder, at the Bidder's own responsibility and risk is encouraged to visit andexamine the site of works and its Surroundings and obtain all information that may benecessary for preparing 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.
33.	Prospective applicants are advised to note carefully the minimum qualification criteria as Mentioned in 'Instructions to Bidders' before bidding.
34.	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.
35.	Before issuance of the work order, the Bid inviting authority may verify the Credential& other documents with the original of the lowest bidder if found necessary. After verification, if it is found that such documents submitted by the lowest bidder is either manufacture or false, in that case, L.O.A./ work order will not be issued in favour of the bidder under any circumstances.
36.	If any discrepancy arises between two similar clauses on different notifications, the decision of "Superintending Engineer, West Circle, M.E.Dte." is final & binding.
37.	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.
38.	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.
39.	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% + 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 Crafter full satisfaction of E.I.C.
40.	Any legal matter will be settled within the jurisdiction of Hon'ble District Judges Court at Asansol, Dist.-Asansol, West Bengal.
41.	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 nonrepresentation in that behalf will be entertained by the BidInviting Authority.
42.	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 will be cancelled.
43.	The successful bidderhas 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 competent authority before acceptance of bid and it will be treated as part of the Bid document.
44.	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 bid will be pointed out during pre-bid meeting. All the items not shown in the payment schedule or in bid document but required for successful completion and commissioning of the project will be in the scope of Bidder.
45.	The requisite cost of Earnest Money, as specified in this NIeB shall be paid by online internet bank transfer or NEFT or RTGS (as per GO No. 3975-F(Y) dated 28.07.2016 of Finance Department, Govt. Of West Bengal). Every such Transfer shall be done on or after the date of publish of NIeB. Any Bid without such Transfer of EM (Except exemption as per G.O.) shall be treated as informal and shall be automatically

	cancelled. Online transfer of Earnest Money receipt (Scanned copy) shall be uploaded as Statutory document.
46.	The Bidders quoting rate in BOQ will be treated as the "Quoted rate inclusive of all type of taxes for Central Govt., State Govt., and any other Statutory body as admissible by rules and regulation of the Government (Central/State) time to time. Therefore All usual deductions for taxes as applicable i.e., ST, IT, Labour welfare cess etc. will be deducted from the bills submitted by contractor time to time for their works. No extra claim in any circumstances beyond the quoted rate in uploaded BOQ will be entertained by Asansol Municipal Corporation.

Secretary

Asansol Municipal Corporation

INSTRUCTION TO BIDDERS/BIDDERS

SECTION – A-I

1. *General guidance for e-Biding*

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

2. *Registration of Bidder*

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

3. *Digital Signature certificate (DSC)*

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

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

5. *Submission of Bids.*

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

A. Technical proposal

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

A-1. Statutory Cover Containing

1. Prequalification Document

i. As per Sl. No. 4

ii. Prequalification Application (Sec-B, Form – I)

iii. Online transfer of Earnest Money receipt.(Scanned copy) as per Sl. No. 6 of the Bid document.

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, VAT Registration Certificate (up to date).

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

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

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

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

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

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

viii. List of laboratory Instrument.

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

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

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

INTENDING BIDDERS SHOULD UPLOAD NON-STATUTORY DOCUMENTS AS PER FOLLOWING FOLDERS IN MY DOCUMENT:

E-Bidding system of Government of West Bengal			
Bidder Document Sub Category Master			
Sl. No.	**Category Name**	**Sub Category Name**	**Sub Category Description**
A	CERTIFICATES	A1. CERTIFICATES	1. West Bengal VAT Registration / ST registration / P.F/PAN / P. Tax Clearance Certificate. 2. Income Tax Acknowledgement Receipt (Latest) 3.Valid Electrical License 4. E.S.IRegistration Certificate.
B	COMPANY DETAILS	B1. COMPANY DETAILS 1	1. Proprietorship Firm (Trade License). 2. Registered Deed of partnership Firm 3. Registration Certificate under Company Act.

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

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

B. Bid Evaluation

i. Opening and evaluation of Bid: - If any Bidder is exempted frompayment 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 DigitalSignature Certificate.

iii. Cover (folder) of statutory documents (vide Cl. No. 5.A-1) should beopened first and if found in order, cover (Folder) for non-statutory documents (videCl. No. – 5.A-2) will be opened. If there is any deficiency in the statutorydocuments 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 Department of Municipal Affairs, Govt. of West Bengal. Comparative Statement may be forwarded to appropriate authority depending on the value of the work as applicable as per existing norms and guidelines under 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. 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.

Secretary

Asansol Municipal Corporation

SECTION – B FORM –I

PRE-QUALIFICATION APPLICATION

To

The Secretary,

Asansol Municipal Corporation,

PO:-Asansol, Dist:-Asansol,

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 / we 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.

Enclosures:- 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 31.3.20112	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 has made myself fully acquainted with the site conditions existing level/proposed level and local conditions in and around the site of work. I have also carefully and meticulously gone through the Bid documents. Bid of the above named Bidder is offered and submitted upon due consideration of all factors and if the same is accepted, I on and for behalf of the aforesaid Bidder, being lawfully and duly authorized, promise to abide by all the covenants, conditions and stipulations of the Contractual documents and to carry out, complete the works to the satisfaction of the Bid accepting Authority of the Work and abide by all instructions as may given by the Engineer in Charge of the work time to time. I also hereby undertake to abide by the provisions of Law including the provisions of Contract Labour (Regulation & Abolition) Act, Apprentice Act 1961, West Bengal Sales Tax Act, VAT Act, Income Tax Act as would be applicable to the Contractor upon entering into formal Contract / agreement with the Bid Inviting/Accepting authority.

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

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

Deponent

Solemnly affirmed by the said

……

Before me. (1st class Judicial Magistrate / Notary Public)

SECTION – B FORM- III

STRUCTURE AND ORGANISATION

A.1 Name of applicant:

A.2 Office Address:

Telephone No. and Cell Phone No. :

Fax No. :

E mail:

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

Key personnel and technical staff with Bio-data. :

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

Signature of applicant including title

and capacity in which application is made.

SECTION – B FORM – IV

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

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

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

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

For each item of equipment the application should attach copies of

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

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

Signature of applicant including title

and capacity in which application is made.

Successful agency shall have to make an agreement (in two copies) with the Asansol Municipal Corporation, in the prescribed pro-forma by depositing @ Rs. 1000/- (Rupees one thousand only.) for cost of each tender form in cash stating that the agency is agreeable to supply the Pipe materials as and when require (as per the rates quoted and terms and conditions laid down in the quotation papers) to the Municipality with in the Municipal/Adjoining areas (as the case may be).

Secretary,

Asansol Municipal Corporation

Memo No.:- _____/AMRUT/WS/AMC/2017 **Dated:_____**

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

1. The Mayor, Asansol Municipal Corporation,
2. The District Magistrate, Burdwan.
3. The Commissioner, Asansol Municipal Corporation,
4. The Director SUDA, SUDA BHAWAN, HC Block, Sector-III, Saltlake, Kol-106.
5. The Chief Engineer, M.E.Dte., Bikash Bhawan, Saltlake, Kol-106.
6. The Superintendent Engineer, (Western Circle), M.E.Dte., Burdwan.
7. The Chief Engineer, Asansol Municipal Corporation.
8. The Superintendent Engineer, Asansol Municipal Corporation.
9. The Revenue officer, Asansol Municipal Corporation.
10. The Executive Engineer, M.E.Dte. Asansol Division.
11. The Finance officer, Asansol Municipal Corporation.
12. The Head Clerk for wide circulation in a day by National & local News Paper.
13. The Office Notice Board, Asansol Municipal Corporation for wide circulation.
14. The Guard File.

Secretary,

Asansol Municipal Corporation

SECTION – A

DESCRIPTION OF THE PROJECT

1.0 GENERAL

The work involves Planning, Design, Construction, Supply, Delivery, Installation & Commissioning of 3.62 ML (3620 M^3) Capacity Ground Level Reservoir-2 (top of the water level of the GLR at 1.0 meter above H.F.L.) Cum Pumping Station (16 hours running) with 1250 KVA HT Substation along with all other allied works (Civil & Electromechanical work & others, if any required to complete the project) atAsansol (including 3 months trial run after commissioning and necessary training of maintenance staff & thereafter (subsequently) 5 (five) years operation and maintenance of the Plant) on Turnkey Basis. *The High Flood Level (HFL) and Finished Ground level (FGL) will be considered at top of the Brick Pillar at site as per direction of Engineer-in-Charge.*

2.0 LOCATION

The site of the pumping station atAsansol Municipal area P.S. -Asansol, Dist.– Paschim Bardhaman, W.B.

3.0. SCHEME PROCEDURE TO BE ADOPTED

The water supply scheme which will in general be taken up for supplying the potable water as given below;

ROUTE -5

Installation of (2) two (1W+1S) nos. vertical turbine pumping units of 252 M^3/ hour (70 LPS) for Root – 5 for feeding OHR-12, OHR-13 and tentative head 50 M (Designed by the bidder after studying the pipe line configuration) in the pumping station.

a. GLR-2 to point 5A of length 3500 M & dia. of pipe 350 mm DI-K9
b. Point 5A to OHR -12 of length 950 M & dia. of pipe 250 mm DI-K9
c. Point 5A to OHR -13 of length 1850 M & dia. of pipe 200 mm DI-K9

ROUTE -6

Installation of (3) three (2W+2S) nos. vertical turbine pumping units pumping unit of 234 M^3/hour (65 LPS) each for Root – 6 for feeding OHR-11, OHR-14 & OHR- 15 and tentative head 49 M (Designed by the bidder after studying the pipe line configuration) in the pumping station.

a. GLR-2 to point 6A of length 3850 M & dia. of pipe 450 mm DI-K9
b. Point 6A to OHR -11 of length 300 M & dia. of pipe 300 mm DI-K9
c. Point 6A to point 6-B of length 2180M & dia. of pipe 350 mm DI-K9
d. Point 6B to OHR -14 of length 150M & dia. of pipe 250 mm DI-K9
e. Point 6B to OHR -15 of length 200 M & dia. of pipe 200 mm DI-K9

ROUTE -7

Installation of (3) three (2W+2S) nos. vertical turbine pumping units pumping unit of 216 M^3/hour (60 LPS) each for Root –7 for feeding OHR-10 , OHR-6& OHR- 7 and tentative head 45 M (Designed by the bidder after studying the pipe line configuration) in the pumping station.

f. GLR-2 to point 7A of length 4800 M & dia. of pipe 400 mm DI-K9
g. Point 7A to OHR -10 of length 1150 M & dia. of pipe 250 mm DI-K9
h. Point 7A to point 7-B of length 90 M & dia. of pipe 300 mm DI-K9
i. Point 7B to OHR -6 of length 1647 M & dia. of pipe 200 mm DI-K9
j. Point 7B to OHR -7 of length 390 M & dia. of pipe 250 mm DI-K9

ROUTE -8

Installation of (2) two (1W+1S) nos. vertical turbine pumping units pumping unit of 252 M^3/hour (70 LPS) each for Root –8 for feeding OHR-9 & OHR- 16 and tentative head 45 M (Designed by the bidder after studying the pipe line configuration) in the pumping station.

a. GLR-2 to point 8A of length 6950 M & dia. of pipe 350 mm DI-K9
b. Point 8A to OHR -9 of length 300 M & dia. of pipe 300 mm DI-K9
c. Point 8A to OHR -16 of length 750 M & dia. of pipe 200 mm DI-K9

The total pumping units will be 12 Nos. each capacity of the pumping units is given above will be installed on the Ground Level Reservoir-2.

a) Drawing of individual delivery line from the pumping unit with non-return valve (NRV), Butter-fly valve actuator operated, dismantling joint, enlarger, and reducer and connected to the separate dia. four sets of common delivery manifold placing in/ out side of the pumping station for separate four numbers roots.

b) All Electro-Mechanical works related to water supply should strictly conform to relevant IS Code, IE rules & CPHEEO manual

The contractor has the liberty of using alternative arrangement but the design parameters and technical specifications should strictly conform to relevant IS Code, IE rules & CPHEEO manual

4.0 **SCOPE OF WORK**

i) The Bid is a design-cum-execution Bid on Turnkey basis. The Bidder is advised to go through the documents meticulously and prepare Bid on the basis of the data made available. In case of any doubt about any data, the Bidder may seek clarification before the Bid Inviting Authority in writing within seven (7) days from the date of publishing of the Bid documents by the Bid inviting authority.The bidder shall submit his/her queries in writing at least four working days in advance from the date of pre-bid meeting by e-Mail.

The reservoir has to be checked against uplift pressure / Buoyancy with respect of Existing ground level. Beside this the earth pressure co-efficient will be taken as greater of active earth pressure co efficient and Earth pressure at rest condition.

ii) The scope of work includes

a) For Civil Works: - Surveying, planning, design, drawing and construction of civil works including supply, carriage of all materials with foundation for the various units of the plant such as GLR cum pumping station and substation building structure.

b) The High Flood Level (HFL) or Finished Ground Level (FGL) will be 0.5 m above nearby road calculated by the bidder. Ground has to be filled by good earth up to HFL/FGL.

c) Pump sump have to prepare in a way so that the floor level of CWR and floor level of the pump sump bottom level has a slope lesser than 15 degree.

d) The whole arrangement of civil & E/M component will be done in a manner so that a net quantity of water can be transferred to OHR's

e) For Electro-mechanical works: - Planning, designing, 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 water supply scheme complete in all respects to deliver potable water to the proposed/existing rising main after providing a butterfly valve with valve chamber in each root of the feeding rising main of the OHR and placement of Temper proof kinetic air release valve.

f) The successful bidder has to initiate & pursue diligently for any approval required from the appropriate Authority on behalf of the Secretary, Asansol Municipal Corporation.

g) Internal and external illumination arrangement by LED Lights only of pumping station with HT substation will be the Bidder scope.

h) Placement of 10 MT capacity Hand Operated Travelling crane with chain pulley block arrangement.

i) In order to accommodate the cables and control panel room equipment / appliances will be housed at a level motor floor. Drawing of cable on cable trench and cable tray where is necessary.

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

k) The installation of all HT & L.Telectrical equipment's should be strictly as per prevailing I.E. Rules.

l) 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.

m) The Bidder has to submit pump operation curve matching with the system resistance curve for pumping unit for delivery the portable water to the OHRs feeding rising main. Pump selection should be based upon that Family curves for individual operation at all possible consequences depending upon the variation of percentage opening of the butterfly valve are to be submitted.

n) The total capacity of the pumping station will be 252 m^3/hour, 234 m^3/hour, 216 m^3/hour & 252 m^3/hour at head (data supplied by the bidder) in meter to be provided by the bidder with operation of one working and one standby for root - 5 & root - 8 two number pumps working and two numbers pump acts as a stand by for Root - 6 & Root - 7. Each separate delivery manifold and delivery line from common manifold should be equipped with manually operated butterfly valves, valve chamber, blank-flange if necessary (detail of which is given in technical specification). Pump delivery lines shall be connected with the common delivery line at an angle not greater than 45 degree.

o) The Bidder has to consider electrical actuator operated butter fly valve of the delivery side of the pumping units.

p) All the cabling work required to operate the equipment by power cable of all sizes must be 1100 Volt, aluminium, 3 or 3.5 core (as required) armoured XLPE / PVC cable for all motors. The power cable of HT side will be 11 KV grade.

q) The earthing arrangement shall have to be done by GI strip as per IE rules and IS specification. The separate neutral earthing of the transformer will be the Bidder scope. No welding will be allowed in the earthing arrangement as per IE rules.

r) A temper proof air release valve shall have to be placed on the each common delivery line of each root.

A) LIST OF ELECTRO MECHANICAL WORKS TO BE EXECUTED			
Sl. No.	**Description of work**	**Qty.**	**Unit**
1	Supply, delivery & installation vertical turbine Pump Sets with MS fabricated base frame, motor stool and other accessories i.e. coupling for pump and motor, coupling guard, column pipes, shaft, spider etc. The Pump should not less than 750 rpm (syn.), Impeller, Shaft Sleeve & Lantern Ring of Bronze and shaft made of Stainless Steel of following specification and as per technical specification and direction of EIC.		
	a. Discharge Capacity: 252 cum/hour Total Head: decided by the bidder.(Approx-Head-50 M for Root-5) Number of pump – 1W +1S	2	Nos.
	b. Discharge Capacity: 234 cum/h Total Head: decided by the bidder. (Approx-Head-49M for Root-6) Number of pump – 2W +2S	4	Nos.
	c. Discharge Capacity: 252 cum/h Total Head: decided by the bidder. (Approx-Head-60 M for Root-7) Number of pump – 2W +2S	4	Nos.
	d. Discharge Capacity: 234 cum/h Total Head: decided by the bidder. (Approx-Head-45 M for Root-8) Number of pump – 1W +1S.	2	Nos.
2	Supply, delivery & installation of Squirrel Cage AC Induction Motor suitable for 3 phase, 415V ± 10%, 50Hz ± 3% Power Supply having TEFC enclosure Class 'F' insulation (temp. rise limited to Class 'B') and speed of the motor will be matching with the above pump and as per Technical specification and direction of EIC.	12	Nos.
3	Supply ,delivery & installation of CIDF Non-Rising electrical actuator control type butterfly Valve (Kriloskar / IVI make only) of PN-1.5 Rating as per IS:14846:2000 and as per Technical specification and direction of EIC. for individual pump delivery lines.	12	Nos.
4	Supply ,delivery & installation CIDF Swing Check Non-Return Valve (Kriloskar / IVI make only) of PN-1.5 Rating as per IS:5312 Part-I and as per Technical specification and direction of EIC for individual pump delivery line	12	Nos.

5	Supply and delivery and installation CI kinetic temper proof air release valve with valve (Kriloskar / IVI) make in/ out side of the pumping station conforming to IS: 14845-2000 having small orifice elastic ball resting on a gun metal orifice nipple and large orifice vulcanized ball sitting on molded seat ring, valve with kinetic features, isolating sluice valve mounted in horizontal position and operated by wheel gearing, inlet faced and drilled to IS: 1538 table 486, valve suitable for maximum working pressure 10 kg/ cm2. Placed on common delivery line of each root.	4	Nos.
6	Supply, delivery at site & installation of MS Dismantling Joints as per following specification and as per Technical specification and direction of EIC for pump delivery line in between two valves.	12	Nos.
7	Supply, delivery & installation of MS Pipe, Puddle Flanges, Bend, Common Suction Header, Common Delivery Headers for each separate root , Specials, Flanges, Nuts, Bolts, Gaskets etc. as required to make the installation complete in all respects up to the battery limits.	4	lot
8	Supply, delivery & installation at site and storage & installation of bourdon type pressure gauge 150 mm. dia. Cast Aluminum dial with S.S. internal with DN 15 G.I. Impulse line 3 way cock, root isolator valve etc. Pressure gauge for pump discharge line 0-10 Kg/cm2 and as per technical specification and direction of EIC.	12	Nos.
9	Supply, delivery & installation of mechanical level measuring unit with colour indicator for continuous level monitoring and as per Technical specification and direction of EIC.	2	Nos.
10	Supply, delivery at site and storage of Liquid Chlorinator for feeding accurately controlled dosages of chlorine solution into the supply drinking water by connecting chlorine pump of Positive make with flow rate of 200 L/hr. and pressure 10 Kg/cm2 including base plate, flexible coupling, coupling guard for pump & motor and foundation both suction & discharge flanges with all accessories including 1 HP AC 3 phase, 400V ± 10%, 1440 rpm Motor complete set including 100 litre PVC container and other materials as per direction and as per Technical specification and direction of EIC.	4	Nos.

11	Supply, delivery at site and storage of CDD 5000/ Na DCC Granules Dehydrates	400	KG
12	Supply, delivery & storage of Indoor type floor mounted 2 mm. thick CRCA Sheet Steel enclosed cubical type 415V Motor Control Centre IP-54 degree of protection with inter locked hinged door, box channel, busbar chamber, cable alloy, busbar alloy, all fabricated as per relevant IS and consisting of following incoming& outgoing feeders as detailed in technical specification and as per Technical specification and direction of EIC.	1	no
13	Supply, delivery, installation of HT VCB panel as per Bid document and as per direction of EIC & technical advisor (E/M), M.E.Dte. And as per Technical Specification.	1	no
14	Supply, delivery, installation of 1250 KVA outdoor distribution Transformer of rating11kV/433 V, DY 11 as per Bid document and as per direction of EIC & technical advisor (E/M), M.E.Dte.	1	no
15	Supply, delivery & storage of Indoor type floor mounted 2 mm. thick CRCA Sheet Steel enclosed cubical type APFC Panel IP-54 degree of protection with inter locked hinged door, box channel, busbar chamber, cable alloy, busbar alloy, all fabrication	1	no
16	Supply delivery installation of PDB with its caballing and earthing arrangement of the HT substation (No welding allowed in earthing strip) complete in all respect considering bid documents as per approval from competent authority and direction of EIC	1	no
17	Supply, Delivery & Laying glanding, socketing of 1.1 KV grad XLPE insulated Al. Ar. Cable for Supply Main to LT Panel to motor etc and as per Technical specification and direction of EIC. Note- Payment will be made as per measurement. If size of the cable calculation submitted by the bidder.	1	lot
18	Supply, delivery laying, glanding & socketing of 11KV grade 3 core cable as per Bid document and as per direction of EIC & technical advisor (E/M), M.E. Dte. specified as below from		
	a. WBSEDCL panel to HTVCB panel 3 core 400 sq.mm	30	M
	b. HT VCB panel to HT side of the transformer 3 core 400 sq.mm	30	M

	c. LT cable from PDB to Main MCC of pumping station 3.5 core 400 sq.mm 4 Nos. cables (double run for each incomer) will be connected on bus bar through bus coupler. (4 Nos. x 200.00 Meter)	200	M
19	Supply & Fixing of perforated GI cable tray with perforation notmore than 17.5% suspended from ceiling incl. S&F GI connector, 6mm dia. MS suspender, bolts & nuts, steel fastener etc. as required of the following size. Incl. Al painting of MS support (i) Without angle iron support Note- Payment will be made as per measurement.	60	M
20	Earthing with 50 mm dia. GI pipe 3.64 mm thick x 3.04 Mts.long and 1 x 4 SWG GI (Hot Dip) wire (4 Mts. long), 13 mm dia. x 80 mm long GI bolts, double nuts, double washers incl. S &F 15 mm dia. GI pipe protection (1 Mts. long) to be filled withbitumen partly under the ground level and partly above groundlevel driven to an average depth of 3.65 Mts. below the groundlevel as below:a. By TATA-Medium GI pipeNote- Payment will be made as per measurement. If size of the cable changed the payment will be made as per PWD norms	10	Set
21	Connecting the equipment body to earth bus bar with bus coupler for two incomer including S & F 25 mm x 6 mm galvanized (Hot Dip) MS flat on wall/floorwith GI saddles as required and connection to equipment incl. drilling holes, with bolts, nuts, washers etc. Note- Payment will be made as per measurement. If size of the cable changed the payment will be made as per PWD norms.	200	M
22	Supplying & fixing earth busbar with bus coupler for two incomer of galvanized (Hot Dip) MS flat 65 mm x 8 mm on wall having clearance of 6 mm from wallincluding providing drilled holes on the busbar with bus coupler for two incomer complete with GI bolts, nuts, washers, spacing insulators etc. as required Note- Payment will be made as per measurement.	20	M
23	Earthing with 80 mm dia. GI pipe (TATA-Medium) x 3.0 Mts. long and 1 No. 65 mm x 8 mm galvanized (Hot Dip) steel strip (4 Mts. long), 20 mm dia. x 125 mm long galvanized bolt,double nuts, double washers including finishing both ends bymaking holes etc.and S & F 80 mm dia. GI pipe (ISI-Medium) protection (3 Mts. long) to be filled with bitumen partly under the ground level and partly above ground level to an average depth of 3.65 meters (For substation earthing).	8	Nos.

24	Connecting the equipments body to earth busbar incl. S & F 50 mm x 6 mm Galvanized (Hot Dip) MS flat on wall/floor with GI saddle as required and connection to equipments with incl. drilling holes, bolts, nuts, washers etc. (for substation earthing)	200	M
25	Extra for connecting the neutral of Transformer / Earth busbar to earth electrode including S & F Galvanized (Hot Dip) Steel strip 65 mm x 8 mm on wall/floor with GI saddles &insulating the same by one layer of PVC strip over one layer of ampere tape.	50	M
26	Connecting the equipments body to earth busbar including S &F 25 mm x 6 mm galvanized (Hot Dip) MS flat on wall/floorwith GI saddles as required and connection to equipments incl. drilling holes, with bolts, nuts, washers etc. (for pumping station)	200	M
27	Supplying and fixing double-door SPN MCB Distribution Board with IP-42/43 protection, concealed in wall after cutting the wall & mending good the damages to original finish incl. Inter connection with suitable size of copper wire and neutral link & provision for earthing attachment.	2	No
28	Supplying and fixing 240/415 V MCB of Breaking capacity 10kA & C characteristics on din rail of existing DBs and necessary connection a) 6- 32 A	2	No
29	Distribution wiring in 2x 22/ O.3 (Ph. & N) and 1 x 22/ 0.3 as ECC single core stranded 'FR' PVC insulated & unsheathed single core stranded copper wire (Finolex make) in 19 mm bore, 3 mm thick polythene pipe (for horizontal & vertical run in wall and ceiling portion through prelaid polythene pipe) complete with all accessories embedded in wall to light / fan / call bell / Exhaust Fan points with. Piano key type switch (Anchor make) fixed on MS CRC sheet metal (16 SWG) switch board on wall complete with 2 no. "Ph &N" copper bar with holes fixed on Bakelite / hard rubber insulation over the welded chairs with Bakelite / Perspex (wall matching Colour) top Cover (3 mm thick) flushed in wall incl. mending good damages to original finish. No wire will be cut in joint box, Wires are to be drawn from load to switch directly. (Average runs 10 meters). (22/0.3 = 1.5 sq. mm).		
	a) Light point	55	Nos.
	b) Fan point	20	Nos.

30	Distribution wiring in 2 x 22 / 0.3 (Ph. & N) and 1 x 22 / 0.3 as ECC single core. stranded 'FR' PVC insulated & unsheathed single core strand copper wire (approved make) in 19 mm bore, 3 mm thick polythene pipe complete with aft accessories embedded in watt to 250 V 5A 5 pin plug point incl. Supply and fixing 250 V 5A 5 pin flush type plug socket & piano key type switch (Anchor make) including Supply and fixing earth .	10	Nos.
31	Continuity wire, fixed on sheet metal (16 SWG) switch board with Bakelite / Perspex (wall matching colour) top cover (3 mm thick) flushed in wall incl. mending good damages to original finish. [22 / 0.3 = 1.5 sq. mm].		
32	Supplying & fixing 250 V 3 Pin 15 A 6 pin flush type plug socket with 15 A Piano key type (Anchor make) switch, and Fuse and indicator unit [not composite] on sheet metal box. with- Bakelite top cover and earthling attachment incl. S & F sheet metal box of size 175mmx100mm [16 SWG] with 3mm thick Bakelite top cover.	10	Nos.
33	Phillips make industrial rail type LED tube fitting with 1 No. 22 W tube lamps complete.	20	Nos.
34	Fixing only single/twin LED light fitting complete with all accessories Directly on wall/ceiling with HW block and suitable size MS fastener, Ceiling plate, nipples etc. as required	15	Nos.
35	1200 mm. Sweep Ceiling Fan with regulator & down rod of approved make.	15	Nos.
36	Fixing only ceiling fan complete with blades, canopy, fork, rubber bush etc. incl. S & F connecting wire for down rod up to 30 cm incl. painting the rod with approved paint and making necessary connection as required by 2 x 1.5 sq.mm flexible copper wire.	15	Nos.
37	Supply Fixing only exhaust fan after making hole in wall and making good damages and smooth cement finish etc. as practicable as possible and providing necessary length of PVC insulated wire and making connection for exhaust of following diameter: a) 30 cm (12")	15	Nos.
38	Supplying & Fixing Outdoor type LED luminaries with deep drawn aluminium housing anodized inside& clear acrylic cover and accessories incl. for 25 watts LED lamp incl. S & F 32 mm dia. GI pipe bracket, clamp, nut & bolts etc.	15	Nos.

39	Providing Safety Equipment arrangement like fire extinguisher, fire buckets, rubber mat, shock treatment chart & first aid box complete for the pump house include other pumping arrangement as per details in technical specification and as per direction of EIC.	3	Lot
40	Supply delivery & installation 10 MT capacity HOT crane including supply of all erection materials complete in all respect as detailed in the tender specification as well as advise of the crane manufacturer and as per direction of EIC.	1	No.
** All other electro mechanical works(if any) or any additional materials (if any) which is required to complete the project in all respect are to be consider by the bidder and has to be incorporate in the BOQ (.xls) format while quoting rate. If the component is major in nature, the matter has to be raised in pre bid meeting.			

5.0 Commissioning & trial run: - The scope also includes trial run and testing the plant for three months after commissioning (72 Hours).

6.0 Operation & maintenance: - Operation and maintenance of the same for a period of 60 (sixty) 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.

7.0 Training: - This also includes necessary training to employees of the ULB for this water supply scheme.

8.0 Limit of Contract:–

The limit of contract starts from construction of the GLR-2 cum pumping station with 1250 KVA HT substation with installation of the pumping units and it's all other accessories. From the GLR-2 the potable water will be delivered to the existing / proposed different diameter rising main of DI pipe with placing of manually operated butterfly valve with valve chamber outside the Pump House with kinetic temper proof air release valve. The sources of Electric Power (11KV) would be taken from the WBSEDCL supply point to HTVCB panel and feed the outdoor transformer and power distribution board with APFC Panel by required cable size with earthing arrangement. The supply of cables and laying the same

is the bidder scope from substation PDB to LT panel of pumping station. Necessary arrangements to connect the cables of appropriate size with full satisfaction of Engineer in Charge are within the limit of this work. The preparation of cables trenches, laying the cables from WBSEDCL power point to HTVCB panel, HTVCB to HT side of outdoor transformer and LT side of transformer to LT PDB, LT PDB panel to APFC panel and LTPDB to MCC panel 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 Bid inviting authority. The all dedicated pipe lines are to be connected to the OHR's pipes up to 5 m from periphery of the boundary wall. The all materials including civil & E/M and constructionare in the bidder's scope from 5 m ahead of periphery of boundary wall to 5 m beyond periphery of boundary wall.

Secretary

Asansol Municipal Corporation

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 pr 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.

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Secretary
Asansol Municipal Corporation

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 wholeproject as it is turnkey job"

(b) Authority means the “The Secretary, Asansol Municipal Corporation” 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 Asansol Municipal Area means the area described as such in Schedule-I of the Act;

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

(k) "Employer" means “The Secretary, Asansol Municipal Corporation”

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

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

(n) "Existing Ground Level (EGL)" means the level of the referred point of the exposed surface of the ground, road or pavement free from extraneous materials and High Flood Level (HFL) or Finished Ground Level (FGL) is the referred top most point of the nearby road shown in site plan.

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

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

(q) "Month" means English calendar month.

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

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

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

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

(v) "Specification" means the specification referred to in the Bid and any modification thereof or addition thereto as may from time to time be furnished or approved in writing by

the “Superintendent Engineer, West Circle Municipal Engineering Directorate,. Further specification laid down in the P.W.D Schedule of Govt. Of West Bengal & all relevant IS codes with latest amendments will be implied after due approval from S.E (WC). In case of any ambiguity or completion of different schedule the decision of S.E (WC), will be final and bindings.

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

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

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

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

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

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

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

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

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

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

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

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

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

2.0. ENGINEER IN CHARGE AND HIS REPRESENTATIVES

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

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

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

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

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

4.0 SUBLETTING

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

5.0 CONTRACT DOCUMENTS

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

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

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

6.0 DRAWINGS

(1) Custody of drawing: All the approved Drawings shall remain in the safe custody of the Executive Engineer, Asansol Division, Municipal Engineering Directorate, but one copy thereof shall be furnished to the Contractor free of charge. The Contactor shall provide and make at his own expenses any further copies required by him. At the

Completion of the Contract, the Contractor shall return to the Executive Engineer, Asansol Division, Municipal Engineering Directorate, Govt. of West Bengal all drawings as provided under the Contract.

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

(3) Disruption of progress: The Contractor shall give written notice to EIC whenever planning or progress of the works is likely to be delayed or disrupted unless any further approval of drawing or order, including a direction instruction or approval is issued by Superintendent Engineer, West Circle Municipal Engineering Directorate, on recommendation of Executive Engineer Asansol Division, Municipal Engineering Directorate within a reasonable time. The notice shall include details of the drawing or order required, and of why and by whom it is required and of any delay or disruption likely to be suffered if it is further delayed.

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

7.0 ADDITIONAL COPIES OF DRAWINGS

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

8.0 GENERAL OBLIGATION

Contractor's General Responsibilities - The Contractor shall, subject to the provision of the Contract, and with due care and diligence, execute and maintain the Works and supply all labour, including the supervision thereof, materials, equipment, Constructional Plant and machinery, tools and all other things whether of a temporary or permanent nature, required for such execution and maintenance, so far as necessary for providing the same

is specified in or is reasonably to be inferred from the Contract. The Contractor shall take full responsibility for the adequacy, stability, safety & security or all Site operations and methods of construction, erection etc. During trialrun and annual maintenance period the contractor has to assured safety and security of the whole plant by providing necessary guard/watchmen at his own cost.

9.0. CONTRACT AGREEMENT

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

10.0. GUARANTEE

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

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

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

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

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

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

meet the guaranteed performance and be up to the specification, in both material and workmanship.

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

10.1 START-UP GURANTEES

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

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

11.0. INSPECTION OF SITE

The EIC shall have made available to the Bidder with the Bid documents such data like its location, distance from fixed point including the layout drawing and location of the primary

grid point, level drawing data the source of filling the reservoir and the Bid shall be deemed to have been based on such data. But the Bidder shall be responsible for his own interpretation thereof. The Bidder may also undertake investigations at his own cost on such levels or any other levels prior to submission of his offer.

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

12.0 SUFFICIENCY OF BID AND ADVERSE PHYSICAL CONDITIONS, ARTIFICIAL OBSTRUCTIONS

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

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

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

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

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

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

14.0. WORK PROGRAM

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

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

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

15.0. CONTRACTOR'S SUPERINTENDENCE

The Contractor shall give or provide all necessary superintendence during the execution of the Works and as long thereafter as the Superintendent Engineer, West Circle Municipal Engineering Directorate, may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract. The Contractor or a competent and authorized agent or representative approved of in writing by the Chairperson, which

approval may at any time be withdrawn, is to be constantly on the Works and shall give his whole time to the Superintendence of the same. If such approval be withdrawn by the Superintendent Engineer, West Circle Municipal Engineering Directorate, the Contractor shall, as soon as is practicable, having regard to the requirement of replacing him as hereinafter mentioned after receiving written notice of such withdraw, remove the agent from the works and shall not thereafter employ him again on the Works in any capacity and shall replace him by another agent approved by the Superintendent Engineer, West Circle Municipal Engineering Directorate,. Such authorized agent or representative shall receive, on behalf of the Contractor, direction and instruction from the Superintendent Engineer, West Circle Municipal Engineering Directorate, or, subject to the limitations of Clause 2 hereof the Engineer's Representative.

The agent or representative of the Contractor must be able to speak and communicate in English/Bengali. In the absence of the Contractor's designated agent or representative for a particular operation on any site of the works the Contractor's supervisory staff or sub-agent or leading hands shall be instructed to receive and carry out any instruction or direction issued or given by the Superintendent Engineer, West Circle Municipal Engineering Directorate, or the EIC.

16.0. EMPLOYEES

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

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

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

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

(2) The Engineer shall be at liberty to object to and require the Contractor to remove forthwith from the Work any person employed by the Contractor in or about the execution

or maintenance of the Works who, in the opinion of the Executive Engineer, Asansol Division, misconducts himself, or is incompetent or negligent in the proper performance of his duties, or whose employment is otherwise considered by the Executive Engineer to be undesirable and such person shall not be again employed upon the Works without the written permission of the Executive Engineer. Any person so removed from the Works shall be replaced as soon as possible by a competent substitute approved by the Executive Engineer.

17.0. SETTING-OUT

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

18.0. WATCHING AND LIGHTING

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

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

19.0. WORKS & RISKS

(1) Care of Works: From the commencement of the Works until the date stated in the Certificate of Completion for the whole of the Works, pursuant to Clause 47 hereof, the Contractor shall take full responsibility for the care thereof. Provided that if the EIC shall

issue a Certificate of Completion in respect of any part of the Permanent Works, the Contractor shall cease to be liable for the care of that part of the Permanent Works (O&M not counted) from the date stated in the Certificate of Completion in respect of that part and the responsibility for the care of that part shall pass to the EIC provided further that the Contractor shall take full responsibility for the care of any outstanding work which he shall have undertaken to finish during the period to Maintenance until such outstanding work is completed.

In case any damage, loss or injury shall happen to the Works, or to any part thereof, from any cause whatsoever, save and except the expected risks as defined in sub-clause (2) of this Clause, while the Contractor shall be responsible for the care thereof the Contractor shall, at his Own cost, repair and make good the same, so that at completion the permanent Works shall be in good order and condition and in conformity in every respect with the requirements of the Contract and the EIC instructions.

In the event of any such damage, loss or injury happening from any of the excepted risks, the Contractor shall, if and to the extent required by the EIC and subject always to the provisions of Clause 62 hereof, repair and make good the same as aforesaid at the cost of the Employer. The Contractor shall also be liable for any damage to the Works occasioned by him in the Course of any operations carried out by him for the purpose of completing any outstanding works or complying with his obligations under Clause 48 or 49 hereof.

(2) Expected Risks: The 'expected risks" are war, hostilities, invasion, act of foreign enemies, rebellion, revolution insurrection or military or usurped power, civil war or unless solely restricted to employees of the contractor or of his sub- contractors and arising from the conduct of his workers, riot commotion or use or occupation by the EIC of any part of the permanent works, or a cause solely due to the Engineer's design of the Works, or ionizing radiations or contamination by radio-activity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive, nuclear assembly or nuclear component thereof, pressure waves cause by aircraft or other aerial devices travelling at sonic or supersonic speeds, or any such operation of the force of nature as an experienced contractor could not foresee, or reasonably make provision for or insure against all of which are herein collectively recurred to as "the expected risks."

20.0. INSURANCE OF WORKS, ETC.

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

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

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

21.0. DAMAGES

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

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

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

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

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

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

22.0. INSURANCE

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

(2) Minimum Amount of third party insurance: Such insurance shall be affected with an insurer and in terms approved by the EIC, which approval shall not be unreasonably withheld, and for a least the amount started in the Appendix to the Bid. The Contractor shall, whenever required, produce to the EIC or the Engineer's Representative the policy or policies or insurance and the receipts for payment of the current premium. However, the Bidder should insure for an amount commensurate with the risk involved subject to the minimum amount prescribed elsewhere in the Bid.

(3) Provision to indemnify Employer: The terms shall include a provision whereby, in the event of any claim in respect of which the Contractor would be entitled to receive lt identify under the policy being brought or made against the Secretary, Asansol Municipal

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

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

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

26.0. FOSSILS, TREASURE TROVE ETC.

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

27.0. PATENT RIGHTS AND ROYALTIES

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

28.0. INTERFERENCE WITH TRAFFIC AND ADJOINING PROPERTIES

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

29.0. TRAFFIC

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

(2) Special Loads: Should it be found necessary for the Contractor to move one or more loads of Constructional plant, machinery or pre-constructed units or parts of units of work over part of a highway, railway or bridge, the moving whereof is likely to damage any highway, railway or bridge unless special protection or strengthening is carried out, then the Contractor shall before moving the load on to such highway, railway or bridge give

notice to the EIC or Engineer's Representative or the local authority of the weight and other particulars of' the load to be moved and his proposals for protecting or strengthening the said highway, railway or bridge. The Contractor at his own cost and expenses shall carry out such proposals, including any modifications thereto that the Engineer or the local authority may require.

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

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

30.0. RESTRICTION

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

(b) Opportunities for other contractors: The Contractor shall in accordance with the requirements of the EIC, afford all reasonable opportunities for carrying out their work to any other contractors employed by the Employer and their workmen and to the workmen of the employer and of any other duly constituted authorities who may be employed in the execution on or near the Site of any work not included in the Contract or of any contract which the Employer may enter into in connection with or ancillary to the Works. If,

however, the Contractor shall, on the written request of the EIC or the Engineer's Representative, make available to any such other contractor, or to the Employer or any such authority, any roads or ways for the maintenance of which the Contractor is responsible, or permit the use by any such of the Contractor's scaffolding or other plant on the Site, or provide any other service of whatsoever nature, the Employer shall pay to the Contractor in respect of such use or service such sum or sums if at all as shall, in the opinion of the Engineer, be reasonable.

31.0. CONTRACTOR TO KEEP SITE CLEAR

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

32.0. CLEARANCE OF SITE ON COMPLETION

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

33.0. LABOUR

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

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

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

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

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

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

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

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

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

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

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

(d) Other existing National or State Statute, Ordinance or other Law or any Regulation or Bye-law of any local or other duly constituted authority which may be

applicable, including any such Law, Regulation or Order that may be passed or ordered from time to time and come into force during the tenure of the Contract.

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

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

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

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

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

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

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

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

34.0. RETURNS OF LABOUR ETC.

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

35.0. MATERIALS AND WORKMANSHIP

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

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

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

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

a) Not so intended by or provided for, or

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

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

36.0. INSPECTION OF OPERATIONS

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

37.0. EXAMINATION

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

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

38.0. REMOVAL

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

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

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

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

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

39.0. SUSPENSION

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

a) Otherwise provided for in the Contract, or

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

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

d) Necessary for the proper execution of the work or for the safety of workmen or Works of any part thereof in so far as such necessity does not arise from any act or default by the Engineer or the Employer or from any of the expected risks defined in

Clause 19 hereof provided that the Contractor shall not be entitled to recover any such extra cost unless he gives written notice of his intention to claim to the Employer within twenty-eight days of the Engineer's order. The EIC shall settle and determine such extra payment and/or extension of time under Clause 43 hereof to be made to the Contractor in respect of such claim as shall in the opinion of the Employer be fair and reasonable.

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

40.0. COMMENCEMENT TIME AND DELAYS

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

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

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

3.0 Any other reasonable data that may be asked for.

41.0. POSSESSION

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

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

42.0. TIME

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

(2) Failure in keeping to stages of work Programmed: If the Contractor does not keep to the approved program and continues at any stage to fail behind his schedule by

as much as twenty percent (20%) of the said approved work programmed, within thirty (30) days from receipt by him of a written notice from the Engineer, or if in the opinion of the Engineer the delay will substantially affect operation activities or execution of a major work item and it is ascertained by the Engineer that the Contractor cannot remedy the occasion within the stipulated time, the Superintending Engineer, West Circle, M.E.Dte on recommendation of Engineer shall have full authority to undertake measures to recover from such adverse condition in terms of the provisions of Clause 62 thereof.

43.0. EXTENSION OF TIME FOR COMPLETION

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

44.0. NO NIGHT OR SUNDAY WORK

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

45.0. RATE OF PROGRESS AND NIGHT WORK WHEN PERMITTED

If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Works or any section is at any time, in the opinion of the Engineer, too

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

46.0. DAMAGES FOR DELAY

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

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

(3) Extent of Liquidated Damages: The liquidated damages referred to in sub-clause (1) for delay of each day or part thereof, shall be at the rate of one percent (l %) or such smaller amount as the Employer may decide, or the total value of the Contract Price

excluding the value of such part or section of the works as may have been covered by certificate of completion in terms of the provisions of sub-clause (2) above, Provided however that in no case shall be total amount of liquidated damages exceed ten percent (10%) of the total Contract Price for whole Works.

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

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

47.0. CERTIFICATION OF COMPLETION OF WORK

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

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

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

48. MAINTENANCE

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

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

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

49.0. CONTRACTOR TO SEARCH

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

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

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

and of all obligations in regard to such works specified or implied in the Contract, until the removal of such works.

53.0. APPROVAL OF MATERIAL, ETC. NOT IMPLIED

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

54.0. MEASUREMENT

For measurement, the metric system should be used.

55.0. WORKS TO BE MEASURED

The engineer shall, except as otherwise stated, ascertain and determine by measurement the value in terms of the Contract of work done in accordance with the Contract. He shall, when he requires any part or parts of the works to be measured, give notice to the Contractor's authorized agent or representative, who shall forthwith attend or send a qualified agent to assist the Engineer or the Engineer's Representative in making such measurement, and shall furnish all particulars required by either of them should the Contractor not attend, or neglect or omit to send his agent on two consecutive occasions, then in the third occasion the measurement shall be made unilaterally by the Engineer, which shall be taken to be the correct measurement of the work.

For the purpose of measurement such permanent work as is to be measured by records and drawings at suitable intervals of such work and the Contractor, as and when called upon to do so in writing shall, within fourteen days, attend to examine and agree upon such records and drawings, with the Engineer or Engineer's Representative and shall sign the same when so agreed.

If the Contractor does not so attend to examine and agree upon such records and drawings on two consecutive occasions they shall be taken to be correct. If, after examination of such records and drawings, the Contractor does not agree with the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor shall, within fourteen days of such examination, lodge with the for decision by the Engineer, a notice in writing giving details of the respects in which such records and drawings are claimed by him to be incorrect together with reasons thereof.

56.0. METHOD OF MEASUREMENT

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

57.0. PAYMENT TERM

TERMS OF PAYMENT : ITEM WISE BREAK UP			
1	**Planning, Design, Construction of 3.62 ML capacity GLR with pumping station and all other allied works including Plastering, Painting, Roof Treatment, inlet pipes,delivery pipes & support, valves support, pump foundation, common delivery line support as per tentative drawing attached with bid document complete in all respect as per approved drawing and direction of EIC.**		
	Break up :		
A	All structural work upto EGL	40%	
B	All structural work upto Roof Level of CWR	20%	
C	All structural work upto Roof Level of Pump house	20%	
D	All work including finishing Complete in all respect	10%	
E	After successful trial run of the plant.	10%	
	Total =	100%	
2	**Planning, Design & Construction of Operator room, Toilet arrangement, Sanitation and plumbing Works at Pump House level with all other allied works such as Plastering, Flooring, Roof Treatment, Fixing Of Doors & Windows, Septic tank & Soak Pit, 3000 liter water tank above pump house roof complete in all respect as per approved drawing and direction of E.I.C.**		
	Break up :		
A	Construction Structural work complete in all respect	50%	
B	All finishing work completion in all respect.	40%	
C	After successful trial run of the plant.	10%	
	Total =	100%	
3	**Planning, Design & Construction of HT Substation building (RCC Framed) for 1250 KVA load along with brick work, Plastering, Painting, Roof treatment, flooring, door & windows, ramp complete in all respect as per tentative drawing in Annexure and Approved design as per direction of E.I.C.**		
	Break up :		

A	Construction of all Structural work complete in all respect	50%	
B	All finishing work completion in all respect.	40%	
C	After successful trial run of the plant.	10%	
	Total =	100%	
4	**Planning, Design, Construction 2.0 m High (From FGL) boundary wall with RCC Column frame structureand and over it 2.0 m boundary wallalong with barbed fencing complete in all respect as per approved drawing and direction of E.I.C.**		
	Break up :		
A	All work up to EGL	50%	
B	All works complete in all respect with barbed fencing.	20%	
C	All finishing work including plastering , painting etc.	20%	
D	After successful trial run of the plant.	10%	
	Total =	100%	
5	**Filling & Land development of Whole Premises up to HFL with ramming, compacting, leveling, and finishing along with good architectural steel gate(5.0 m) with anti-corrosive painting, as per approved drawing and direction of E.I.C.**		
	Break up :		
A	Filling & Land development of Whole Premises with proper compaction and compaction.	50%	
B	After installation of steel gate with all finishing work	40%	
C	After successful trial run of the plant.	10%	
	Total =	100%	
6	**Planning, Design, Construction of Internal RCC road (4.0 m wide) with Min. 60 mm thick designer paver block, Surface drain all around premises for storm water and overflow, as per approved design, drawing and direction of E.I.C.**		
	Break up :		
A	Construction of RCC Road complete in all respect.	40%	
B	Laying paver blocks with specification.	30%	
C	Surface drain	20%	
D	After successful trial run of the plant.	10%	
	Total =	100%	

7	**Supply, delivery and installation of Electromechanical equipment's for Sl No. 1 & 2 of Clause 4.ii.t of Section A of Bid Document complete in all respect as per approved drawing and direction of EIC.**		
	Break up :		
A	Supply of all Electro-Mechanical equipment's required to complete the item.	60%	
B	Installation of Electro-mechanical equipment and any other work required to complete the item in all respect.	30%	
C	Testing, Commissioning and after successful trial run of the plant.	10%	
	Total =	100%	
8	**Supply, delivery and installation of Electromechanical equipments for Sl No. 3,4,5,6,7,8 & 9 of Clause 4.ii.t of Section A of Bid Document complete in all respect as per approved drawing and direction of EIC.**		
	Break up :		
A	Supply of all Electro-Mechanical equipments required to complete the item.	60%	
B	Installation of Electro-mechanical equipment and any other work required to complete the item in all respect.	30%	
C	Testing, Commissioning and after successful trial run of the plant.	10%	
	Total =	100%	
9	**Supply, delivery and installation of Electromechanical equipments for Sl No. 10 of Clause 4.ii.t of Section A of Bid Document complete in all respect as per approved drawing and direction of EIC.**		
	Break up :		
A	Supply of all Electro-Mechanical equipments required to complete the item.	60%	
B	Installation of Electro-mechanical equipment and any other work required to complete the item in all respect.	30%	
C	Testing, Commissioning and after successful trial run of the plant.	10%	
	Total =	100%	

10	**Supply, delivery and installation of Electromechanical equipments for Sl No. 11, 12, 13& 14 of Clause 4.ii.t of Section A of Bid Document complete in all respect as per approved drawing and direction of EIC.**		
	Break up :		
A	Supply of all Electro-Mechanical equipments required to complete the item.	60%	
B	Installation of Electro-mechanical equipment and any other work required to complete the item in all respect.	30%	
C	Testing, Commissioning and after successful trial run of the plant.	10%	
	Total =	100%	
11	**Supply, delivery and installation of Electromechanical equipments for Sl No. 15 of Clause 4.ii.t of Section A of Bid Document complete in all respect as per approved drawing and direction of EIC.**		
	Break up :		
A	Supply of all Electro-Mechanical equipments required to complete the item.	60%	
B	Installation of Electro-mechanical equipment and any other work required to complete the item in all respect.	30%	
C	Testing, Commissioning and after successful trial run of the plant.	10%	
	Total =	100%	
12	**Supply, delivery and installation of Electromechanical equipments for Sl No. 16 of Clause 4.ii.t of Section A of Bid Document complete in all respect as per approved drawing and direction of EIC.**		
	Break up :		
A	Supply of all Electro-Mechanical equipments required to complete the item.	60%	
B	Installation of Electro-mechanical equipment and any other work required to complete the item in all respect.	30%	
C	Testing, Commissioning and after successful trial run of the plant.	10%	
	Total =	100%	

13	**Supply, delivery and installation of Electromechanical equipments for Sl No. 17 &18 of Clause 4.ii.t of Section A of Bid Document complete in all respect as per approved drawing and direction of EIC.**		
	Break up :		
A	Supply of all Electro-Mechanical equipments required to complete the item.	60%	
B	Installation of Electro-mechanical equipment and any other work required to complete the item in all respect.	30%	
C	Testing, Commissioning and after successful trial run of the plant.	10%	
	Total =	100%	
14	**Supply, delivery and installation of Electromechanical equipments for Sl No. 19,20,21,22,23,24,25,26,27,28,29,30,31,32 & 33 of Clause 4.ii.t of Section A of Bid Document complete in all respect as per approved drawing and direction of EIC.**		
	Break up :		
A	Supply of all Electro-Mechanical equipments required to complete the item.	60%	
B	Installation of Electro-mechanical equipment and any other work required to complete the item in all respect.	30%	
C	Testing, Commissioning and after successful trial run of the plant.	10%	
	Total =	100%	
15	**Supply, delivery and installation of Electromechanical equipments for Sl No. 34,35,36,37,38,39 & 40 of Clause 4.ii.t of Section A of Bid Document complete in all respect as per approved drawing and direction of EIC.**		
	Break up :		
A	Supply of all Electro-Mechanical equipments required to complete the item.	60%	
B	Installation of Electro-mechanical equipment and any other work required to complete the item in all respect.	30%	
C	Testing, Commissioning and after successful trial run of the plant.	10%	
	Total =	100%	

16	**Supply, delivery and installation of Electromechanical equipments for Sl No. 41 of Clause 4.ii.t of Section A of Bid Document complete in all respect as per approved drawing and direction of EIC.**		
	Break up :		
A	Supply of all Electro-Mechanical equipments required to complete the item.	60%	
B	Installation of Electro-mechanical equipment and any other work required to complete the item in all respect.	30%	
C	Testing, Commissioning and after successful trial run of the plant.	10%	
	Total =	100%	
17	**Govt. Electrical inspector's fees as complete in all respect and as per Bid document & as per direction of EIC & technical advisor (E/M), M.E.Dte.**		
	Break up :		
	All work complete in all respect.	100%	
	Total =	100%	
18	**Operation and maintenance of the plant for 5 (Five) years. The work includes supplying adequate number of operator personnel and skilled labour 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	Month wise payment for the above work with respect to quoted amount	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 for Sl No. 1 to 18.***		
	b) The 100 % of Security deposit or Retention money for Item 1 to 17 will be returned after completion of successful operation & maintenance period for 12 months without any interest.		

	c) The payment for sl no. 18 will be made on monthly basis after deducting 10 % Security for each month and will be returned without interest after successful completion of the O/M period.
	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 in unable or unwilling at once to do such work or repair, the Employer may employ and pay other persons to carry out such work or repair as the

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

62.0. SPECIAL RISKS

Notwithstanding anything in the Contract contained:

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

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

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

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

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

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

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

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

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

7) Removal of plant of termination: If the Contract shall be terminated under the provisions of the last proceeding sub-clause, the Contractor shall, with all reasonable

dispatch, remove from the Site all constructional Plant and shall give similar facilities to his Sub-Contractors to do so.

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

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

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

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

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

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

63.0. FRUSTRATION

Payment in event of Frustration: A war, or other circumstances outside the control or both parties, arises after the Contract is made so that either party is prevent from fulfilling his contractual obligations, or under the law governing the Contract, the parties are

released from further performance, then the sum payable by the Employer to the Contractor in respect of the work executed shall be the same as would have been payable under Clause 62 hereof if the Contract had been terminated under the provisions of Clause 62 thereof.

64.0. SETTLEMENT OF DISPUTES

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

65. NOTICES

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

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

OFFICE OF THE
ASANSOL MUNICIPAL CORPORATION
P.O. - Asansol, Dist. – Paschim Bardhaman, Pin 713301

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

66. PRICE ADJUSTMENT

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

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

67.0. MISCELLANEOUS

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

68.0. CONTRACT CONFIDENTIAL

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

69.0. CONTRACTOR TO PROVIDE FACILITIES

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

70.0. INTERFERENCE WITH EXISTING FACILITIES

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

71.0. ACTS OF INFLUENCE

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

72.0. INDIVIDUALS NOT PERSONALLY RESPONSIBLE

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

73.0. CONTRACT EMBODIES WHOLE ARRANGEMENT

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

74.0. COMPLETION DRAWING

Completion drawing including detailed construction drawing shall have to be submitted in original with 6 (six) copies of prints of each. The original drawings shall be drawn on thick polyester film approved by the Engineer-in-Charge. Scale and size of drawings shall also be as specified by the Engineer-in-Charge. Soft copy of drawing copied in CD/DVD should

be submitted in addition. No extra payment will be made for it. The Completion drawings are to be got approved by the Employer and shall have to be submitted before the issue of certificate of final acceptance as in Clause C-57 (6).

75.0. BIDDER SHALL VISIT THE SITE

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

76.0 GOVERNMENT AND LOCAL RULES / LAW OF STATE

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

77.0 STORE SHED

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

in suggested by the Superintending Engineer of West Circle of Municipal Engineering Directorate recommendation for better storing of materials that shall have to be carried out by the Contractor at his own cost.

78.0 LAND FOR CONTRACTOR'S ESTABLISHMENT

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

79.0 WATER AND ELECTRICITY FOR CONSTRUCTION

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

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

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

80.0 FIRST-AID FACILITIES

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

81.0 FIRE FIGHTING ARRANGEMENT / FIRE EXTINGUISHING ARRANGEMENT

The Contractor shall provide suitable arrangement for 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 shall be provided at suitable prominent and easily accessible places and shall be properly maintained.

82.0 SAFETY MEASURES

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

83.0 SUPERVISORY STAFF

The Contractor shall engage an experienced and qualified Site Manager to be in day-to-day charge of the work and he should be authorized to receive instructions from the Engineer. He shall receive orders given by the Engineer from time to time and shall act on them promptly. The Contractor shall, during working hours, maintain engineer and

supervisors of sufficient training and experience to supervise the various items and operations of the work. Orders and directions as given to such engineers and supervisors or other staff of the Contractor shall be deemed to have been given to the Contractor. The Engineer of the Contractor responsible for this work, by whatever designation he may be known, but who will be specified on award of the Contract shall at least once in a fortnight inspect the works and shall discuss with the Engineer the conduct and progress of the work.

84.0 JOINT SURVEY

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

85.0 LAYOUT AND CHECKING

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

85. REFERENCE POINTS

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

86.0 CO-OPERATION WITH OTHER CONTRACTORS

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

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

87.0 APPROVAL OF MATERIALS AND EQUIPMENT TO BE USED

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

88.0 CONSTRUCTION RECORDS

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

89.0 PROGRESS PHOTOGRAPHS

The Contractor shall at his own cost and expense arrange to take periodic photographs to show the progress of work or interesting features thereof. The time and the position where from a photograph is to be taken should be as per direction of the Engineer or his Representative, Three copies of each of these photographs to an enlarged size of about 25 cm x 20 cm together with the CD/DVD, shall be supplied to the Superintending Engineer of WestCircle 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 West Circle of Municipal Engineering Directorate. Each sub-work will be considered as complete when it is completed as per specifications and put into commission, as per standards, as a successful component part of the whole plant.

91.0 CHECKING QUALITY OF WORK

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

92.0 RECORDING MEASUREMENTS

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

93.0 SITE ORDER BOOKS

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

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

94.0 TECHNICAL ASSISTANCE

Training of Technical Personnel:-The Contractor shall undertake to train three technical personnel selected and sent by the ULB to the works of the Contractor. These engineers shall be given special training in the shop and drawing office where the equipment will be designed and manufactured and where possible in any other plant where Contractor's manufactured equipment of similar type is under installation tests or maintenance, to

enable them to become fully familiar with the equipment being supplied by the Contractor. The period of training shall be as decided by the ULB but in any case shall not exceed six months for any individual. During the period of training the Contractor shall arrange for reasonable accommodation of the engineers and transport from the place of accommodation to the works or plant. The Contractor's supervisory personnel at site shall continuously and intensively instruct and train an adequate number of the ULB authority operating and maintenance personnel at site during erection and commissioning of the plant to enable them to take over the operation and maintenance of the plant after the maintenance period.No extra payment shall be made by ULB for the training of personnel under this clause.

Secretary

Asansol Municipal Corporation

SECTION – D

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, shall, if so directed by him, 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 EIC 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, labours, 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 specifications contained herein are not exhaustive and for such items of works which may arise and which are not covered by these specifications, the provisions in the relevant Indian Standard (Latest Edition) shall apply.

1.13.2 A list of some Indian Standards is given herein.

1.13.13 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 for Differed steel bar & wires for concrete reinforcement.
IS: 1077	Common Burnt Clay Buildll1g 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: 1893	Workability of Concrete

2.0 EARTH WORK IN EXCAVATION & FILLINGS

2.1 General

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

2.2 Excavation for Foundation, Trenches, Pit etc.

The excavation work shall be carried out in all kinds of Soil including Sand in workman link manner without endangering the safety of the nearby Structures or works without causing any hindrance to other activities in the area. The existence of old buildings, boundary walls, hutment, sewer lines, water lines, if any very close to the area of excavation should be given careful consideration while designing carrying out the excavation work. The excavation shall be done in such method as would technically be appropriate and befitting the site conditions subject to the approval of the Engineer-in-Charge. All foundation trenches shall be excavated to the full width and depths shown on the approved drawing or to such ordered to the Contractor. The Contractor shall not undertake any earthwork without having obtained prior approval from the Engineer-in-Charge to the methods he proposes to employ in order to execute the work in the most efficient manner. He shall not modify such methods without the approval of the Engineer-in-Charge. This approval, however, shall not in any way make the Engineer-in-Charge responsible for any consequent loss or damage.

2.2.1 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.

2.2.2 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.

2.2.3 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.

2.2.4 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.

2.2.5 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.

2.2.6 For the work of excavation the Tenderer shall include in his quotation the shoring, sheeting, bracing and sheet pilling (if required). The quotation shall also include the

cost of compaction of foundation sub-base, removal and storage of excavated materials and back filling.

2.3 Shoring

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

2.4 Back Filling

The space around the foundations in trenches or sites shall be cleared of all trash and loose debris and filled with approved excavated earth, all clods being broken up to the finished G.I. Filling shall be done in 200mm layers, each layer to be property moistened and well 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. **Cement will be off Lafarge Concreto/Ambuja Plus/Ultra Tech premium/ACC F2R make**

3.3 AGGREGATES

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

3.3.1 Coarse Aggregates

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

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

Reinforced Concrete	:	20 mm
Plain Concrete	:	20 mm
Thin R. C. C. Members		
With very narrow space	:	12 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. Reinforced will be SAIL/TATA/RINL make.

3.4.2 The High Yield strength deformed bar (HYSD) shall conform to IS: 1786-1990.

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.

3.4.5 The brand of steel used for the work will selected & approve by the E.I.C in writing before execution of work.

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: 10262. It should be sampled and analysed as per IS: 1199. The concrete should stand the test specified in IS: 516.

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

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

i) For M 15 concrete - 3.75 cm.

ii) For M 20 concrete - 2.50 cm.

iii) For M 25 concrete – 2.00 cm

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

The Concrete shall be thoroughly and shall be efficiently vibrated during laying. The use of mechanical vibrators shall comply with IS: 2608, IS: 2506 and IS: 456. 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.D., 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 Labours, 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 and shall not be less than Grade of M25 for works other than water retaining structure & for water retaining structure (RCC) Grade will be M25 and higher as per IS 3370.

The mix shall be designed to produce the grade of concrete having required workability and a Characteristic Strength not less than appropriate values given in IS: 456 - 2000. For mix design, procedure given in Indian Standard recommendation i.e., IS: 10262 with latest amendments 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. Proper admixtures of reputed brand should be used to maintain workability and in making concrete for water retaining structures with prior approval of E.I.C.

The mix design by the Contractor shall be used for works only after obtaining approval of mix design and written order thereafter 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 equipments 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, centring, shuttering & formwork 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 failing earth during and after placing. Concrete placed in ground containing deleterious substance shall be kept free from contact with such ground or, with water draining from such ground during placing of concrete and for a period of at least 3 (three) days or as otherwise directed by the Engineer-in-Charge, the ground water around newly poured concrete shall be kept to an approved level by pumping or other approved means of drainage at the cost of the Contractor. Adequate steps shall be taken to prevent flotation or flooding. Steps, as approved by the Engineer-in-Charge, shall be taken to project immature concrete from damage by debris, excessive loading, vibration, abrasion, mixing with earth or other deleterious materials, etc. that may impair the strength and durability of the concrete.

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

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

3.11 CONCRETE FINISH

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

3.12 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. Any important operation such as concreting or stripping of form work adequate notice shall be given in advance.

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.

4.0 BRICK WORK

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

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

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

5.0 PLASTERING, PAINTING AND SURFACE TREATMENT

5.1 Cement Plaster

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

5.1.2 The rate shall also include for forming of any moulding drip course etc., and for extra thickness due to corbelling of brick work in parapet or at any other place. All internal

angles shall be rounded off as per drawing or as directed by the Engineer-in-Charge without any extra charges- if required.

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

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

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

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

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

6.0 SURFACE FINISHING

6.1 General

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

6.2 White Washing

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

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

6.3 Weather Guard / Weather Shield / Weather Coat with Primer

6.3.1 Where specified, external surface shall be finished with two coats of 'Weather Guard / Weather Shield / Weather Coat with Primer' of approved colour, shade and manufacture. The surface shall have to be finished it to 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 'Weather Guard / Weather Shield / Weather Coat with Primer' or equivalent to be mixed will be strictly as per manufacturer's specification. The mixed 'Weather Guard / Weather Shield / Weather Coat with Primer' or equivalent shall have to be applied to the surface with a brush of a good quality. The first coat should be well brushed into the surface to form a good bond. Second coat should be applied carefully to give a good finished appearance may be applied by brushing or spraying. Each 'Weather Guard / Weather Shield / Weather Coat with Primer' or equivalent application shall be wetted at the end of the day with a fine water spray. Necessary primer has to be applied before coating of Weather Guard / Weather Shield / Weather Coat with primer.

6.4 Painting to Steel Works

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

6.4.2 Ready mixed synthetic enamel paint of 'Jenson & Nicholson' 'British Paints', 'Shalimar Paints or similar other approved make and approved colour and shade shall only be used. The primer shall be red oxide zinc chromate primer (1S: 2074) or any other anticorrosive primer as approved and directed by the Engineer-in-Charge. The Contractor shall furnish the details of paints to the Engineer-in-Charge for approval of paints before commencement of painting work.

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

7.0 DAMP PROORING WORK

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

8.0 ROOF WATER PROOFING TREATMENT

8.1 Both flat and curved roofs, whether accessible or inaccessible, shall provide with polyurethane based water proofing paint. 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 West 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

The 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 M25 grade concrete with 10mm. to 6mm. stone ships laid in rectangular panel with diagonal length not exceeding 3.00M and finished smooth with neat comment punning 1.5mm thick. After finishing, the surface shall be left undisturbed for two hours and then with wet bags and after 24 hours cured by flooding with water and kept wet for at least 7 (seven) days. Required Camber or Slope should be provided in floor draining wash water, if necessary.

9.2 Cast-in-Situ Mosaic in floor shall be 25mm.thick (finished) laid in panels as directed with necessary underlay of cement concrete (1:2:4) with stone chips with 12mm. thick terrazzo topping finished to 9 mm. after final grinding with 0 to 10 mm. size Mosaic chips highly polished etc. - complete as per specification of IS; 2114-1962. Cast-in-situ Mosaic in Skirting and Dado shall be 12mm. thick. The Mosaic work shall be of approved colour 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 M25 grade concrete and allowed to dry. Then the second layer of 25mm.thick flooring of M25 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 centre to centre or as directed by the Engineer-in-Charge. All pipes encased in walls, columns or under floors must be heavy cast iron with lead caulked joints. For exposed lengths of pipes, these are to be neatly secured clear from the finished wall face with nails and bobbing in the case of cast iron pipes, nails or screwed to hard wood tapping pugs embedded in wall.

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

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

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

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

10.2 Metal Casement

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

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

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

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

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

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

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

10.2.8 Glazing for windows and ventilators shall weight not less than 8.0 Kg./ sq. m for doors, 6mm. thick wire net reinforced glazing shall be used as approved by the Engineer-in-Charge. The glasses shall be cut to size accurately to suit all openings to glaze with slight margin of about 1.50 mm 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 Where specified, mosquito fly proof brass wire screen of approved gauge and mesh shall have to be used in combination with windows. The screen shall be fixed to the inside of the frames and the windows to be opened outside and be fitted with 'Follow 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 rum M.S. Flats and the other clean openings not exceeding 100 mm.

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

10.3 Steel Gate

The M.S gates (6.0X3.0 m), architecturally designed will be obtained from manufacturer as approved by the Engineer-in-Charge. These shall include M.S gate of jail type as per approved design made of strong M.S form work, intermediate stiffeners, and round / square bars or angles of M.S Sheet(not less than 14 gauge), gusset cleat, etc. including necessary reverting, bolting, welding, locking & hanging, arrangement, fitting, fixing etc. complete in all respect as per direction of E.I.C. The both the shutters will have rolling arrangement with a single open able gate in one shutter. The gates shall be fixed in position, de-rusted, discalced and painted with 2 coats of approved ready mixed paint over a coat of approved anticorrosive primer.

10.4 Rolling Shutter

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

11.0 CABLE TRENCHES

11.1 The cable trenches should normally be of dimension 760mm x 460 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 th) are to be provided on the wall side of the cable trench 600 mm apart all along with cable tray.

11.2 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.

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

12.0 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.

13.0 CHEQUERED PLATES ETC.

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

14.0 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.

15.0 IMPORTANT GUIDELINES AND SPECIFICATIONS

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

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

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

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

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

15.5 Roofs shall be provided with polyurethane paint.

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

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

16.0 SPECIAL NOTES

16.1 The layout of the plant as shown on the drawing attached is not binding on the Bidder but is only indicative.

16.2 The Bidder shall not quote for works differing from the specifications of the Bid unless specifically permitted elsewhere in the Bid documents.

16.3 The suitability of the plant will not be decided only by the low capital cost but the economy in the operational & maintenance costs will also be considered. For this purpose all relevant details should be furnished.

16.4 There shall not be any ambiguity in the offer. Bid containing any ambiguity may be interpreted in a manner advantageous to the Employer.

17.0 ITEMS OF WORKS

The items of works have already been detailed in these documents. However, it is repeated below:

a. Retaining cum boundary wall & Illumination of the Substation path way - the scope is to be finalized after given view consideration of the actual site condition and soil report.

b. 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 in all respect are to be provided by the Bidder.

18.0 Levelling of the site

After completion of the work, the entire site all-round the intake jetty pumping station and other allied 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 High Flood Level with boundary or retaining wall as required and as per instruction of E.I.C.

19.0 Procurement of Equipment etc.

Whenever is 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.

Secretary

Asansol Municipal Corporation

SECTION – E

DETAILED TECHNICAL SPECIFICATIONS FOR CIVIL WORKS

1.0 SPECIAL NOTES

1.1 The layout of the GLR cum pumping station with substation 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 There shall not be any ambiguity in the offer. Bid containing any ambiguity may be interpreted in a manner advantageous to the Employer.

2.0 ITEMS OF WORKS

The items of works have already been detailed in these documents. However, it is repeated below:

a. The GLR cum pumping station (civil & electro-mechanical part).
b. The HT substation building at the suitable side of the GLR
c. 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 free of cost.
d. Retaining cum boundary wall & Illumination of the substation area will be the Bidder scope.
e. 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 pumping station with HT substation in all respect are to be provided by the Bidder.

3.0 DESIGN SUBMITTED BY THE BIDDER

3.1 Ground Level Clear Water Reservoir

The general arrangement of the intermediate underground level reservoir is shown in Bid Drawing. The Top of the water level GLR must be at least 1 M above the HFL. The portable water will flow into the reservoir from the infiltration gallery pumping station. The Reservoir shall have overflow arrangement with suitable nos. Over flow pipes not less than 250 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 1:1.5:3 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.

There shall be opening of size 300 mm diameter CI pipes on the roof of the reservoir for berating action and for accessinginside 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 300 mm. below the bottom of beams.

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 he 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.

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 isnot allowed to have any shutter mark and be rendered smooth by rubbing with carborandum stone. The inside water faces of the GLR shall be floored/plastered with neat cement with necessary water proofing compound provided to make the GLR 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.

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.

One mechanical level indicator shall be provided on the chamber of GLR 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.

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.

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.

3.2 Wet Pit pumping station

The wet pit Pump House shall have to be constructed on the GLR at Asansol Municipal area. The total land earmarked for construction of 2.63 million litter pumping capacity reservoir with substation. The wet pit pump house shall be constructed on the underground reservoir. The pump house will house 12 (Twelve) Nos. vertical pump motor units with four working and two as standby will be vertical execution type with one no. common manifold for the pumping unit of each root. The delivery of pumping unit shall have to be placed with delivery valves i.e. Butter-fly valves electrical actuator control, NRV and enlarger reducer etc. inside of the pumping station. For each root one delivery line passes through the wall/ bellow the ground level of the pumping station up to the existing delivery main after placing one no. temper proof air release valve with butter-fly valve and valve chamber for each root and facility of the interconnection of rising main. The

cable tray shall be made 500 mm deep X 460 mm width on the motor floor level for laying the cables. The motor control unit shall have to be placed on the motor floor from which rotating units readily visible. One maintenance bay shall have to be constructed on the G.L. of adequate size. 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 10 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 16 MT. 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 base slab of the GLR with pumping station shall be designed to withstand full downward load taking no relief from sub-soil water pressure and uplift pressure during construction (without any pressure relief valves) and afterward due to subsoil water. The subsoil water level shall be taken at G.L. while designing the structure. The base slab and side wall of the GLR shall be designed as water retaining structure and shall be concrete of grade not less than M-30 to a minimum cement of 400 Kg /Cu. m. A 75 mm thick blinding layer of mix not leaner than 1:1.5:3 shall be provided. Special water proofing treatment shall be applied to this structural member as specified in technical details.

The building shall be structurally designed. No foundation will rest on filled up mass of soil. The unloading bay shall be provided with ramps of suitable size and slope as approved by E.I.C.

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. 16 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 M30 (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 nm 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.

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 30-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 litters 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 bituminous road on W. B. Macadam surface, a 2 m wide apron of 75 mm thick 1:2:4 P.C.C on double brick flat soling around the IGLR and 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 m 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.

The civil construction of the pumping station & HT substation will be in such a fashion that one can move directly from the pumping station to HT substation.

3.3 HT Substation building

The HT substation building size (Overall length – 27.50 M breadth-5.5 M & Clear height – 4.5 M) shall have to be erected at the suitable side of the GLR or pumping station. The plinth of the HT substation will be minimum 0.6 M from the HFL. 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. 8 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 (5.00 M X 5.00 M), 11 KV H.T. Switchgear Room (8.00 M X 5.00 M), 2 (two) Nos. 750 KVA Indoor / outdoor Transformer room (5.00 M X 5.00 M), L.T. PDB with APFC

panel room (8.00 M X 5.00 M). The total area required for the sub-station shall be as per design requirement in accordance to electricity rules. The outdoor transformer shall have to be placed on the civil foundation as per manufacturers guide line.

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.

3.4 RC Framed Boundary wall, surface drain and inter plant roads:-

The boundary wall cum retaining wall 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. If the above boundary wall is of brick work combined RC & Brick structure is to be constructed. Boundary wall along with storm water surface drain (on the catchment basis) is to be designed properly and is to be located in lay out plan. The inter plant roads shall have to be constructed 4m wide for easy movement of the heavy loaded trucks.

4.0 Tool Box and Tools

Bidders shall supply two toolbox (overall dimensions 1200 mm x 900 mm x 750 mm) made of best quality wood/NUWUD and polished or painted as per direction of the Engineer. The box shall be compartmentalized suitable to hold different types of tools separately. The edges of the box shall be protected by aluminium angles and 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.

5.0 Levelling of the site

After completion of the work, the entire site all-round the plant and other allied 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 High Flood Level with boundary or retaining wall as required and as per instruction of E.I.C.

6.0 Procurement of Equipment etc.

Whenever is 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.

Secretary

Asansol Municipal Corporation

SECTION – F

TECHNICAL SPECIFICATIONS ELECTROMECHNICAL WORKS

1.0 Mechanical

1.0 VERTICAL TURBINE (VT) PUMP

The GLR with wet pit pumping station is to bedesigned for installation of twelve (12) pumps normally six (6) pumps will be working while the remaining pump will serve as standby. Delivery of all pumps of pumping station is to be fed to a common delivery manifold of each root. The capacity of the pumping units 70, 65, 60 & 70 LPS and 50, 49, 60 & 45 M (Tentative) Head shall have to be installed in the pumping station.

2.0 DESIGN

The design, manufacturing, performance of the vertical execution pumps as specified hereinafter shall comply with the requirements of applicable codes, the latest applicable Indian/ British/ American/ DIN standards, in particular and in that order of application, the following IS15 Vertical turbine for raw, cold water

2.1. The materials of the various components shall be as per data sheet or equivalent material conforming to applicable IS/ BS/ ASTM/ DIN Standards in that order of application.

2.2. In case of any contradiction between the aforesaid standards and the stipulations as per the technical specification as specified hereinafter, the stipulations of the technical specification shall prevail.

2.3. In case of contradiction between this specification and the pump data specification sheets enclosed, stipulations of the data specification sheets shall prevail.

3.0. PERFORMANCE REQUIREMENTS

3.1. The pump shall be designed to have best efficiency at the specified duty point. The Pump set shall be suitable for continuous operation at any point within the 'Range of Operation', so as to match with the system resistance curve.

3.2. Pumps shall have continuously rising head capacity characteristics from the specified duty point towards shut off point, the maximum being at shut off.

3.3. Pumps of each category shall be suitable for parallel operation. The head vs. capacity, the B.H.P vs. Capacity characteristics, etc., shall match to ensure equal load sharing and trouble free operation throughout the range. In the event of tripping of one of the operation pumps, the operated pumps shall be capable of passing the maximum flow through it as dictated by the system resistance corresponding to both maximum and minimum water level of River Bhagirathi.

3.4. The pump motor set shall be designed in such a way that there is no damage on account of any reverse flow through the pump which may occur due to any mal operation of the system.

3.5. Where reverse flow through the pump is specified in data specification sheets, the drive motor shall be capable of bringing the pump to its rated speed in the normal direction from the point of maximum possible reverse speed without injurious heating, when power to the motor is restored with a minimum voltage of 90% at the motor terminal.

3.6. External head that may be imposed on the pump under reverse flow condition is to be decided by the Bidder after analysing the complete system and the particular abnormal condition of run. However, any specific requirement as mentioned in the Pump Data Sheet shall be adhered to Torque-speed curve for pump and motor for such reverse flow condition shall have to be submitted along with the offer.

4.0. PUMP (SELFLUBRICATED)

Bowl assembly: The Bronze bowl shall be flanged type construction of closed grained materials conform to latest I.S.S. They shall be free from sand holes, blowholes, or other fault and must be accurately machined and fitted to the close tolerance. The shall be capable of withstanding a hydrostatic pressure equal to twice the pressure at rated flow or 1.5 times shut of head which will be greater. The intermediate bowls shall have enamel or

epoxy lined waterways for maximum efficacy and wear protection. All intermediate bowls shall be of identical design for interchange ability. A discharge bowl shall be used to connect the bowl assembly to the discharge column. All the bowls (include the discharge bowl) shall be fitted with sleeve type bearings of bronze alloy.

Impeller: The impeller shall be constructed from ASTMB584 silicon bronze and shall be the enclosed (or semi open) type. They shall be free from defects and must accurately cast, machined and filed for optimum performance and minimum vibration. Impeller shall be balanced to grade G6.3 of ISO 1940 as minimum. They shall be securely fastened to the bowl shaft with taper locks of C1018 steel.

Suction: The suction bowl shall be provided with non-soluble grease packed bronze packed bronze bearing from abrasives in the pumping fluids. The bearing housing shall have sufficient opening at the bottom for easy removal of the bearing.

Shaft: The bowl shaft shall be constructed from ASTM 582 type 416 SS. It shall be precision ground and polished with surface finish better than 40 RMS.

1.1.2. Rating and material of construction of the pump shall conform to the following:

Sl. No.	Description of the items	Quantity
01.	**Required Quantity of Pumps**	**12 Nos. = (1W+1S), (2W+2S), (2W+2S) (1W+1S)**
02.	**System Discharge m3/hr.**	**252, 234, 252 & 234**
03.	**Total Head, MWC declared by Bidder**	**(Approx head** 70, 65, 60 & 70**)**
04.	**Liquid Handled**	**Clear Water**
05.	**Temperature**	**Ambient**
06.	**Type of Impeller**	**Closed / Semi open.**
07.	**Type of Sealing**	**Gland Packing**

08.	**Type of Coupling**	**Flexible Pin / Bush Type / Rubber coupling**
09.	**Type of Bearing**	**Antifriction**
10.	**Type of Lubrication**	**Grease Lubrication**
	Material of Construction	
11.	**Casing**	**CI IS 210 GR FG 260**
12.	**Impeller**	**Bronze**
13.	**Shaft**	**SS 410**
14.	**Shaft Sleeves**	**SS 410 (H)**
15.	**Base Plate**	**Fabricated MS**

5.0. COLUMN ASSEMBLY-WATER LUBRICATED FOR VT PUMP

Column Pipe: The column pipe shall be furnished in section not exceeding a normal length 3.10 Meter (10 Ft) and shall be connected by threaded-sleeve couplings. Pump speeds between 750-1450 rpm shall have intermediate column length and bearing spacing no greater than 1.5 Meter (5 Ft). The pipe shall be of MSERW and weight shall be not less than schedule 30. The end of the pipe shall be with 8 threads per inch with 3/16" tapper per foot thread and faced parallel to butt centring spiders .The inside of the such that minimum head loss occur as per IS Specification.

Line Shaft: The line shaft shall be of stain less steel, ground and polished with surface finish as per standard specification. They shall be furnished in interchange ability facility and shall be coupled with threaded steel couplings machined from solid steel bar. It shall have left hand thread to tighten during pump operation condition. The shaft shall be provided with stainless steel sleeve to act as journal at each bearing location. The sleeve shall be placed on a full size shaft without under cutting and secured in position by a suitable adhesive.

Bearing: Bearing shall be fluted rubber retained in the cantering spider by a shoulder on each end on the bearing.

6.0. DISCHARGE HEAD ASSEMBLY – WATER LUBRICATED (SELF)

Discharge Head: It shall be of the high profile type to allow shaft coupled above stuffing box and provide for mounting the driver and support the column pipe and bowl assembly. It shall be of high grade cast iron or fabricated steel. It shall have a NTP (½") connection for a pressure gauge.

Stuffing box: The stuffing box shall be cast iron and shall contain a minimum of five rings packing. It shall have pressure relief connection. The packing gland shall be a split type secured in place with non-corrosive studs and nuts. Rubber slingers shall be secured to the shaft above the packing gland.

Head shaft: The head shaft goes through the stuffing box shall be stainless steel. It shall be precision ground and polished with surface finish as per standard practice.

Suction bell mouth & strainer: The suction bell mouth shall be sufficient length and shall have a minimum inside diameter and weight larger than the discharge column pipe. A suitable cone strainer of galvanised steel shall be provided having a free area at least four times of the flow area of the suction pipe.

7.0. TEST

7.1. GENERAL

a) All pressure parts shall be subject to hydraulic testing at a pressure of 150% of shut off head or 0% of rated head (effective head) whichever is higher, for a period not less than 30 minutes.

b) Performance-test is to be conducted to cover the entire range of operation of the pumps. These shall be carried out to a span of at least 125% of rated capacity up to pump shut off condition. A minimum of five combinations of head and capacity are to be achieved during testing to establish the performance curves including the design capacity points and the two extremities of the Range of operation specified. For range of operation, stipulation relevant in Clause is applicable.

c) Tests shall preferably be conducted with actual drive motors furnished.

d) Reports and test certificates of the above tests shall he submitted to the Engineer-in-charge for approval of the employer.

e) All rotating components of the pumps shall be subjected to dynamic balancing tests, if specified, in Data Sheets.

8.0 Technical Requirements and Calculations

8.1 The Pumping Station will be installed 12 nos. Pump sets (Two sets containing 4 Nos. pumping sets another two sets containing 2 nos. pumping sets) of 70, 65, 60 & 70 LPS. at the lowest water level condition of the GLR sump at a system head demand to be determined by the bidder. The tentative head is 50, 49, 60 & 45 M.

8.2 For the numbers OHRs supply according to the root tenderer has to determine the pump TDH considering the different obligatory levels collected from the site requirement here in after taking into account the pump suction side losses, station losses for all components i.e. valves, specials, piping covered in the tender, pump internal loss, manifold &header losses etc. Similarly the tenderer shall confirm the maximum NPSHR on the total range of operation of the pump without any positive tolerance. The NPSHR of the offered pump shall have a margin of at least 0.5 m with the NPSHA even working on the lowest water level condition. Calculations to prove the adequacy of the same taking atmospheric head as 10.0 MWC shall be furnished by lowest bidder before issuing the work order in addition to the NPSHR curves.

8.3 Tenderer are required to furnish the following technical particulars by the lowest tender without fail, in absence of which the bid may be considered as technically non responsive and rejected.

a) Detailed system head calculations including H-Q, P-Q, Efficiency-Q, NPSH-Q etc. curves at various level conditions in solo and parallel condition superimposed on the system resistance curve, the printed family curve of the pump model offered shall be furnished along with offer.

b) Detailed calculations showing adequacy of NPSHA having at least 0.5 m margin over NPSHR even at lowest water level condition as has been asked for in the technical specifications of the pumps elsewhere.

Note : <u>To work out the system head on Hazen-William's formula to arrive out the pipe frictional losses taking 'C' value as 90 for all CI Piping shall be considered (This is completely arbitrary – it is must be fixed after testing the pipe lines) and for</u>

C value of DI as 140. The following 'K' values for valves, specials shall be considered as follows.

Sl. No.	Name of the items	Rating
01.	Sluice Valve	0.4
02.	Non Return Valves:	0.35
03.	Other specials:	Guideline as per CPHEEO Manual
	Units used for the curves/data	
04.	Flow Rate: in cu m per hour	288, 288, 234 for each pump
05.	Head, NPSH:	..... MWC
06.	Power	..... KW
07.	Efficiency	.....%

1.4.1 The following flow velocities shall be maintained for the pump suction and delivery branches:

Pipe diameter	Suction Side	Delivery Side
Up to DN 150 mm.	0.6 to 1.0 m/s	1.0 to 1.7 m/s
DN 200 mm. to DN450 mm.	0.10 to 1.2 m/s	1.7 to 1.9 m/s
DN500 mm. to DN1000 mm.	1.0 to 1.5 m/s	1.7 to 2.2 m/s

9.0 The following pipe specification shall be followed to determine frictional losses in pipelines:

a) For sizes up to DN150, ERW black pipes to IS: 1239 Part-I (Hvy) and IS: 1239 Part-II (Hvy) fittings to be followed.

b) For sizes DN200 to DN350, ERW black pipes to IS: 3589 having wall thickness 7.1 mm. and 7.9 mm. for sizes DN400 to DN500. Fittings shall be fabricated from parent pipes.

c) For CI pipes 20 years old – by testing the pipe lines.

10. Obligatory Data & Information to the tenderer to work out the system head for feeding the OHRs. For the purpose of working out the detailed engineering on various system requirements, the following data and information shall be applied.

For the purpose of working out the detailed engineering on various system requirements, the following data and information shall be applied.

Sl. No.	Description of item	Data to be Considered for Design Purpose
1	**Average ground level of site above MSL**	**± 0.00 M**
2	**Liquid to be handled for pumping**	**Clear Water**
3	**Turbidity**	**Up to 5 NTU**
4	**Temperature**	**12 ºC to 37 ºC**
5	**Specific Gravity**	**1.01**
6	**No. of Pump Motor set to be installed**	**(1 Working + 1 Stand by for 252 M^3/ hour for each set total 2 sets), (2 Working + 2 Stand by for 234 M^3/ hour for each set total 4 sets) and (2 Working + 2 stand by for 252 M^3/hour for each set total 4 set.) (1 Working + 1 Stand by for 252 M^3/ hour for each set total 2 sets)**
7	**Likely supply voltage at plant premises**	**415V ± 10%, 50Hz. ± 3%, 3 phase**
10	**Discharge station flow at duty point**	**21010, 21010 & 234 m^3/hr. at a head to be determined by the bidder**
9.	**Suction and delivery common manifold**	**Separate for 2 sets each and 1 set of pumping units according to head & discharge**

10	**After awarding the job the mechanical drawings shall have to be submitted with details hydraulics calculation**	**For approval**

10.1 While calculating the pump TDH the tenderer must explicitly specify the length and diameter of pipes and specials they have selected while taking into account the velocity considerations given earlier in this NIT. The rates quoted by the tenderer in the BOQ / Price Schedule shall be assumed to be for that particular diameter of pipes, specials & valves etc. No departure from the declared data of the tenderer shall be allowed in future. The battery limit of the work is the start from receiving of electrical power and end is the outer flange of the butterfly valve on common delivery header with valve chamber and a temper proof kinetic air release valve.

The lowest Tenderer shall fill-up the enclosed check list after awarding the Bid.

Sl. No.	Description of item	Data to be Considered for Design Purpose
A.	**General.**	
01.	**Manufacturer:**	
03.	**Model No.**	
04.	**Type of pump.**	
05.	**No of pumps offered**	
06.	**Performance (per pump)**	
07.	**Discharge in lowest level**	
08.	**Head in lowest level**	
09.	**Pump flow & head**	
10.	**Material of Construction**	
11.	**Casing**	
12.	**Impeller**	

13.	**Shaft**	
14.	**Sleeves**	
15.	**Couplings**	
16.	**Key**	
17.	**Base frame**	
18.	**Weight of the total pump assembly.**	

11.0 Motor

11.1

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.

11.2

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.

11.3

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.

11.4

The drive electrical motors shall be of squirrel cage induction type horizontal 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 vertical pumping unit 10-20 % of the pump BHP, of 415 V±10%, 3 phase, 50 Hz±3 %, greater than 750 RPM (Synchronised) and also suitable for drive the pumping units.

11.5

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 15 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.

11.6

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

11.7

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

11.8

Motor shall be designed for Autotransformer above 50 KW /Star-Delta bellow 50 KW /Direct on line bellow 5KW 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)

11.9

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.

11.10

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 .

11.11

All motor enclosures shall be totally enclosed fan cooled (TEFC) and conform to the degree of protection IP55

11.12

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%)

11.13

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.

11.14

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.

11.15

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.

11.16

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

11.17

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.

11.18

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.

11.19

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 alongwith 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.

11.20

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

11.21

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.

11.22

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

11.23

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.

11.24

Motor shall be provided with eye bolts or other adequate provision of lifting.

11.25

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

11.26

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.

11.27

Motor including fan shall be painted with corrosion proof paint

12.0 Motor control centre (MCC)

Medium voltage Power Distribution board is required to receive power from WBSEDCL/ Substation. The PDB cum MCC shall be suitable for 415V ± 10%, 50Hz ± 3%, 3 phase, 4 wire supply system and Degree of Protection IP-54. The PDB cum MCC shall be 2mm CRCA sheet steel enclosed, floor mounted type, self- supporting, fully compartmentalized, dust proof , cubicle pattern and all the compartment door would be interlocked in such a way, the door cannot be open unless the switch is in Off position.

It shall be finish painted with powder coated paint after necessary chemical treatment for rust free surfaces and application of anti rust chemical coating. The base frame of the panel shall be made of ISMC – 75 channels. The panel shall be dead front type with concealed hinged doors at front and bolted covers at the rear. It shall have rear access and the cable termination arrangement shall be provided at the rear of respective feeder

modules where detachable type undrilled cable gland plates shall be provided for this purpose. The vertical dropper bus bars shall be placed back side of each feeder pillar and should be shrouded to avoid accidental contact during back door open condition. The bus of the panel shall be made of E91E grade of Aluminium alloy insulated with 1.1KV grade heat shrink type PVC colour coded sleeve. The rating of the bus bar shall be 1.5 to 2 times of the full load current of low voltage side of the transformer.

The current density of the bus bars shall not exceed 1Amp / Sq. mm. The bus bars shall be supported on non-hygroscopic resin mouldedfibre glass supports / insulators and the distance between supports/insulators shall be so designed to make the bus bar system capable of withstanding a short circuit fault current of 50KA (r.m.s.) for 1 Sec, necessary calculation for bus bar selection should be submitted along with drawing for approval. Two cut outs shall be provided at the top bus chamber and covered with plate for future extension purpose. The front bus bar chamber shall be fully shrouded to avoid accidental contact with the live bus bars.

The minimum clearance between bus bars and bus bars to earth shall be as per I.S. Specification. Air Circuit Breaker termination shall be done with extended bus bar arrangement. The cable termination chamber shall be provided with cable supporting clamps. Each Breaker shall receive3 nos. 1.1KV 3.5 core not less than required300 Sq. mm. armoured Al. Cable. For other outgoing feeders the cable alley shall have to be provided in such a fashion that the cable will be taken out easily.

The control wiring of the panel shall be done with 1.1 KV grades PVC insulated flexible copper wires with tinned copper lugs and ferrule marking at each end. Require two nos. fully rated control transformer with change over scheme should be provided for control voltage. Wire bunches routed through horizontal and vertical wire ways which provide support and routed through PVC cable duct with cover in entire panel. All hinged doors shall be earthed with flexible copper wires. Lifting arrangement shall be provided for lifting at the top of the panel. Space heaters with thermostat& MCB /rotary switch shall be provided in bottom of the each vertical section of the panel board.

Incoming Feeders each consists of followings devices:

a) 2(Two) No. 2000A electrically draw out type microprocessor based 4 pole Air Circuit Breaker with the following feature such as breaking capacity 50 KA, rated operational voltage – 690 V AC, rated insulation voltage – 1000 V AC and impulse withstand voltage-

12 KV with quick make quick break trip free mechanism and provided with over load and short circuit trip release, shunt trip coil, safety shutters, castle lock with Digital protection relay with 3 phase over current & earth fault element each with high set unit for feeding the of intermediate ground level Reservoir pumping station panel.

b. 1 No. flush mounted type Voltmeter (0-500V) with selector switch.

c. 1 No. flush mounted type Ammeter 0- 2500 A with selector switch and CT

d. 3 nos. Universal Voltage LED for indication of Breaker On/Off/Trip.

e. 1 no flush mounted type power factor meter of lag & lead scale

Outgoing Feeder

a) 10 nos. 400 amp draw out type microprocessor based 3 pole & N Air Circuit Breaker with the following feature such as breaking capacity 50 KA,with thermo-magnetic type Release for O/L & S/C protection &Aux. Switch.

b) ATS starter with capacitor bank for 10nos. Pumping units

c) 1 no. 63A TPN MCCB, 50KA with thermo-magnetic type Release for O/L & S/C protection & extended type door drive kit & spreader with 1NO + 1NC Aux. Switch

d) 1 no 32 A TPN outgoing Feeders MCCB for house wiring purpose

e) 1 No. 63A TPN outgoing Feeders MCCB (for Yard Lighting + miscellaneous use)

f) 96 Sq. mm. flush mounted type Ammeter with selector switch required CT arrangement for each feeder.

g) 10 no 16 amp TP MCCB for Valve actuator units

h) Universal Voltage LED for indication of Breaker On/Off/Trip for the each unit.

13.0 Cable, Laying, glanding & socketing)

a) All HT &LT Cable power cable shall be11 KV & 1.1 KV grade stranded aluminium conductor PVC insulated armoured and the control cable shall be of copper conductor, PVC insulated, armoured/XLPE insulated armoured. All power cable and control cable

shall be laid neatly in covered masonry trench, fabricated cable trays. While selecting the cable size suitable de-rating factor shall be considered. Tenderer shall furnish a cable lamination plan giving type, size and length of the cable proposed to be used.

b) All cables within buildings shall be laid neatly on wall or on trays as the case may be and shall be readily accessible for inspection or replacement. TheLT control cable shall be of 660 volt grade, PVC 1.5/2.5 sq.mm multi stranded, multi-core screened cable of electrolytic copper conductor. Two spare cores shall have to left for future provision

c) The cables shall be11 KV, 1.1 KV grade for LT 3.5/3 2/1 core XLPE AL conductor cable of suitable size and length as per requirement for electrical loading. The selection of the size of the cable will be considering voltage drop, 1.5-2 times of the normal current drawl by the load and de-rate factor of the cable when laid in ground, cable spacing and temperature of the ambient. The cable will be ,if, necessary laid in underground trenches dimension for trench must be 450 mm width x 760 mm average depth, with brick protection on the top of the cable with 16 nos. bricks per meter and filling up the trenches with shifted soil, levelling up and restoring the surface to the satisfaction of the Engineer-in-Charge.

Where cable is laid in masonry trench/metal trays, the cable trenches (when applicable) shall be filled up with sand or covered with chequered plate/RCC slab according to the direction of Engineer-in-Charge. Where necessary cables shall be supported on clamps of approved type and shall be properly protected with G.I. conduit or other protective covering as per direction of Engineer-in-Charge. Length of each type of cable should be assessed from G.A. drawing as well as physical verification from site.

d) For weather proof entry of armoured power & control cable through plain holes on equipment gland plate (Minimum threaded length 12 mm) threaded (ET) holes on equipment body / casing heavy duty brass machine finished & tined , double compression (as per BS 6121) thickness of plating not less than 10 mm. All washers and hardwires will be on tin plated brass. Rubber components shall be of neoprene tested quality.

e) The socket shall be Dowell (Mumbai) make solder less crimping type tubular / sockets ring / fork ring / pin type tinned copper for power cable termination . Nylon straps, aluminium cable tags, plastic ferrules (Yellow with black engraving) coloured insulation sleeves and tapes and all other necessary termination accessories, hardware's and consumable will have to be provided.

f) The socketing can be done by hydraulic punching machine and gland plate hole shall have to be made by drilling machine.

14.0 Sluice Valve (Kriloskar & IVI make only rating PN 1.5)

The sluice valves shall be manufactured from closed grain Gray cast iron conforming to IS: 14846 of the year 2000. Flange ends as per IS: 1538 or as per other standards to match with other flanges. The Body shall be of Cl I.S. 210 FG 200. The delivery side sluice valves shall have by-pass arrangement but suction side slice vale the by-pass arrangement not acceptable. The seat pressure shall be 10 kg/cm2 and body pressure shall be 15 kg/cm2. The valves should pass through hydrostatics test for duration of 10 minutes. Materials of construction test certificate & ultrasonic test report shall be provided during supplies. The sluice valves shall be non-rising/rising-spindle type with gearing arrangement for easy manual operation for suction side but in delivery side will be hand wheel and indicating pointer where rising main connected with outside/ inside the pumping station.

15.0 Butterfly Valve actuator control (Kriloskar & IVI make only rating PN 1.5)

The butterfly valves (delivery side) shall be CIDF, long wiper type, PN 1.5, conforming to IS 13095 of 1996. The seat pressure shall be 10 kg/cm2 and body pressure shall be 15 kg/cm2. The valve shall operate smoothly & steadily in both directions, free from flow-induced vibrations. It should provide tight shut off closures & shall be suitable for frequent operation as well as from throttled duty conditions. The valve disk should rotate 90 from full open to full close. The valve disk shall be solid streamlined slab design, and to have minimum headless. The scat ring shall be replaceable type and to be bolted on the body. The rubber seal on the disk must be of easy replaceable type with the facility to be replaced at site. The valve at delivery side shall have suitable and adequate capacity of gearbox for electrical actuator control with hand wheel and indicating pointer.

15.0 NON RETURN VALVES (Kriloskar & IVI make only rating PN 1.5)

The non-return valves shall be manufactured from closed grain Gray cast iron conforming to IS5312 part I & BSEN 12334. Flange ends as per IS 1538 or as per other standards to match with other flanges. The body seat shall be of CI / DI. The non-return valves shall have by-pass arrangement with single door type with quick closing type as required for trip of the pumping unit. The seat pressure shall be 10 kg/cm2 and body pressure shall be 15

kg/cm2. The valves should pass through hydrostatics test for duration of 10 minutes. Materials of construction test cet1ificates & ultrasonic test report shall be provided during supplies.

16.0 DISMANTLING JOINT / RUBBER EXPANSION JOINT

One dismantling joints of diameter equal to diameter of the delivery line of each individual pumping unit shall be incorporated for easy removal of the valves etc.

17.0 PUMP DELIVERY PIPING AND COMMON DELIVERY MANIFOLD

The pump individual delivery/Suction side piping shall be of suitable designed diameter made from M.S. of not less than 8 mm thick plates painted both inside and outside by anticorrosive epoxy paints. The pipes shall be of welded joints and shall consist of necessary companion flanges so as to connect the piping with the DL Valves/Special of the individual pump delivery branch. The pump individual delivery side piping shall be connected to the common delivery manifold as per the layout. Necessary gaskets of suitable thickness shall have to be provided to all flange Joints complete with all necessary nuts, bolts, washers etc. The length shall be ascertained from the layout and the exact dimensions of the valves/specials. The Bidder should also provide the necessary arrangements to encounter the horizontal back thrust and the details as per the pump manufacture's recommendation shall be clearly indicated in the layout drawing.

The common delivery manifold shall be of requisite diameter and shall be of MS of not less than 6 mm thick. The common manifold shall have blank flange on both sides/one sides with adequate stiffening. The length of the manifold must be extended at least one meter on both sides after the interconnections with the delivery pipe lines from the pumps at the two extreme ends to provide a blank flange.

In the delivery line one no. Temper proof air release valve (double throat) shall have to be placed. The pipe shall be laid underground and shall be painted with anticorrosive paints at the inside and outside shall be wrapped and coated with corporate of not less than 4mm thick so as to prevent the pipes from corrosion.

18.0 Temper proof Kinetic air release valve (Kriloskar & IVI make only rating PN 1.5)

The temper proof kinetic air release valve valves shall be manufactured from cast iron conforming to IS: 14845 of the year 2000. The Body shall be of C l I .S. 210 FG 200. The

valves shall have small orifice with bronze ball and larger ball will be made of SS and seal ring will be natural rubber arrangement. The body pressure shall be 15 kg/cm2. The valves should pass through hydrostatics test for duration of 30 minutes. Materials of construction test certificate & ultrasonic test report shall be provided during supplies.

19.0 Mechanical Level Indicator

The Mechanical level indicating shall be equipped with scale for measuring the level of the CWR continuously (range of measurement shall be approximately 0 to 5.5 mtr.) and placed in such a position that operator can easily read the level of water of the sump.

20.0 Lighting arrangement in Pumping station & HT substation

20.1 Complete lighting of the Pump House and HT substation& peripheral areas shall have to be provided by the tenderer. The scope of lighting shall include the following areas:-

a) Outside periphery of the Pump House and HT substation. b) Inside lighting of the Pump House and HT substation.

20.2 Lighting Distribution System

Lighting power shall be taken from the MCC. One lighting distribution board with sufficient no. of feeders shall be provided for the pump house. The LDBs shall be wall mounted type.

20.3 Lighting of Pump House and HT substation Periphery

Lighting of the outside periphery of the pump house shall be controlled by means of SPN MCB of LDB at operating floor. Four nos.LED street light fittings shall be provided on four sides of the pump house. The fittings shall be mounted on the outside wall of the pump house and shall be supported by means of GI Pipes of suitable size. Supply of G.I. pipe supports and clamps shall be included in installation rate for fittings.

20.4 Lighting of Pump House and HT substation

Lighting of the pump house shall be done by means of Industrial rail type LED light fitting with 20 Watt LED complete all accessories. The fitting shall be fitted on the wall of the pump house. Total 12 (twelve) Nos. Fittings shall be used. Two Nos. 16A, 5Pin switch socket outlet shall be provided in the pump house.

20.5 LDB for Pump House and HT substation

The lighting distribution board shall be 2mm thick CRCA sheet steel enclosed wall mounted type with maximum operating height of 2000 mm. and minimum operating height 800 mm. Lighting distribution board for the pump house will be following devices.

a) One No. 32A TPN MCB isolator as incomer.

b) Two Nos. 16A SPN MCB for Plug, Periphery Lighting.

c) Ten Nos. 6A SP MCB for pump house lighting & one spare.

The LDB will have cable entry from top and bottom for which detachable gland plate shall be provided.

20.6 Wiring of the lighting system will be done by means of single core stranded copper conductor wire in 20 mm. dia. PVC conduit. Sub main wiring from LDB to switch box will be done by means of 2.5 sq. mm. PVC insulated stranded copper wire. Point wiring from switch box to fittings will be done by means of single core 1.5 sq. mm. stranded copper wires in 20 mm. dia. PVC conduit. Approximate point wiring length will be around 9 meter per point.

21.0 Safety Equipment

21.1 Tenderer shall include all standard safety devices and accessories at the pump house and HT substation as per IE Rules and to the satisfaction of the Electrical Inspector including but not limited to the following items:

21.2 Safety devices and accessories for the Pump House and HT substation:

a) Eight nos. 5 Kg. Dry powder type wall mounted fire extinguishers, Gas cartridge conforming to IS: 2171.

b) 3 Mtr. of rubber mat of minimum width of 600 mm. and thickness of 8 mm. For pumping station and HT substation

b) Fire bucket 4(four) Nos. with stands.

c) Two first aid box complete with all accessories.

d) Shock treatment chart one each in English and Bengali.

e) Caution board per panel.

22.0 H.O.T CRANE

Provisions have to be made for a 10.0 M.T. capacity Hand Operated Travelling Crane (H.O.T.) suitable for inching operation with a lift up to motor floor level and cross travel of 12 M for handing pump, motor and other accessories. They shall be of reputed make as per vendor list and as approved by Engineer-in-Charge. Suitable type of crane rails, girders and all other accessories as necessary for installation and operation of the crane are to be designed and provided by the contractor within the lump sum pipe quoted. The two travels and two hoists i.e. long cross & main Auxiliary etc. must be mechanical operation. The buffers must be spring-loaded operation. Suitable vertical clearance is to be provided over the rail level to the bottom of the roof beam

23.0 Earthing

a) 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.

b) All terminal connections for earthing shall be carried out by soldering earth strips / wires with suitable lugs.

c) Pipe electrodes for earthing shall be made of galvanized steel of class ‘B’ Medium quality and shall not be smaller than 50 mm. (2"). The length of the pipe electrode shall not be less than 3 Mtr. (10’). Proper sizes (50 × 6) of galvanized flat shall be connected securely on the properly cleaned surface of top end of pipe electrode suitably.

d) A suitable hole 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 3.68 Mtr. (12’) below ground surface or below as directed.

e) For each earthing station, a masonry inspection pit of size 450 mm. × 450 mm. with suitable sized CI cover, wire mesh, funnel etc shall be constructed / provided.

f) 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.

g) The distance between the pipe electrodes 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.

h) All electrical equipment 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 adequate size of GI conductor.

i) Whatever be the method of the earthing, the value of resistance to earth shall not exceed 1(one) Ohm.

j) Two separate earthing shall have to be done for Transformer neutral earthing.

24.0 Painting

a) The painting works, unless otherwise stated elsewhere, shall be applicable for the following items as follows: Various equipments inclusive of electric motors, pumps, panels, control desks and accessories.

b) All metal surfaces, after preparation of surface, shall be painted with two primer coats and two finish coats.

c) 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.

d) The procedure for surface preparation shall be solvent cleaning, hand tool cleaning, power tool cleaning, flame cleaning, blast cleaning, pickling or combination thereof as applicable.

e) The primer coating shall be Red oxide 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.

f) 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.

25.0 Erection, Commissioning and Maintenance:

Erection:

25.1 All equipment and materials covered by this specification shall be erected in accordance with good engineering practice.

25.2 Erection materials and all consumables required for proper erection shall be supplied by the contractor.

25.3 All Civil work such as grouting of foundation bolts, valve and pipe supports has be to carried out by the successful Tenderer.

Commissioning:

25.4 On completion of erection, the system shall be given a pre-commissioning check and then trial run of all units of each zone to ascertain mechanical and electrical stability.

25.5 If the trial run of each zone establishes electrical and mechanical stability, and complete the specified hours of operation, it will be deemed that the system has been commissioned successfully.

Operation and Maintenance:

25.6 Operation and maintenance period of each zone will commence from the date of successful commissioning of the same.

25.7 The contractor shall be responsible for operating and maintaining the project for a period of one year engaging his own personnel.

25.8 If any repair or rectification is to be carried out during the maintenance period and within the guarantee period on any of the equipment installed, the same shall be done by the contractor without any cost implication.

SECTION-G

POWER TRANSFORMER

1.0 POWER TRANSFORMER (2 Nos. 750 KVA)

1.1 Scope

The 2 Nos. 750 KVA Indoor/out door type Transformer shall be 11000 volt in primary side and 433 volt in secondary side of the transformer. The transformer is to be required for feeding the total electrical loading of pumping station and other loads (if necessary).

1.2 General

Power Transformer shall have to two sets of winding (suitable size of the electrolytic grade copper conductor) wound in a common magnetic core. The core of the windings shall be enclosed in a tank filled with Transformer oil. The properties of Transformer oil shall be in accordance with revised IS-1180 and the colour of the oil pale yellow colour. The Terminals of the windings shall be connected to the end of the internal bushing ends. The bushing shall be supported by the Transformer tank body. A tap changer shall be provided in the low voltage side and it is off load tap changing type of scale ± 2.5% and ± 5 % in accordance with vector group DYN-11 and N brought out.

The oil filed transformer shall have a conservator tank with level gauge placed slightly higher of the Transformer tank with a breather filled by silica jell which allow the air to the conservator tank without moisture. A Buchholz relay shall be placed in between conservator tank and Transformer tank – it protects the transformer when gases are generated in oil due to small discharge or arc. An explosion vent shall have to be provided for protecting the Transformer from firing. As the transformer running continuously so the efficient cooling system shall be provided by radiator fins type arrangement.

The fins shall be jointed in such a fashion so that leakage of transformer oil will not be acceptable. A winding Temperature indicator with alarm and trip contact placed in the Transformer tank with time delay setting (i) Alarm- 95 degree centigrade (ii) Trip- 120 degree centigrade. The followings safety devices will be accompanied with the transformer

- Fluid Level gauge
- Bushing for termination of cables

- Explosion Vent
- Cooling system
- Hot spot Temperature indicator
- Buchholz Relay
- Silica gel dehydration breather
- Oil filter valve
- Transformer tank drain valve one upper and one lower
- Bi-directional roller
- Two earthing Terminals
- Air release valve
- Lifting Lugs
- Off load tap changer at high voltage side with padlock arrangement
- Rating plate with diagram
- Oil for first filling of oil.

1.3 Testing (Factory)

The following routine test shall be performed at factory in presence of the dept. engineer not below the rank of SAE. The Travelling cost boarding and food cost bear by the agency as per direction by EIC. The movement of the Eng. will be depends on as per direction of EIC. Personnel should be least path and minimum time. The following tests are witnessed

a. Ratio and polarity test

b. Load losses test

c. Impedance measurement test

d. Insulation test

e. Resistance of windings

f. No load loss

g. No load current

1.4 Installation

The preparation of foundation should be according to the foundation plan outside of substation building. Foundation bolts, cable trenches should be prepared as per approved submitted drawing. The first filling of oil shall be done by using oil filtration machine and record the break down voltage of the oil by using H.V oil testing machine. The erection should be carried out as per manufacturer instruction manual. A peripheral fencingarrangement shall have to be provided to avoid fatal accident.

2.0 CABLING

2.1. GENERAL

All HT/LT Cable power cable shall be 11KV/1.1 KV grade stranded aluminium conductor PVC/XLPE insulated armoured and the control cable of 660 V grade PVC insulated shall be of copper conductor all power cable and control cable shall be laid neatly in covered masonry trench, fabricated cable trays. While selecting the cable size suitable de-rating factor shall be considered. Bidder shall furnish a cable lamination plan giving type, size and length of the cable proposed to be used.

All cables within buildings shall be laid neatly on wall or on trays as the case may be and shall be readily accessible for inspection or replacement.

The LT control cable shall be of 660 volt grade, PVC insulated 2.5 sq.mm multi stranded, multi-core screened cable of electrolytic copper conductor. Two spare cores shall have to left for future provision

2.2. SELECTION OF CABLE SIZE

HT Cables--------- 3 core 400 sq. mm (double run each for 2 Nos. Transformer)

LT cables---------- 2 Nos. 3.5 core 400 sq. mm from each transformer (selection of the size of cable from Transformer to ACB shall have to be full load current of the transformer LT side and also load factor of the Pumping station.

3.0 LED LIGHT FITTINGS

The LED light fittings should be industrial corrosion proof with lamp and their fittings and fixing wiring should be done as per direction of EIC .LED light fittings shall be single/double LED light. Each room shall be illuminated minimum 4 nos. LED light fittings

4.0. CEILING FAN

Minimum 2 Nos. 1200 mm sweep ceiling fans are to be provided with electronic regulator and necessary wirings and clamps and down rod etc. in each room.

5.0 EXHAUST FAN

The exhaust fan should be of 450 mm with the louvers with necessary wiring etc. as per direction of EIC. Necessary holes are required to be done. Minimum 2 Nos. Exhaust fan are to be provided in each room of the substation.

6.0 TESTING COMMISSIONING

After completion of erection work test shall be conducted by the contractor as per relevant is applicable rules & regulations and as per instruction from EIC. Temporary arrangements of electrical connection if necessary for the test shall be provided by the contractor including required instruments, tools and trackless, supervisory personnel and labours. The contractor shall record and furnish the test result in agreed format as per direction of EIC.

The following tests are to be carried out for HT and LT panel

- Megger test
- High voltage test
- Primary injection test for CTs with associated relay.
- Secondary injection test of individual relay for looking of IDMT feature.

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SECTION – H

HIGH TENSION PANEL

1.0 SCOPE OF WORK

The scope of work of this specification covers selection of HT VCB panel for receiving of power from WBSEDCL and feeding the 2 (two) number outdoor type distribution power transformer of 750 KVA capacity as per requirement of load demand as well as smooth running ofAsansol ground level reservoir pumping station . The arrangement of earthing, cabling, illumination system and fire management etc. as per specification stated in this specification.

2.0 GENERAL

1. HT VCB panel (3 Panel composite 1 incomer 1250 Amp and 2 outgoing 750 Amp with C.T. ratio 125/5 as incomer and 75/5 as outgoing).
2. LT Power Distribution Board (PDB).
3. APFC panel

3.0 HT 11 KV VCB PANEL

3.1 Scope

The HT VCB panel of 11 KV (3 Panel composite 1 incomer 1250 Amp and 2 outgoing 750 Amp with C.T. ratio 125/5 as incomer and 75/5 as outgoing). 630A will be as follows for feeding two Nos. LT Power supply to the of intermediate ground level Reservoir pumping station at Asansol. The HT VCB (3 Panel composite) shall have1 incomer 1250 Amp and 2 outgoing 750 Amp with C.T. ratio 125/5 as incomer and 75/5 as outgoing. Two Nos. outgoing for feeding two Nos. indoor / outdoor transformers with protection system.

3.2 Standards: - The offered equipment should comply to IS: 13118, IS: 3427, IS: 2705, IS: 3156, IS: 613 with its latest amendments.

Panel:- The width of panel of the Switchboard should not be more than 600 mm for space saving and withdraw-able dry type voltage transformers with primary fuses should be mounted in the cable compartment and can be withdrawn from the front after removing thecircuit breaker. A suitable mechanical de-latching facility must be provided for the spring charging mechanism so that in the event of failure of spring charge limit switch, the

drive mechanism will get automatically de-coupled. The following type tests are to be conducted only from CPRI with this design:

1) Short time current rating

2) Temperature Rise Test

3) Impulse withstand test

4) IP-4x

The H.T switchboard shall be suitable for three phase 11000 Volt 50 Hz A.C main power supply and at least suitable for 350MVA fault level of power supply. This shall be made of high grade pickled & oiled mild steel sheet cut & folded on numerical controlled machines. The cubical parts shall be riveted / bolted together to form a rigid enclosure with fully segregated busbar compartment, circuit compartment, VCB compartment and low voltage compartment. The construction shall be complied fully with the requirement of a metal clad enclosure as defined in IEC 62271-200. Standard protection grade shall be IP-4x as per IEC-60529 and shall be duly type tested for the same.

The bus-bar chamber with bus coupler system synchronised of two transformers shall be housed of the main bus bar system. The bus bar shall be provided with the insulation along the complete length and the joints will be provided with removable shrouds and shall be garneted no leakage current shall not be flowed in the long run. The main bus bar with bus coupler system synchronised of two transformers shall be 1250 amps and made electrolytic grade copper and shall be vertically placed one after another. The bus bar should be air insulated and must be covered with by special heat shrink PVC insulating sleeve / epoxy insulation coating and follow the colour code R-Y-B for easy identification of the phases.

The bus bar chamber with bus coupler system shall be designed or placed in a position that live parts should not be easily accessible. The earth bus bar also should be Electrolytic Grade Copper. The bus bar system shall be with bus coupler system synchronised of two transformers type. The VCB chamber shall be housed the VCB truck. The movement of the VCB truck shall be interlocked with the VCB and the VCB door to provide complete safety. The automatic metal shutters shall be provided to prevent access to live parts when VCB is isolated or withdrawn. This metallic shutter shall be spring operated and the mechanism is, in turn, linked to the movement of the circuit breaker

truck. The mechanism shall not be acceptable if it is gravity control. The above mechanism shall be adopted at when the voltage transformer (potential transformer) is withdrawn from the circuit. The VCB compartment shall be fitted with a padlock able front door. The operation of the VCB and the earthing switch shall be carried out with the door closed.

The following interlocks shall be provided in the panel for safety measure:

- All operation shall be carried behind closed door.
- VCB shall not be engaged or withdrawn unless it is in open condition.
- VCB shall not be operated unless it is in the engaged or test position.
- Earthing switch shall not be closed when VCB in engaged position.
- VCB shall not be engaged when the earthing switch is closed.
- The rear door shall not be opened unless the breaker is in the test position and the earthing switch is closed.
- VCB shall not be racked unless the plug is lifted.

The VCB cubical and parts shall be painted by an epoxy base powder coating paint. The breaker shall be vacuum break with integral truck design and horizontal isolation and horizontal draw out type. It shall have a motor operated charged spring, stored energy manual or electrical release. The spring charging shall be O-C-O cycle. The VCB should be of single break design and have one interrupter per phase. The vacuum interrupter should not be pinch tube type design, it should be sealed by brazing in a vacuum oven and all the vacuum interrupter must be segregated in cast resin housing.

The minimum expected operational life of the vacuum interrupter should be 30000 thousand mechanical, 10000 electrical at rated current & 100 at rated short circuit. The VCB mechanism shall be minimal maintenance. The breaker should have minimum auxiliary switch of 6NO+6NC. The VCB shall be tested as per latest international standard IEC: 62271-100.The low voltage compartment shall be located shall have in the cubical for housing mounting terminals, fuses, MCB, relays, meter etc. for any standard scheme. An additional chamber should be mounted, if, necessary, for complex protection and control

scheme, Wire bunches should be routed through, horizontal and vertical wire ways which provide order and support.

The cable chamber should be located at 300mm above floor level. The cable termination height shall be more than 600mm. above floor level and generous space will be provided for terminating the power cables. This will be ensures a higher bending radius as well as reduces tension on terminals. The cable chamber shall be housed CT and the earthing switches. Circuit earthing switch shall be affected by a fault make earthing switch interlocked with the VCB. The switch will be tested to make and carry the rated short circuit for 3 seconds. Earthing by means of integral earthing switch is proven to be safe, simple and reliable. Bus bar earthing will be effected by a bus bar earthing switch usually mounted at the bus section panel. Earthing trucks for cable earthing and bus earthing trucks shall be provided for safety management.

The dual core current transformer shall be mounted of 125/5-5A current capacity for incomer and 75/5 – 5 A on outgoing of bushing type CT and mounting arrangement ensures higher degree of safety. The class of CT will be 5 P10 of class 1 per phase for protection & metering respectively. The burden of the CT should not less than 15VA.

The voltage (potential) transformer (PT) shall be draw out type and shall be mounted rear side and upper half of the cubical. The potential transformer should have the HRC fuse protection both the primary and secondary side. There should be provision for replacing the fuses both the sides when the circuit is in live condition. Hence the line connected PT will not be acceptable. The P.T cast resin moulded and insulated type encapsulated and 3 phase type with Y-Y connection. It should be class of 1.0 for industrial metering and class 5.00 for co- ordination with over-voltage factor 1.2 continuous for a solidly grounded system. For PT unearthed system should be rated for the over voltage factor 1.9 for 8 hours.

The rectifier / stored energy power pack unit shall be provided in the panel for tripping mechanism the AC source will be the voltage transformer. The one no universal voltage LED indicating lamp shall be included in the power pack unit in input and output side that indicates system is healthy.

The name plate, lifting arrangement and the designation label should be provided for each panel Prepared as per approved submitted drawing. The erection should be carried out as per manufacturer instruction manual

3.3 Technical Data

Sl No.	Name of the items	Rating and Quantity
01.	Rated voltage at 50 Hz	up to 12 KV
02.	Impulse withstand voltage	75 kVp
03.	One minute power frequency withstand voltage	210 kV
04.	Transient recovery voltage	20.6 kVp
05.	Normal current	400 Amp.
06.	Short circuit breaking current	25 kA
07.	Short circuit making current	50 KA
08.	Duration of short circuit	3 sec
09.	Degree of protection	IP 4X
10.	Operating sequence	0-0.3 sec-CO-3 min-CO
11.	Operating time (in m sec)	35
12.	Breaking time	< 3 cycle
13.	Full load switching life	10,000
14.	Closing voltage / Tripping voltage	24V-220V
15.	Spring charging voltage	110 V-230 V AC
16.	DC source	Stored energy power pack.
3.4	Components of each feeder	
01.	Mechanical ON& OFF indicator	01 Set
02.	universal voltage LED indicating lamp for On & OFF ,Trip, Spring charged, Trip circuit Healthy, DC fail indication of the VCB	01 Set

03.	**Shunt trip coil of rated DC voltage**	**1 set**
04.	**space heater with ON & OFF switches with thermostatic arrangement.**	**1 set**
05.	**Panel illumination lamp with door switch**	**1 set**
06.	**96 sq. mm (0-14 KV) voltmeter with selector switch with protection fuses.**	**1 set**
07.	**96 sq. mm 100 amp ammeters with selector switch.**	**1 set**
08.	**Local remote switch**	**1 set**
09.	**TNC breaker control switch with Pistol handle**	**1 set**

3.5 Relay details. Feeder

The digital microprocessor based feeder protection relay shall be provided for each VCB panel. The IDMT characteristics shall have to be incorporated in the relay with the feature 3 phase Thermal, over current with Earth fault protection current setting from 50 to 200% of normal current in 7 steps in case of over current and 10 to 40% of normal current in 7 steps in case of earth fault with self / without self-supervision feature- if without self-supervision- supervision relay shall be incorporated separately.

The relay shall have self / without high speed tripping device –if without high speed tripping device- high speed tripping device or serial port shall have to be incorporated. The rating of the relay shall be 5 amp or 1 amp as per rating of the CT. The auxiliary supply will be 20-110V DC as per output of the rectifier / stored energy power pack and the rating of shunt/ under voltage relay tripping device. The construction of the relay shall have to draw out type in such a manner when relay will be taken out that CT circuit must have short circuited. For Transformer faults like OTI /WTI /Buchholz Alarm and Trip separate relays shall be provided for the feeder.

3.6 Testing

The fully assembled switchboard shall be offered for Routine Testing as per provision of IS Standard and witnessed by the Dept. engineer. The Travelling cost boarding and food cost bear by the agency as per direction by EIC. The movement of the Eng. Personnel should be least path and minimum time as per direction of EIC. The following tests are carried out

a. Insulation Resistance measurement.

b. High voltage test with breaker close and open.

c. High voltage test of the breaker.

d. Primary current injection test of relay

The manufacturer/Bidder should be submitted 6 copies all test report at the time of billing.

3.7 Installation, Commissioning

a. The preparation of foundation should be according to the foundation plan. Enough space should be provided nearly 1.7 M from the front and 0.750 m from the rear. Foundation bolts, cable trenches should be prepared as per approved submitted drawing.

The erection should be carried out as per manufacturer instruction manual.

b. The Bidder shall have to submit the details (with dimension) drawing of the HT electrical components of substation system mentioning the separate two neutral earthing (without welding) of each Transformer duly approved by the Govt. Electrical inspector West Bengal.

4.0 Main power distribution board (PDB) at substation

4.1 SCOPE

Medium voltage Power Distribution board is required to receive power from 2 Nos. 750 KVA capacity Transformers and provide ACBs as incomer and ACB as outgoing feeders to feed Motor Control Centre at utility loads for ground level reservoir pumping station panel at Asansol. The PDB shall be suitable for 415V ± 10%, 50Hz ± 3%, 3 phase, 4 wire supply system and Degree of Protection IP-54. The PDB shall be 2mm CRCA sheet steel

enclosed, floor mounted type, self- supporting, fully compartmentalized , cubicle pattern and all the compartment door would be interlocked in such a way, the door cannot be open unless the switch is in Off position. It shall be finish painted with powder coated paint after necessary chemical treatment for rust free surfaces and application of anti rust chemical coating. The base frame of the panel shall be made of ISMC – 75 channels. The panel shall be dead front type with concealed hinged doors at front and bolted covers at the rear.

It shall have rear access and the cable termination arrangement shall be provided at the rear of respective feeder modules where detachable type undrilled cable gland plates shall be provided for this purpose. The vertical dropper bus bars shall be placed in between two vertical aligned feedermodules. The bus of the panel shall be made of E91E grade of Aluminium alloy insulated with 1.1KV grade heat shrink type PVC colour coded sleeve. The rating of the bus bar shall be 2 to 2.5 times of the full load current of low voltage side of the transformer.

The current density of the bus bars shall not exceed 1Amp / Sq. mm. The bus bars shall be supported on non-hygroscopic resin mouldedfibre glass supports / insulators and the distance between supports/insulators shall be so designed to make the bus bar system capable of withstanding a short circuit fault current of 50KA (r.m.s.) for 1 Sec. Two cut outs shall be provided at the top bus chamber and covered with plate for future extension purpose.

The front bus bar chamber shall be fully shrouded to avoid accidental contact with the live bus bars. The minimum clearance between bus bars and bus bars to earth shall be as per I.S. Specification. Air Circuit Breaker termination shall be done with extended bus bar arrangement. The cable termination chamber shall be provided with cable supporting clamps. Each Breaker shall receive

4 nos. 1.1KV 3.5 core not less than required 400 Sq. mm. armoured Al. Cable. For other outgoing feeders the cable alley shall have to be provided in such a fashion that the cable will be taken out easily. The control wiring of the panel shall be done with 1.1 KV grades PVC insulated flexible copper wires with tinned copper lugs and ferrule marking at each end. Wire bunches routed through horizontal and vertical wire ways which provide support and order. All hinged doors shall be earthed with flexible copper wires. Lifting arrangement shall be provided for lifting at the top of the panel. 2 Nos. space heaters with rotary switch

shall be provided in bottom of the panel board. The rating of the incomer will be full load current of LT side of the transformer.

Incoming Feeders each consists of followings devices:

a. 2 (two) Nos. 2000 amps electrically draw out type microprocessor based 4 poles Air Circuit Breaker with the following feature such as breaking capacity 50KA, rated operational voltage – 690 V AC, rated insulation voltage – 1000 V AC and impulse withstand voltage- 12 KV with quick make break trip free mechanism and provided with over load and short circuit trip release, shunt trip coil, safety shutters, castle lock.

b. 1 No. flush mounted type Voltmeter (0-500V) with selector switch.

c. 1 No. flush mounted type Ammeter 0-(breaker rating) A with selector switch and CT

d. 3 nos. Universal Voltage LED for indication of Breaker On/Off/Trip.

e. Current Transformer of ratio 1500 / 5A, Class: 1.0, 15 VA 3 Nos.

f. Current Transformer of ratio 1500 / 5A, Class: 5P10, 15 VA 3 Nos.

g. Red, Yellow, Blue phase indicating lamp 3 Nos.

h. CB ON / OFF / TRIP / Spring Charged / Trip Circuit HealthDC Fail Indicating Lamp 6 Nos.

i. TNC Breaker Control Switch 1 No.

j. 1 No. Non Directional IDMT Relay with high instantaneous element for over current & earth fault protection.

k. 1 No. flush mounted Multifunction meter

Outgoing Feeders

A. For feeding main panel of the intermediate ground level reservoir pumping station

a. 2 Nos. 2000 A for feeding the main pumping station panel electrically draw out type microprocessor based 4 pole Air Circuit Breaker with the following feature such as breaking capacity 50 KA, rated operational voltage – 690 V AC, rated insulation voltage – 1000 V AC and impulse withstand voltage- 12 KV with quick

make quick break trip free mechanism and provided with over load and short circuit trip release, shunt trip coil, safety shutters, castle lock with Digital feeder protection relay with 3 phase over current & earth fault element each with high set unit for feeding the IGLR pumping station panel.

b. 1 No. 96 Sq. mm. flush mounted type Ammeter 0-2500 A with selector switch and CT.

c. 3 Nos. Universal Voltage LED for indication of Breaker On/Off/Trip.

d. 2 Nos. 63A TPN outgoing Feeders MCCB (for Yard Lighting + miscellaneous use)

e. 1 no 25 A TPN outgoing Feeders MCCB for house wiring purpose

f. 1 No 2000 Amp feeding the APFC panelplaced in the substation electrically draw out type microprocessor based 3 pole Air Circuit Breaker with the following feature such as breaking capacity 50 KA, rated operational voltage – 690 V AC, rated insulation voltage – 1200 V AC and impulse withstand voltage- 12 KV with quick make quick break trip free mechanism and provided with over load and short circuit trip release, shunt trip coil, safety shutters, castle lock with Digital feeder protection relay with 3 phase over current & earth fault element.

Checklist for Medium Voltage Panel (being offered by the lowest bidder before issuing the work order)

Sl. No.	Description of the items	Rating / Quantity
01.	Name of the manufacturer	ABB/ SEIMANCE/L&T
02.	Rated Voltage	
03.	Rated Current	
04.	Short Circuit Withstand Capacity 50 KA	Yes / No.
05.	Sheet Steel Thickness	2 mm CRC Sheet
06.	Degree of Protection IP – 45	Yes / No
07.	Bus Bar Rating & Short time Capacity of Incomer	-------Amp / .....KA

08.	**Breaking Capacity**	
09.	**No. of Pole**	
B	**Relay**	
10.	**Protective Relay Type**	**Draw out / Non draw out**
11.	**Relay Voltage**	**Self / Separate…Volt**
12.	**Relay feature (O.C. & E.F.)**	**Yes / No.**
13.	**Used in Incomer feeder**	**Yes / No.**
C	**Outgoing Feeder**	
14.	**Outgoing Type**	**ACB / MCCB**
15.	**Nos. of outgoing**	
16.	**Rating of the outgoing**	**---VA …KA breaking Capacity**
17.	**No. of Pole**	
18.	**Protective relay Type (ACB Feeder)**	
19.	**Switch Fuse Unit Number & Rating**	
20.	**Size : Length x Breadth x Height in mm.**	
21.	**Approximate weight in Kg**	
D	**APFC panel (Auto power factor correction panel)**	

Checklist for Medium Voltage Panel (being offered by the lowest bidder before issuing the work order)

Sl. No.	Description of the items	Rating / Quantity
01.	Name of the manufacturer	ABB/ SEIMANCE/L&T
02.	Rated Voltage	
03.	Rated Current	
04.	Short Circuit Withstand Capacity 50 KA	Yes / No.
05.	Sheet Steel Thickness	2 mm CRC Sheet
06.	Degree of Protection IP – 45	Yes / No
07.	Bus Bar Rating & Short time Capacity of Incomer	-------Amp / .....KA
08.	Breaking Capacity	
09.	No. of Pole	
B	Relay	
10.	Protective Relay Type	Draw out / Non draw out
11.	Relay Voltage	Self / Separate…Volt
12.	Relay feature (O.C. & E.F.)	Yes / No.
13.	Used in Incomer feeder	Yes / No.
C	Outgoing Feeder	
14.	Outgoing Type	ACB / MCCB
15.	Nos. of outgoing	
16.	Rating of the outgoing	---VA …KA breaking Capacity

17.	**No. of Pole**	
18.	**Protective relay Type (ACB Feeder)**	
19.	**Switch Fuse Unit Number & Rating**	
20.	**Size : Length x Breadth x Height in mm.**	
21.	**Approximate weight in Kg**	
D	**APFC panel (Auto power factor correction panel)**	

4.2 APFC panel (Automatic power factor correction panel)

The Medium voltage APFC panel is required to develop the power factor from 0.8 lag to 0.98 lag after providing 1250 A TPN (four poles) ACB. The APFC panel shall be suitable for indoor type 415V ± 10%, 50Hz ± 3%, 3 phase, 4 wire supply system and Degree of Protection IP-52. The APFC panel shall be 2mm CRCA sheet steel enclosed, floor mounted type, self- supporting, fully compartmentalized, dust proof, cubicle pattern. It shall be finish painted with powder coated paint after necessary chemical treatment for rust free surfaces and application of anti rust chemical coating.

The base frame of the panel shall be made of ISMC – 75 channels. The panel shall be dead front type with concealed hinged doors at front and bolted covers at the rear. It shall have rear access at respective feeder modules where Capacitor bank shall be provided. The bus of the panel shall be made of E91E grade of Aluminium alloy insulated with 1.1KV grade heat shrink type PVC colour coded sleeve. The rating of the bus bar shall be 2 to 2.5 times of the full load current of the capacitor draw current.

The current density of the bus bars shall not exceed 1Amp / Sq. mm. The bus bars shall be supported on non-hygroscopic resin moulded fibre glass supports / insulators and the distance between supports/insulators shall be so designed to make the bus bar system capable of withstanding a short circuit fault current of 50 KA (r.m.s.) for 1 Sec. The front bus bar chamber shall be fully shrouded to avoid accidental contact with the live bus bars. The minimum clearance between bus bars and bus bars to earth shall be as per I.S. Specification.

The capacitors shall be of APP type. The capacitors shall conform to IS 2834 of latest amendments. The panel shall be suitable for minimum 400 KVAR rating (Exact KVAR rating should be calculated and submitted at the time of detail engineering) and complete in all respect with required stages of each 30 KVAR, required stages of each 25 KVAR, required stages of each 10 KVAR, required stages of each 5 KVAR capacitor bank to generate 400 KVAR at 440 V as per requirement to improve P.F. as near as 0.95. The capacitors should come into line automatically with certain time delay for which contactors / relays / timers should be used. Suitable current transformer and potential transformer is to be used. There shall be also provision for manual push button operation in addition to the auto mode. P.F. meters in incoming & outgoing are to be placed along with one P.F meter for displaying the improvement in P.F. achieved. The panel should be with all interconnection complete. The control wiring should be with 2.5 sq mm 'Cu' single core conductor of 1.1 KV grade cable.

The following components are to be incorporated with the panel.

a) All power contactor shall be Capacitor duty (with dumping resistance) for capacitor switching.

b) All individual feeders will be backed by suitable rated Power fuse base with link.

c) All individual banks should be suitable for Manual / Auto operation.

d) APFC relay will be 16 channels with microprocessor base system along with display.

4.3 Testing

A. Visual inspection for checking the panel components, its voltage, current rating, breaking capacity etc. as per approved drawings.

B. The insulation Test as Indian Electricity Rules.

C. Operation test at site with load.

D. Relay Tripping Test as per specification at site.

4.4 Installation

A. Transport of materials from store to erection site.

B. After opening the packing case, inspection of materials is required, if any damage is occurred during transportation necessary rectification is to be done, if require touch up paint should be done where necessary.

C. All alignment, levelling, grouting, anchoring and adjustment including Inter Panel locking as necessary in accordance with manufacturers. Any chipping/ levelling insertion of packing plate's minor attendance of board internals etc. as necessary for the above is in bidder scope.

D. Retightening of the bus bar and rechecking of the control panel wiring are in the bidder scope.

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LIST OF TOOLS OF ELECTRICAL EQUIPMENT

Supplied by the bidder

Sl. No.	Description of Item	Quantity & Make
A	Mechanical instrument	
01.	Double Ended Spanner (6 mm to 25 mm)	3 Sets
02.	Screw Driver (6 mm to 25 mm)	3 Sets
B	Sliding Pipe Wrench	
03.	150 mm	3 Nos.
04.	250 mm	3 Nos.
05.	350 mm	3 Nos.
06.	Hand Drill (6 mm to 19 mm)	3 Nos.
07.	H.S. Drills (1.5 mm to 10 mm)	3 Nos.
08.	Round Rough File 350 mm	3 Nos.
09.	Flat Rough File 350 mm	3 Nos.
10.	Steel Tape 2 Meter	3 Nos.
11.	Hacksaw 300 mm	3 Nos.
C	Hammer with handle	
12.	1 kg	3 Nos.
13	2.5 kg	3 Nos.
14.	Cold Chisel 200 mm x 20 mm	3 Nos.
15.	Centre Punch	3 Nos.
16.	Engineering Square 200 mm	3 Nos.
17.	Spirit Level	3 Nos.
D	Electrical Equipment	
18	Multi Range Tong Tester	1 No.
19	500V Meggar	1 No.
20	Multi Meter	1 No.

ANNEXURE –II SITE PLAN

A site plan will be prepared by the successful bidder duly approved by the Superintending Engineer, Western Circle, Burdwan before started the work for general understanding of arrangements.

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ANNEXURE – III LIST OF VENDORS

Sl. No.	Equipment / Instrument	Make
01.	Pumps	KIRLOSKAR/WPIL/ KSB/ MATHER & PLANT
02.	Motors	SIEMENS/KBL/ABB/CG/MATHARON
03.	MCC	LARSEN & TOUBRO/SIEMENS/ABB/SALWIN
04.	Electrical component	LARSEN & TOUBRO/SIEMENS/ABB
05.	Power distribution board	LARSEN & TOUBRO/SIEMENS/ABB/SALWIN
06.	Hoist	INDEF/ROPEMASTER/SUREKHA
07.	Valves (Sluice/Butterfly/NRV)	KIRLOSKAR/IVC/KSB/AUDCO
08.	Isolation Penstocks	Nil
09.	Pressure Gauge	H.GURU/BELLS
10.	Ammeter, Voltmeter	AE / IMP/ L&T
11.	Control Switch.	SIEMENS / L&T / ABB
12.	Push buttons, Selector Switches, Indicating Lamps	SIEMENS / L&T / ABB
13.	Air Circuit Breakers	ABB/GE/LARSEN & TOUBRO/ABB
14.	Power Cable (Aluminium)	UNIVERSAL/HEAVELS/GLOSTER/NICCO/FINOLEX
15.	Control Cable (Copper)	UNIVERSAL/HEAVELS/ NICCO/ FINOLEX
16.	HRC Fuse	LARSEN & TOUBRO/SIEMENS/GE
17.	Contractors	LARSEN & TOUBRO/SIEMENS/GE
18.	Overload Relays	SIEMENS/GE/LARSEN & TOUBRO/AVK-SEG & CONTROLS (I) LTD/CUTLER HAMMER
19.	Local start / stop Push button switch	SWITCHGEAR AND ACCESSORIES/ SIEMENS/L&T
20.	Current Transformers	CROMPTON/BHARAT BIJLEE/EMCO/KAPPA
21.	OC/EF & Under voltage	EE/LARSEN & TOUBRO/ABB
22.	Capacitor	CROMPTON/KHATAUJUNDER/NCEF/UNISTAR
23.	Light Fitting including Lamps & Tubes.	PHILIPS/HEAVELS/CROMPTON (all should be LED lights)
24.	Ceiling Fans & Cabin Fans	GEC/ CROMPON/HEAVELS

25.	Exhaust Fans	GEC/ CROMPON/HEAVELS
26	15-A Industrial Plug Socket outlets.	HEAVELSA/ANCHOR
27.	Multi-range Tongue Tester	MOTWANE
28.	Avo-meter	MOTWANE/HITACHI
29.	500 Volt Meggar	HITACHI/MOTWANE
30.	Paints	ICICI/JONSON & NICHOLSON/SHALIMER/ BERGER
31.	Epoxy Resin	CIBA - GEIGY
32.	Fibre Glass	MAT FIBRE GLASS PILKINGTON
33.	Flow meter	ABB/SEIMANCE/MARSHALL
34.	Temper proof air release valve	KBL/IVC
35.	Power Transformer	ANDRIWEL/ SCHINIDER/ KEC/ CG/ BHEL/ELECTROMECH
36.	HT VCB	ABB/SEIMANCE/SCHINIDER/KEC/CG/BHEL /BICCO-LAWRIEE

Secretary

Asansol Municipal Corporation

ANEEXURE –IV SOIL INVESTIGATION REPORT

A soil investigation report is attached with reference to which foundation design have to be done. The contractor is free to choose more safer value if he desire so as per site condition but no extra claim will be entertained in this respect.

ON

***For* Construction of GROUND LEVEL RESERVOIR AT RADHANAGAR**

MOUZA: BAMANDIHA J.L. NO: 53, R.S.PLOT NO: 49 & 50, R.S. KHATIAN 306 & 359

2630 CUM CAPACITY

PREPARED BY:

S.N. CONSULTANTS, 98, KARAYA ROAD

KOLKATA-700019

CONTENTS

CHAPTER – I NTRODUCTION

OWNER OF THE LAND INTENDS :- THE LAND IS UNDER WEST BENGAL GOVT.

NAME OF THE WORK :- **CONSTRUCTION OF GROUND LEVEL RESERVOIR 2 AT RADHANAGAR**

They took up a programme for soil investigation work at the said premises in order to have an idea regarding allowable Bearing Capacity of the subsoil and the type of foundation which is expected to be suitable for the proposed structure.

M/S. S.N.CONSULTANTS *was awarded the contract for carrying out the subsoil investigation work. The job includes sinking of four nos. boreholes at predetermined positions, collecting of sufficient nos. of samples, testing of collected samples at Laboratory, submission of report, in duplicate, containing suggestion for suitable foundation system.*

1.01 FIELD WORK

The fieldwork was started on 27/03/2017 and completed on 03/04/2017. The boring was advanced by a combination of Auger and Wash boring method as per IS 1892-1981 and standard penetration test (SPT) was conducted at suitable intervals, within the borehole, as per IS 2131-1981. Flush Jointed casings were used to prevent the caving of the sub-soil during boring work. The undisturbed and disturbed samples were collected from suitable depths and were brought to the Laboratory for testing purpose. The water table was found to be at 4.50 m below the existing ground level (E.G.L.).

1.02 FIELD INVESTIGATIONS

The programme of field work at the present site was consisted of the following :-

I. *Sinking of boreholes (2 Nos.)*

II. *Collection of undisturbed soil sample from suitable depth below G.L.*

III. *Conduction of standard penetration test at suitable depths below G.L.*

IV. *Collection of disturbed soil samples.*

1.03 TECHNIQUES OF BORING

Bentonite mud drilling technique developed by the Central Building Research Institute was adopted in this case. Boring was done with soil cutter by direct and circulation throughout the borehole, the 5% bentonite slurry, ejecting out of the cutter, brought the cut materials to the surface. The bentonite slurry, by virtue of its density and thixotropy stabilises the borehole and prevented sand blowing, soft soil blowing and sedimentation. Thus the natural characteristic of the sub-soil strata was not disturbed and the firm base of the borehole could be reached for undisturbed soil sampling and conduction of standard penetration tests.

1.04 COLLECTION OF UNDISTURBED SAMPLES

Undisturbed soil samples were collected as per specification given is I S:2131. After recovery of the samples, the sample tubes were properly sealed at both ends, marked and sent for laboratory testing.

1.05 STANDARD PENETRATION TESTS

Standard penetration test were conducted at each borehole at suitable intervals of depth in between levels from which undisturbed samples were taken in the cohesive strata. S.P.T. was also conducted within the sandy strata. The tests were done with the standard split spoon sampler as per IS: 2131.The N-Values were obtained by counting the number of blows required to drive the spoon from 15 cm. to 45 cm.

1.06 COLLECTION OF DISTURBED SAMPLES

Disturbed samples are collected manually from the Auger and from Split Spoon Sampler . These samples are taken in polythene bags, sealed properly to make it water tight and sent to Laboratory . These samples are used for Grain Size analysis, Atterburg tests etc. These are also enable to locate the change of layers,

CHAPTER – II

LABORATORY INVESTIGATIONS

2.0 LABORATORY TEST

The programme of the laboratory testing was consisted of the followings:

i. *Determination of natural moisture contents (N.M.C);*
ii. *Mechanical analysis;*
iii. *Grain size distribution ;*
iv. *Determination of Atterberg limits(Liquid Limit and plastic limit);*
v. *Tri-axial tests;*
vi. *Consolidation tests;*

2.01 NATURAL MOISTURE CONTENT

It is the ratio of the weight of water to the dry weight of soil determined by oven drying.

2.02 BULK DENSITY

It is the weight of the undisturbed samples for unit volume determined by taking the weight and volume of the specimen.

2.03 GRAIN SIZE DISTRIBUTION

By this test, the percentage of sand, silt and clay constituting the soil are determine based on stoke' law , by virtue of velocity of failing particles. Known weight of soil is dispersed in known volume of water and the purpose is served by pipe fitting out the mixture after required intervals and oven drying.

2.04 ATTERBURG LIMITS

These are arbitrary moisture contents to determine the instant at which the soil is on the verge of being viscous liquid, liquid limit or non-plastic (Plastic) limit. Liquid limit is determined with the help of a liquid limit apparatus, Plastic limit is the water content at which the soil begins to crumble when rolled out into a thing thread of 3 mm diameter.

2.05 TRI-AXIAL TEST

These tests were conducted on the clay/clayey silt samples to determine their shear strengths. The samples were tested under quick condition at the rate of 1.25 mm min. and were loaded upto maximum of 20% axial strain. The cell pressure employed during the tests were 1.0 kg/cm$_2$ and 1.5 kg/cm$_2$.

2.06 CONSOLIDATION TEST

This test is necessary to estimate the settlement characteristics of cohesive soils. In the consolidometer ring (6.25 cm dia.) a 2 cm high sample is taken with porous stones on top and bottom. After saturation, a compressive load is applied and maintained for 24 hours. The compression of the sample is measured at regular intervals by a deal gauge. Thus load increment is made and the procedure is repeated. From the results obtained, e-log$_p$ curve is drawn to estimate the compression index (c_c).

CHAPTER – III

S U B – S O I L P R O F I L E

3.0 SUBSOIL PROFIIE AND PROPERTIES

Two nos. boreholes, one upto 20.0 m and rest one upto 10.0 m, below ground level were made in pre-determined positions to assess the subsoil profile and the engineering properties of soil to determine the foundation system for the proposed structure. Depending on colour, constituents, consistency etc. revealed from two nos. boreholes, the total subsoil profile is found to be made with a single deposit of fine to medium sand with a small surface filling at top. The subsoil profile thus obtained is shown in 'Borehole logs'. To assess the characters of each layer elaborately, brief description of each stratum is given below:-

3.1 CLASSIFICATION OF STRATA

STRATUM I

*A **layer** which varies from 0.10m To 3.00 average from E.G.L. as per the longitudinal aspects of the site. This layer consists of /yellowish black **clayey silt with sand/ mica particles** suitable for any type of moderate foundation. **The subsoil parameters are generalized and given below:***

Field 'N" value	:	***3-6***
Bulk Density	:	***1.50 to 1.75***
Dry density	:	***1.09 to 1.58***
Natural moisture content	:	***15%- 18%***
Liquid limit	:	***22%***
Plastic limit	:	***15-16***
Untrained cohesion Cc	:	***4.25-4.60 n/mm2***
Specific gravity	:	***2.30-2.55***
Initial void ratio	:	***e0 0.728***
Sand	:	***55***
Silt	:	***32***
clay	:	***12***

STRATUM II

This strata consists of yellowish gray silty clay with sand and mica with dense strata whose densification increases with the increment of depth of the said stratum. The 'N' values are ranging from 25to 35 showing its consistency for keeping the load intensity of the proposed structure. Extension of the stratum goes up to 4.50M.

The subsoil parameters are generalized and given below:

Field 'N" value	*:*	***5-18***
Bulk Density	*:*	***1.60/1.75***
Dry density	***:***	***1.29-1.42***
Natural moisture content	***:***	***15%***
Liquid limit	***:***	***18%***
Plastic limit	***:***	***12-14***
Untrained cohesion Cc	***:***	***4.95n/mm2***
Specific gravity	***:***	***2.584***
Initial void ratio	***:***	***e0 1.452***
Sand	***:***	***62***
Silt	***:***	***30***
clay	***:***	***08***

CHAPTER – IV
F O U N D A T I O N S & B E A R I N G C A P A C I T Y

4.0 DISCUSSIONS ON FOUNDATION

The structure for which the subsoil exploration was conducted is a proposed multistoried building. So the loads coming on foundations may be moderate to high, though it largely depends on column grids. From the exploratory borings, field tests and after rigorous study of laboratory test results, it is found that the topmost layer of 1.0 m thickness is a filled up one with heterogeneous materials. The single stratum of the profile is of reddish grey fine to medium sand, found upto 20.0 m from existing G. L. Depth of standing water level is found at 4.0 m the below the existing ground level. Considering all the above factors and also keeping in mind the economic point of view, it is suggested that shallow foundation in different form may be provided for the structure in discussion. The depth of foundation is considered as 1.80 m below G. L. The Net Allowable Bearing Capacity for different shape and size of shallow footings are calculated and some sample calculation is shown in following pages.

4.01 CALCULATIONS

BEARING CAPACITY OF SOIL FOR ISOLATED SQUARE FOUNDATION

The Ultimate Bearing Capacity of soil for cohesion less soil, as our case is, can be Obtained by using the following relation:-

Q_{ult}	=	*C Nc Sc dc ic*
Where C	=	*Cohesion*
Nc	=	*Bearing Capacity Factor*
Sc	=	*Shape factor -1.30 for isolated square*
dc	=	*Depth factor*
i_c	=	*Inclination Factor = 1.0 for vertical loadings*

3.0M x 3.0M FOOTING

Q_{ult} = 4.7 x5.14x1.175x1.30X1.0 = 36.895 t/m2

Using a factor of safety of 2.50 the Safe Net Bearing Capacity is given by

Q_{safe} = 14.76T/m_2

2.0M x 2.0M FOOTING

Q_{ult} = 4.70 x5.14 x 1.35 x1.26250x1.0 = 39.66/M2

Using a factor of safety of 2.50 the Safe Net Bearing Capacity is given by

Q_{safe} = 15.86 t/M2

STRIP FOOTING

3.00M WIDE FOOTING

Qu = 4.7 x5.14x.1.175x1.0 = 28.94 t/m2

Using a factor of safety of 2.5the Safe Net Bearing Capacity is given by

Q_{safe} = 11.57T/m_2

2.00M WIDE FOOTING

Qu = 4.70 x5.14x1.2625x1.0 = = 30.50T/m2

Using a factor of safety of 2.5the Safe Net Bearing Capacity is given by

Q_{safe} = 12.20 T/m_2

FOR RAFT FOUNDATION:

Qu = C Nc Sc dc ic n+q Nq Sq dq iq

Where C = 4.70 Nc=5.14, Sc=1.35 dc= 1+0.2xDf/B =1.02 Nq=1.0 Sq=1.20 dq=1.0

Ic = iq=1 F.O.S.=2.50

Qu = 4.70 x5.14x1.35x1.02x1 + 1.80x0.75x1x1.2x1x1=34.86t/m2

Considering F.O.S. = 3.00

Allowable Bearing Capacity will be 11.62 t/m2 considering allowable settlement criteria. The calculated settlement is 102.50mm.

SETTLEMENTS FOR FOUNDATIONS

Now we will justify the safe bearing of soil in respect of serviceability aspect. There are two types of settlements i) Immediate settlement, which occurs without time lag after loading on foundation. ii) Consolidation Settlement, which is a time dependent settlement and happens over a long period mainly dominant in case of cohesive soils.

IMMEDIATE SETTLEMENT

The Immediate Settlement is given by

S_i	=	$[q B (1 – u)^2 / E_u] x If$
Where q	=	*Stress of soil*
B	=	*Breadth of footing*
u	=	*Poisson ,s coefficient = .50*
E	=	*Young's Modulus = 1500*

If = Influence factor

3.0M x 3.0M FOOTING

Si	=	*12.25 x3.00x0.75/1400]x0.82 16.14 mm*
P	=	*12.25 x3.0x3.0/5.25x5.25=4.00 T/m2*
Sc	=	*0.0027x4.00x4.50= 49.14*
Total Settlement	=	*65.28 mm*

2.00 M x 2.00M FOOTING

Si	=	*13.10x200x0.75/1400]x0.82 = 11.50 MM*
P	=	*13.10 x2.0x2.0/ / 3.50x3.50=4.28 T/m2*
Sc	=	*0.0027x4.28.x3.50= 40.48*
Total Settlement	=	*52.00mm*

3.0 M wide FOOTING

IMMEDIATE SETTLEMENT

S_i = 9.40x2x.75/1400]x1.70= 8.80MM

CONSOLIDATION SETTLEMENT

Sc = 0.0027x3.16x4.0=34.18 mm

Total settlement = 42.00 MM

2.0M WIDE FOOTING

IMMEDIATE SETTLEMENT

S_i = 10.10X3.0X0.75/1400]X0.82 = 8.90 mm

CONSOLIDATION SETTLEMENT

Sii = 0.0027x3.37x6.25=56.00mm

Total settlement = 8.90+56 = 64.56 mm <75mm

BEARING CAPACITY TABLE

TYPE OF FOOTING

SIZE OF FOOTING [M]

NET ALLOWABLE BEARING CAPACITY OF SOIL [T/M_2]

ESTIMATED SETTLEMENT [MM]

ISOLATED

SQUARE = 2.00X2.00 15.20 52

3.00X3.00 14.50 65

STRIP

FOUNDATION 2.00 M WIDE = 12.20 65

3.00 M WIDE = 11.60 42

RAFT FOUNDATION

15 .00 M WIDE 11.00 72

NOTE: Net permissible settlement of the foundation :75mm

CONSULTING GEOTECHNICAL ENGINEER

SUVANKAR CHAUDHURI

MCE, MIGS LBS(I)

STRUCTURAL ENGINEER

CHARTERED ENGINEER

GEOTECHNICAL CONSULTANT

FOR higher loadings as proposed we have to opt for the bored cast in situ piles which would depend upon the capacity of the piles and spacing of the columns. However the foundation design will depend upon the sub soil condition also. For the subsoil condition we have to consider two points which are to be satisfied i.e. the soil should not fail in shear and the settlement will be in permissible limits. In view of the subsoil condition the deep foundation in the form of D.M.C. piles have been investigated for the proposed structure.

The ultimate load carrying capacity of pile, "Q_u", consists of two parts. One part is due to friction, called *skin friction* or *shaft friction* or *side shear* denoted as "Q_s" and the other is due to *end bearing* at the base or tip of the pile toe, "Q_b". The equation given below is used to calculate the ultimate load carrying capacity of pile.

Where,

A_p	=	cross-sectional area of pile base, M2
D	=	diameter of pile shaft, m
γ	=	effective unit weight of the soil at pile tip, kN/m_3
N_γ	=	bearing capacity factor
N_q	=	bearing capacity factor
Φ	=	Angle of internal friction at pile tip
P_D	=	Effective overburden pressure at pile tip, in kN/m_2
K_i	=	Coefficient of earth pressure applicable for the 4th layer

P_{Di} = Effective overburden pressure for the ith layer, in kN/m_2

δ_i = Angle of wall friction between pile and soil for the ith layer

A_{si} = Surface area of pile shaft in the ith layer, in m_2

The first term is the expression for the end bearing capacity of pile ($\mathbf{Q_b}$) and the second term is the expression for the skin friction capacity of pile ($\mathbf{Q_s}$). A minimum factor of safety of 2.5 is used to arrive at the safe pile capacity (Q_{safe}) from ultimate load capacity (Q_u).

$$\mathbf{Q_{safe} = Q_u / 2.5}$$

To calculate the capacity of the pile here the length of the pile may be adopted to 14.00m with a consideration of the cut off level as 1.50m from formed G.L. FRICTIONAL component of second layer

0.55 (3.5x3)+4.6x1.5+6.5x6+2.2x1.5+60) = 65.83D

FOR THE third layer frictional component:

KPd tan d As= 1.50x20xtan32DX4= 75D

FOR THE ROCK layer:

KxPd tand x As= 1.50x20xtan34Xdl(30)69D

Total frictional component will be

= 269D with FO.S.=2.50 Pf= 83.6D

End bearing capacity of the pile

Nq=58 considered phi-34* Ny= 59

Total load capacity of end bearing

=3.1417D2/4(0.5x1.0x59+23x58+1.50Nc=1341D2

Considering the f.o.s. = 5 safe bearing capacity = 268 D2

TOTAL LOAD WILL BE : 83D+268D2

PILE DIA. PILE TIP CUTOFF SAFE CAPACITY

MM	***M .***	***TON***
400	*(-)12.00*	*(-)1.50 76*
450	*(-)12.00*	*(-)1.50 91*
500	*(-)12.00*	*(-)1.50 108*

UPLIFT CAPACITY AND HORIZONTAL CAPACITY OF THE PILE

The ultimate skin friction of the pile = 50% of design load + self wt of the pile
Or with the F.O.S 3.00 we can
consider the load capacity = 69.7 D
Consider the uplift capacity = 69 mt

HORIZONTAL CAPACITY OF THE PILE:
Lateral capacitycan be given by Qu = 12EI/4+Lfx3
Where Lf = embedded length of the pile
Depth of fixity (EI/KtL/5 465.9
from table1 KI = 0.146 kg/cm2
Li/Ro = 0Lf/R=2.10
Qu to be calculated as = 26.50mt
According to Prof N.Som and S.C.
Das the lateral load will be = 2-5% of the vertical load
Permissible horizontal capacity
will be 351x0.03 = 10.05mt
THE actual load bearing capacity should be determined by carrying out load test at site as per IS code of practice.
A minimum distance of = 2.50D-3.0D

Should be maintained between the centers to center of the piles. Where D is the diameter of the piles.

PILE FOUNDATION : PILE DIA. C.O.L. SHAFT LENGTH

SAFE AXIAL PILE LOAD UPLIFT CAPACITY HORIZONTA L CAPACITY (M) CAPACITY mt

400	***1.50***	***12.00***	***76***	***28***	***2.07***
450	***1.50***	***12.00***	***91***	***35***	***2.73***
500	***1.50***	***12.00***	***108***	***42***	***3.24***

6.0 RECOMMENDATIONS

1) Any loose or filled up soil found at foundation bed must be lifted out and replaced by properly compacted sand cushion of 200mm.

2) Construction in stages is advisable.

3) Overstressing of soil due to closely spaced footings or vicinity of adjacent structures is Not considered in this Report.

4) In case of any query arising out of this Report one may feel free to the undersigned.

5] The test pile should be done before ascertaining the capacity of the pile

CONSULTING GEOTECHNICAL ENGINEER

Secretary

Asansol Municipal Corporation

Aneexure - V

Tentative Lay out drawing for 800 kVA Sub Station building

A Tentative Lay out drawing is attached as Annexure V for construction of Sub Station

Secretary

Asansol Municipal Corporation