BID DOCUMENT

FOR

Surveying, Geo-Technical investigation, Planning, Designing ,construction supply & erection of RCC Raw Water Intake Structure(Fixed type), containing intake well with raw water pump house and with 3.00 m width RCC walk way with suitable pile foundation, having allowing at least water withdrawl of 17.21 MLD (Approx.- 865 m3/hr, with 20 Hrs Pumping) with tolerance of 25% over loading & with necessary civil, electrical (according to I/E rules), including construction of Jetty along with 500 KVA substation at Ichapur ghat in river Rupnarayan near Tamralipta Municipal Town with bank protection and other allied works, including all civil, electrical and mechanical works for proper completion of work to draw the requisite water and after satisfactory completion of 3(three) months trial run and 5 (five) year operation and maintenance on turnkey basis under AMRUT-II .

NOTICE INVITING ELECTRONIC TENDER No.

Municipal Engineering Directorate

GOVERNMENT OF WEST BENGAL
OFFICE OF THE SUPERINTENDING ENGINEER
SOUTH CIRCLE
MUNICIPAL ENGINEERING DIRECTORATE
MUNICIPAL AFFAIRS DEPARTMENT

Kausallya, Opposite Kausallya T.O.P., Kharagpur, Dist-Paschim Medinipore, Email ID : se_southmed@rediffmail.com

NOTICE INVITING e-BID

Memo No. MED/SE(S)/122/W-6/06 Pt. II **Dated-12/07/2023**

Notice Inviting e-Bid No.- WBMAD/NIQ-01/SE(S)/2023-24

The Superintending Engineer, South Circle ,M.E.Dte invites sealed competitive Tender on turnkey basis from a reliable and resourceful Companies/Firms/Contractors having experience and acumen in construction work as noted below and the eligibility is depicted here under for participating in the Bid.

1. Name of Work: Surveying, Geo-Technical investigation, Planning, Designing ,construction supply & erection of RCC Raw Water Intake Structure (Fixed type), containing intake well with raw water pump house and with 3.00 m width RCC walkway with suitable pile foundation, **having allowing at least water withdrawl of 17.21 MLD (Approx.- 865 m3/hr, with 20 Hrs Pumping) and also** with tolerance of 25% over loading & with necessary civil, electrical (according to I/E rules), including construction of Jetty along with 500 KVA substation at Ichapur Ghat in river Rupnarayan near Tamralipta Municipal Town with bank protection and other allied works, including all civil, electrical and mechanical works for proper completion of work to draw the requisite water and after **satisfactory completion of 3(three) months trial run and 5 (five) year operation and maintenance on turnkey basis under AMRUT-II** .

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2. Location of the work: i) Intake jetty location – Latitude: 22 degree 15 ‘ 7” N
Longitude: 87 degree 57 ‘ 7” E

ii) Intake substation location - JL.No.- 53, Plot No-327 Mouza- Icchapur , Dist: Purba Medinipore

3. Scope of Work:

i) Surveying, Geo-Technical investigation, Planning, Designing, Construction & commissioning of intake Jetty structure (not less than 96 Sqm or as designed)with raw water pump house having capacity to supply 17.21 MLD (Approx.- 950 m3/hr,with 20 Hrs Pumping) with tolerance of 25% over loading & with necessary civil, electrical (according to I/E rules) & mechanical works & all other allied works related to the project in all respect complete for drawl of water from river Rupnarayan & supplying up to the ongoing water treatment plant at Tamralipta Muncipality with other allied works as per KOPT hydraulic survey report (with necessary approval from respective Authority) including jetty lightening and internal illumination and after satisfactory completion and commissioning, 3 (three) months trial run, necessary training of maintenance staff & there after (subsequently) 5 (five) year operation and maintenance with security and guarding arrangement .

<u>The Major Components</u>:

i) All Civil & Electromechanical Works for Construction for Construction of Raw Water Intake Setup on the river Rupnarayan.

ii) RCC Intake Well, Mounted Pump House* of Required Size & Shape will be pin pointed on location as mentioned in (Sl No-2) as per recommendation of feasibility study done by the KOPT.

iii) Connecting RCC Jetty from river bank to Intake Well by RCC pipe carriage way supported by suitable pile foundation of required length & width (not less than 3 m width) to accommodate all required provisions including Pipe Carriage way, Gangway, Cable Trench etc.

iv) Supplying, installation, commissioning of all Pumping Machineries for Pump House including Vertical Turbine (V.T.) Pumps, manifolds, other equipments, Compound illumination Complete execution of all Electro Mechanical Works of Pump House.*

v) Supplying, installation, commissioning of all required Electrical Goods, Equipments, Machineries, Devices, and Appliances for Electrical Substation including Transformers Panels, Compound illumination etc, and complete execution of all Electro Mechanical Works for Electrical Substation. The temporary service connection charges as per WBSEDCL Quote will be borne by the agency.

vi) Bank Protection works in the vicinity of intake structure as per side requirement.

vii) Construction of 500 KVA Intake Sub Station Building (Not less than 200 sqm area or as designed) along with all electro mechanical work including necessary allied work like land development, construction of retaining wall etc

viii) It is required to construct a boundary wall along fencing with operable locked gates to isolate the Intake Setup from surroundings.

ix) Trial Run of the Comprehensive Project Setup for a period of 3 Months

x) Operation & Maintenance of the Comprehensive Project Setup for a period of 60 Month

**** It is to be noted that the Intake Well and Pump House should be designed to accommodate Machineries to withdraw 21.26 MLD Raw Water in 20 Hrs pumping (For future provision). But for now Pumping machineries need to be designed & installed to obtain 17.21 MLD Discharge***.

4. Eligibility to participate in the Bid:

Having experience and technical acumen in Executing, Construction & Completion of raw water intake structure on tidal river including pumping arrangement of capacity at least 7.0 MLD with pumping station and 3.0 M width RCC walk way along with 250 KVA substation including all Civil, Electrical & Electro-mechanical works with completion of operation & maintenance of similar pumping machineries successfully for at least 12(twelve) months in any contracts during last Five financial years in any Govt. Dept. /Board/Semi Govt./Corporation/ Statutory Authority/Undertaking etc. under single contract.

AND

Having experience and technical acumen in Executing, Construction & Completion of raw water intake structure of capacity at least 5.0 MLD each in two works along with with pumping station and 3.0 M width RCC walk way and 250 KVA substation in each work including all Civil, Electrical & Electro-mechanical works with completion of operation & maintenance of similar

pumping machineries successfully for at least 12(twelve) months in any contracts during last Five financial years in any Govt. Dept. /Board/Semi Govt./Corporation/ Statutory Authority/Undertaking etc. under single contract.

AND

Having experience and technical acumen in Executing, Construction & Completion by 80% of raw water intake

structure and capacity of which will be at least 7.0 MLD after completion along with pumping station and 3.0 M width RCC walk way

and 250 KVA substation including all Civil, Electrical & Electro-mechanical works in any contracts during last Five financial years in any Govt. Dept. /Board/Semi Govt./Corporation/Statutory Authority/Undertaking etc. under single contract.

AND

The available Bid capacity (to be calculated on the basis of prescribed format) of the prospective applicant shall not be less than that of the estimated amount put to tender as per
Annexure-A in terms of memorandum no- 45-W(C)/1M-23/15 Dated- 13.02.2015 of Principal Secretary Public works Department, works Branch, Govt. of West Bengal

Note: Only works completed successfully will be treated as credential. Joint venture, Consortiums etc are not allowed.

A certificate from the executing authority/ client not below the rank of Executive Engineer/ Divisional Engineer/ equivalent is to be produced in support of above criteria clearly stating that the works entrusted to the bidder have been successfully completed.

Each work must have been executed by the bidder successfully under a single contract within the last 5 (Five) years as prime Contractor anywhere in India in drinking water supply project with State or Central Government / Govt. Autonomous body.

Machinery & Equipment

Having in possession of Sophisticated & Modern Equipment, Machineries etc. for construction specially required for construction of intake jetty extended up to deep channel of tidal rivers

Technical Personnel

Having qualified salaried technical personnel with sound knowledge & experience in execution of similar work. The following personnel are :-

1. Civil Engineer (Degree holders with min. 3 Yrs. of experience in construction field) : 1 nos.
2. Mechanical Engineer(Degree holders with min.3 yrs. experience of similar type of work): 1 no.
3. Electrical Engineer (Degree holders with min.3 yrs. of experience of similar type of work) : 1 no.

4. Civil Engineer (Diploma holders with min.3 yrs. experience in construction field) : 1 nos.

5. Electrical Engineer (Diploma holders with min.3 yrs. experience of similar type of work) : 1 nos.

6. Mechanical Engineer (Diploma holders with min.3 yrs.experience of similar type of work): 1 nos.

7. Licensed Electrician & Electrical Supervisor having certification of 11 KV HT line : 1 no.

The bidder should not have a history of any penal measures taken by any authority/ client on any account against the organization / firm for any project of similar nature or any other project executed during the last 3 (three) years. A declaration to this effect will have to be submitted by the bidder in A4 the form of Affidavit in non-judicial stamp paper duly certified by 1st class Judicial Magistrate. Without submission of this document the bidder will be disqualified.

5. Financial Criteria:

i) Completion certificate produced as credential should clearly indicate the description of works, value of contract, executed work value, date of award, actual date of completion etc. and name, address, telephone no. of the client.

ii) The Bidder should have Average Annual Turnover during last 5 (five) financial years (i.e. 2018-2019, 2019-2020, 2020-21 , 2021-22 & 2022-23) of not less than **Rs. 10.00 Crore (Rupees Ten Crore)** (General Notes:- The average annual turnover shall be based on Tax Audited Report in 3CD Form duly signed by a registered chartered accountant of immediate proceeding last 5 (five) financial years.)

iii) The Bidder should have a valid Trade License/Registration Certificate, Professional Tax Challan, PAN Card, GST Registration Certificate & GSTIN No

iv) Bidder should submit Banker's certificate

having Solvency of at least Rs **5.00 Crore (Five Crore)** only from a nationalized/scheduled bank of India. Issue date of the certificate must be after date of publication of the tender.

All documents in original to be produced in due course of time as & when asked by the Tender Inviting Authority

6. Earnest Money:

(a) The intending bidders shall have to deposit Earnest Money in the following manner Initial earnest money of Rs. 4.00 Lakh to be submitted online through ICICI bank gateway linked with the e-tender website as an initial Earnest Money Deposit shall accompany with Bid Proposal, in the form of The Earnest Money, as specified in this NIeB. Bid will be declared informal if earnest money receipt is not submitted and uploaded with bid document.

(as per GO No. 3975-F(Y) dt. 28.07.2016 of Finance Deptt., Govt. Of West Bengal). Every such Transfer shall be done on or after the date of publish of NIeB. Any Bid without such Transfer of EM (Except exemption as per G.O.) shall be treated as informal and shall be automatically cancelled. Online transfer of Earnest Money receipt (Scanned copy) shall be uploaded as Statutory document.

The amount will be converted into security deposit.

b) Balance Earnest Money Deposit i.e. 2% of bid amount beyond Rs. 4,00,000.00 (if any) shall have to be deposited after acceptance of Bid Proposal in the form of Demand Draft from any nationalized/scheduled Bank in favour of the Executive Engineer, East Midnapore Division,M.E.Dte. Payable at Tamluk.

7. Date and Time Schedule :-

Sl. No.	Particulars	Date and Time
a)	Date of uploading of NIB (Bid Documents(online) (Publishing date)	12/07/2023 at 5:00 PM
b)	Document download start date (online)	12/07/2023 from 5:30 PM onwards.
c)	Date of Pre Bid Meeting (offline) with the intending Bidders in the office of the Superintending Engineer, Central Circle, Municipal Engineering Directorate.	24/07/2023 at 1:00 P.M
d)	Both Technical and financial bid submission starting date (On line)	13/07/2023 10:00 A.M onwards
e)	Last date of submission of queries (To be reached at SE (South Circle)	24/07/2023 up to 1:00 P.M
f)	Document download closing date (online)	7/08/2023 up to 5:00 P.M
g)	Both Technical and financial bid submission (on line) closing date	7/08/2023 up to 5:00 P.M
h)	Date of opening of Technical Proposals(online)	9/08/23 after 12:00 Noon.
i)	Date of uploading of list of technically qualified bidders (online)	Will be informed later
j)	Date of opening of financial bid (online)	Will be informed later
K)	Date of uploading of list of bidders along with the rates through (online), also if necessary for further negotiation through (offline) for final rate.	Will be informed later

8. Time of completion — Time of completion of the Contract is 365 days from the date of issue of Work Order.

9. 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, 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.

10. Bid documents

A full set of Bid documents consists of Two Parts.

I) Part I containing all documents in relation to the name of the firm applied for and credentials possessed by them along with all documents

AND

Section A: Description of the Project.

Section B: Conditions & requirements for Bidding.

Section C: General conditions of the Contract.

Section D: Special provisions.

Section E: General specifications of Workmanship & materials for Civil Works.

Section F: General technical specification.

Section G: Detailed technical specifications for Civil works.

Section H: Annexure

Section I: Technical specification of motor

Section J: Technical specification of pump

Section K: Technical specification of panel

Section L : Technical specification Mechanical

Section M: Technical specification of pile

Section N : Technical specification of fabrication

Annexure under Section H :

i. Hydraulic survey report.
ii. List of tools / Electrical equipment.
iii. List of vendors
iv. Map of the Intake

II) **Part II** containing following documents;

a. Bid Price / Price Schedule (.xls. sheet)

11.	Validity of Bid	A Bid submitted shall remain valid for a period of 120 calendar days from the date set for opening of Bids. Any extension of this validity period if required will be subject to concurrence of the Bidders.
12.	Withdrawl of Bid	A Bid once submitted shall not be withdrawn within the validity period. If any Bidder/Bidders withdraw his/their Bid(s) within the validity period then Earnest Money as deposited by him/them will be forfeited.
13.	Acceptance of Bid	The Superintending Engineer,South Circle will accept the Bid after due approval of Financial Evaluation sheet by State Level Technical Committe committee of Amrut . The committee does not bind itself to accept otherwise the lowest Bid and reserves to itself the right to reject any or all of the Bids received without assigning any reason thereof.
14.	Intimation	The successful Bidder will be notified in writing of the acceptance of his Bid. The Bidder then becomes the "Contractor" and he shall forthwith take steps to execute Formal Contract Agreement in appropriate Govt. Form with the Superintending Engineer,South Circle and fulfill all his obligations as required by the Contract. After the Bid is provisionally accepted, the Bidder shall submit detail Design, Drawing and working specifications phase wise based on existing site condition & proposed levels at site. If it is found technically correct and acceptable with proper examination by the Superintending Engineer, South Circle, M.E. Directorate, Kharagpur, provisional approval of the submitted drawings will be accorded phase wise for execution and Drawings are to be vetted by the reputed Govt technical Institute before submission of same to the Superintending Engineer, South Circle, M.E. Directorate, Eventually, all the parts, Design, Drawings etc. of the successful Bidder shall be taken as a part of the agreement.

15.	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.
16.	Name & address of Engineer-In-Charge (EIC) of the Work	Executive Engineer, East Midnapore Division, Municipal Engineering Directorate, Department Of UD & MA, Salgechhia, Nimtola More, Ward No.-17, Tamralipta Municipality, P.O.-Tamluk, Dist.-East Midnapore, Pin-721636 West Bengal, . Phone & Fax: (03228) 263360 E-mail ID – medmideast@yahoo.com.
17.	Execution of Work	The Contractor is liable to execute the whole work as per direction and instruction of the Executive Engineer, East Midnapur Division of Municipal Engineering Directorate who is the Engineer in Charge of the work after due approval of "The Superintending Engineer, Southl Circle, M. E. Dte."
18.	Payment	Payment will be made to the successful Bidder by the Executive Engineer, East Midnapur Division of Municipal Engineering Directorate on receipt of fund from ULB end and Payment for all Electro-mechanical works will be made after due recommendation by the Executive Engineer, (E/M) MED.

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

19. In case office faces sudden closure owing to reason beyond the scope and control of The Superintending Engineer, South Circle, any of last date/dates as schedule in Sl. No 7 may be extended up-to/to next and following working day without issuing further separate notice.

20. Persons having authenticated and having registered Power of Attorney may be considered lawfully becoming to be acting on and for behalf of the Bidder.

21. Sufficient care has been taken to avoid variance in between the contents of the listed documents in the Bid documents. However, if there is any variance between the contents of different documents, the provision of documents appearing earlier in the list shall prevail over the same provided in the contents coming later.

22. 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.

23. Bid Acceptance Authority is the Superintending Engineer, South Circle, M.E Dte. Directorate,

24. In case of any dispute arising from any clauses of similar nature between bid documents, the decision of Superintending Engineer, Central Circle, M.E. Directorate, Malda will be final and binding.

25. All usual deductions for taxes 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)

26. No conditional/ incomplete Bid shall be entertained. Cost of Agreements documents as per order no 432-A/PW/0/10 C-35/10 date 26/07/2011

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General notes:

(a) No joint venture in the form of M.O.U. or in any shape will be accepted at any stage of tendering.

(b) The Bidder should also upload Place of Registration, Principal Place of Business & Power of attorney of signatory of tender.

(c) The average annual turnover shall be based on audited balance sheets of last 3 (three) consecutive financial years.

(d) The drawing and design to be submitted by the successful bidder in connection to the work with duly vetted by the Reputed Govt Engineering college like IIT, Kharagpur/Jadavpur University/IIEST, Shibpur, Howrah.

(e) Canvassing in connection with the e-tenders is strictly prohibited and the tenders submitted by bidder who take resort to canvassing will be liable to rejection.

(f) Partnership Firms shall furnish the registered partnership deed and Companies shall furnish the Article of Association and Memorandum. [Non Statutory Documents]

(g) In case of Proprietorship and Partnership Firms and Company, the Tax Audited Report to be furnished along with balance sheet and profit and loss account and all schedules forming the part of Balance Sheet and Profit & Loss Account in favour of applicant. No other name along with applicant name, in such enclosure will be entertained. [Non Statutory Documents]

(h) Submission of Income Tax Acknowledgement Receipt for Current Assessment Year is mandatory.

(i) Any legal matter will be settled within the jurisdiction of the Hon'ble District Judges' Court at Tamluk, Distt.- Purba Medinipore, West Bengal.

(j) The 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 Tender documents before the Tender Inviting Authority in writing within the stipulated date and time as mentioned in this e-NIT. Beyond such period no representation in this regard will be entertained by the Tender Inviting Authority. The Pre-Bid Meeting will be held at the Office of the Superintending Engineer, South Circle, M.E Dte on Stipulated date & time .

(k) Written clarification or amendments etc. as may be issued by the Tender inviting authority in pursuance to the presentation made by the Bidder shall be final and binding on the Bidder and shall form part of the Tender documents

(l) Before issuance of the Acceptance / Work Order, the tender inviting authority may verify the credential & other documents of the lowest bidder if found necessary. After verification, if it is found that such documents submitted by the lowest tender is either manufactured or false in that case, work order will not be issued in favour of the lowest bidder under any circumstances.

28. Electrical Licence and Labour Licence:

Upon receipt of acceptance order, the successful bidder has also to obtain the labour licence from the office of the Joint Labour Commissioner of the concerned District in which the location/site of the work falls, under the provision of W.B. Contract labour (Regulation & Abolition) rules, 1972 and Electrical Licence and Electrical Supervisory Licence has to be obtained by the bidder from the appropriate authority. Copies of the licenses are to be submitted to this office through the concerned Executive Engineer before execution of deed of contract.

29 . Penalty for suppression / distortion of facts

If any bidder fails to produce the original hard copies of the documents or any other documents on demand of the Tender Inviting Authority within a specified time frame or if any deviation is detected in the hard copies from the uploaded soft copies or if there is any suppression, the bidder will be suspended from participating in the tenders one-Tender platform for a period of 3(three) years. In addition, his User Id will be deactivated and Earnest Money Deposit will stand forfeited, besides,
the tender inviting authority may take appropriate legal action against such defaulting bidder.

30. Award of Contract

The Tender Inviting Authority reserves the right to accept or reject any Bids and 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 Bidders or any obligation to inform the affected Bidder or Bidders of the ground for Tender Inviting Authority's action. The Bidder whose Bid has been accepted will be notified by the Tender Inviting & Accepting authority through acceptance letter. The notification of award will constitute the formation of the Contract

31.Security Deposit/Deduction.:

The entire deposited amount as EMD shall be converted to initial security deposit in case of successful bidder.

ii) Balance amount of security deposit (10% of the accepted value of the work or as per Govt Order amended time to time - EMD already deposited) will be deducted from each progressive bill of work .

32.Payment

Payment of RA bill as well as final bill will depend upon the availability of fund and no financial claim in case of any delay in payment will be entertained. Payment on supply without successful erection and commissioning will not be entertained. Materials which will be supplied should be supported by valid challans.

The bidder will notify the authority regarding the work being completed. The quantity and quality of executed work will be taken into account for the preparation of bill. The engineers shall field verify the work executed. Only the items which are successfully installed and commissioned will be taken in the preparation of bill.

All the applicable routine test, type test and other test reports shall be submitted along with the bill prayer.

32 A. PAYMENT TERM

PART-A

Terms of Payment: Item wise break up (Civil & Mechanical Work)			
1.	Surveying, Geo-Technical investigation, Planning, Designing & Drawing of all civil structure, sub structure, foundation for intake jetty, Pump house, pipe carrying bridge & Electrical Substation including necessary design calculation , preparation of level sheet , drawing sheet etc and submission for approval.		
	Break up		
A	After Submission of Drawing design for Approval.	10%	3 % of Quoted Amount
B	After final Approval of drawing design.	90%	
	Total	100%	

2	Construction of RCC Intake well with pile foundation, along with Ironite floor finished with RCC spiral stair case including construction of pump house with all necessary finishing work.		
	Break up		
A	After completion of pile foundation work	20%	10 % of Quoted Amount
B	All structural workup-to Roof Level of Pump house	40%	
C	All work including finishing Complete in all respect	30%	
D	After successful trial run the plant.	10 %	

	Total	100%	

3	Construction RCC walkway / Pipe Carrying Bridge (3.0 M width) up to river bank		
	Break up		
A	After completion of pile foundation work	20%	20 % of Quoted Amount
B	After completion of all structural work	40%	
C	All work including finishing Complete in all respect	30%	
D	After successful trial run the plant.	10 %	
	Total	100%	

4	Filling & Land development of Whole Premises up to HFL with ramming, compacting, levelling, and finishing including construction of RCC retaining wall		
	Break up		
A	Filling & Land development of Whole Premises with proper compaction and compaction	50%	5 % of Quoted Amount
B	After completion of all structural work of Retaining Wall	40%	
C	After successful trial run the plant.	10%	
	Total	100%	

5	Bank Protection works in the vicinity of intake structure		
	Break up		
B	After completion of all work	40%	8 % of Quoted Amount
C	After successful trial run the plant.	10%	
	Total	100%	

6	Construction of 2.0m High (From FGL)boundary wall with RCC Column Frame structure along with barbed fencing with good architectural steel gate (5.0 m)with anti corrosive painting, including surface drain as per approved drawing and direction of E.I.C. in all respect .		
	Break up		
A	After completion of all structural work including brick work	40%	3 % of Quoted Amount
B	All finishing work including paining work with barbed wire fencing	30%	
C	After installation of Gate	10%	
D	Construction of surface drain	10%	
C	After successful trial run the plant.	10%	
	Total	100%	

7	Construction of 500 KVA Electrical substation as per approved drawing and direction of E.I.C. in all respect		
	Break up		
A	After completion of all structural work including brick work	50%	5 % of Quoted Amount
B	All finishing work including paining	40%	
C	After successful trial run the plant.	10%	
	Total	100%	

8	Laying of 500 mm DI pipe line from common manifold of Intake well to river bank of Rupnarayan through pipe carrying bridge including making necessary connection with previously laid Raw water rising main		
	Break up		
A	After completion of all laying work including necessary joint connection	90%	1 % of Quoted Amount
B	After successful trial run the plant	10%	
	Total	100%	

Electro-Mechanical Part			
9	Supply,delivery and installation of Electro-mechanical equipments for pump & motor 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%	15 % of Quoted Amount
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 Electro-mechanical equipments for intake well, MS manifold ,valves and specials, flow meter, and all mechanical equipments 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%	5 % of Quoted Amount
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 Electro-mechanical equipments for PDB cum MCC & Earthing 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%	4 % of Quoted Amount

C	Testing, Commissioning and after successful trial run of the plant..	10%	
	Total	100%	

12	Supply,delivery and installation of Electro-mechanical equipments for cable,cable tray,distribution wiring, mechanical type level indicator 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%	4 % of Quoted Amount
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 Electro-mechanical equipments for cable, cable tray, distribution wiring, mechanical type level indicator 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%	4 % of Quoted Amount
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 outdoor and indoor LED fittings, exhaust fans, pedestal fans , fire fighting equipments rubber mats of Bid Document Completion 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%	4 % of Quoted Amount
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	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		
A	All work complete in all respect	100%	1 % of Quoted Amount
	Total	100%	

16	Any other works which s not covered under (SLNo1 to15) stated above(specify Detail scope of works) but required for the Project.		
	Break up		
A			3 % of Quoted Amount

PART-B	Operation and maintenance of the plant (both Civil and Electro mechanical works) for 5 (Five) years		
16	Operation and maintenance of the plant (both Civil and Electro-mechanical works) for 5 (Five) years ensuring smooth and effective run of comprehensive system under the contact to obtain designed discharge from intake well and delivered the designed quantity discharge at the inlet of WTP at D.C. Sankarara , Tamluk town . This work also 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. complete in all respect as per Bid document and as per direction of EIC.		
	Break up		
A	Periodical payment for the above work with respect to quoted amount to be finalized Superintending Engineer, South Circle, MED after acceptance of Bid		5 % of Quoted Amount

33.Deduction of tax, royalty , Labour welfare Cess & GST

All duties, taxes, royalties, cess and also an amount equal to 1% of the contract amount will be deducted from the RA bill / final bill on account of "the building and other construction work (regulation of employment and condition of service) Act, 1996" and "The building and other construction work welfare cess Act, 1996" apart from other statutory deductions from bills/ payment due & GST will be deducted as per Govt norms

34. Minimum Wages

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.

36. Laboratory Test:

The successful bidder will have to establish field testing laboratory equipped with requisite instruments in conformity with relevant code of practice and technical staff according to the requirements of works to be executed. The executing agency will have to produce satisfactory test report of all the materials of the work as well as on samples collection jointly by him and concerned authority of the Engineer-in-Charge from all completed / ongoing items of works as per relevant codes of practice at his own cost from any Govt. approved / Govt. testing laboratory during execution of works. The successful bidder will have to bring all requisite plants and mechanical equipment and / or technical personnel and / or laboratory and field testing machineries and equipment for all the items of work as per BOQ and / or as per relevant IS / IRC Codes of practice and / or as per direction of the Engineer-in-Charge and / or as per relevant PWD Schedule of Rates at the time of execution of work at site even if upon technical evaluation he is declared as "qualified" without having all the requisite plants and mechanical equipment and / or technical personnel and / or laboratory and field testing machineries and equipment at the time of submission of bid.

37. No Moblisation Advance:

No Mobilisation Advance and Secured Advance will be allowed. Agencies shall have to arrange required land for installation of Plant & Machineries, (specified for each awarded work, storing of materials, labour shed, laboratory etc. at their own cost and responsibility nearest to the work site.

38. Influence Any attempt to exercise undue influence in the matter of acceptance of Tender is strictly prohibited and any bidder who resorts to this will render his bid liable to rejection.

39. If any discrepancy arises between two similar clauses on different notifications, the clause as stated in later notification will supersede former one in following sequence:

(i) West Bengal Form No. 2911(ii)

(ii) NIeB

(iii) Special terms & Conditions

(iv) Technical bid

(v) Financial bid

In case of inadvertent typographical mistake in the BOQ / Schedule of Works/ Price Schedule/rates /elsewhere, the same may be treated to be so corrected as to conform with the relevant schedule of rates and / or technically sanctioned estimate.

40. Bid Evaluation Committee (BEC):

A Bid Evaluation Committee (BEC) has been constituted under the Superintending Engineer (South Circle), Municipal Engineering Directorate, Government of West Bengal, who is the tender inviting authority for all works beyond the tender accepting power of the Executive Engineers.

The members of Bid Evaluation Committee would be:-

1. Superintending Engineer (South Circle)- Chairman
2. Executive Engineer(East Midnapore Division)- Member.
3. Executive Engineer, (South Circle)- - Member.
4. Divisional Accounts Officer / Divisional Accountant (East Midnapore Division) - Member.

The Bid Evaluation Committee will do the technical and financial evaluations of the bidders for different types of works and make recommendation to the tender accepting authority. The bidders will have to meet all the minimum criteria regarding:-

(a) Financial Capacity

(b) Technical Capability

(c) Experience / Credential

The eligibility of a bidder will be ascertained on the basis of his digitally signed documents in support of the minimum criteria as mentioned in (a), (b), (c) above with the help of his DSC and the declaration executed through prescribed affidavit in non-judicial stamp paper of appropriate value duly notarized. If any document submitted by a bidder is either manufactured or false, in such case the eligibility of the bidder/ tenderer will be out rightly rejected at any stage without any prejudice and further penal action may be taken against him as per rule.

In case there is any objection regarding prequalifying an agency, that should be lodged to the Chairperson & Convenor of the Bid Evaluation Committee.

41.Defect Liability Period:-

For Civil work defect liability period Should be observed for 5 (Five) Year from date of completion. (As par Notification No. 5784-PW/L&A/2M-175/2017 dt. 12.09.2017 of Principal Secretary, PWD).

42.Refund of Security Deposit:

In cases of Refunding and Releasing of 100% (one hundred percent) Security Deposit held with the Government, arising out from works contract, Security Deposit will be released after issuance of Completion Certificate.

For Civil work with 5 (five) years Defect Liability Period:

No amount shall be refunded to the contractor for first 3 (three) years from the actual date of completion of the work;

30% (thirty percent) of the same shall be refunded to the contractor on expiry of 4 (four) years from the actual date of completion of the work;

The balance 70% (seventy percent) of the same shall be refunded to the contractor on expiry of 5 (five) years from the actual date of completion of the work.

Note: All addendum and corrigendum, if published through https://wbtenders.gov.in in relation to this tender, will have to be considered as parts and parcel of this comprehensive tender document. Bidders have to follow all publications carefully and it will be the

responsibility of the bidder to finalize their quoted Rate before the date of final submission.

43. The bidder is responsible for completion for all civil,Mechanical and Electrical works involved with the requisite components as per relevant IS codes and CPHEEO Manual (duly approved by competent by competent Authority) to extract 17.21 MLD water including Substation of capacity 500 KVA or as designed.

The Superintending Engineer,
South Circle, M.E. Directorate

Memo No.:- **Dated:**

Copy forwarded for wide circulation through:

1. The Chairman, Tamralipta Municipality for his kind information
2. The State Mission Director, AMRUT-II, ILGUS Bhawan, Sector-III, Kol-700106
3. The Joint Secretary, UD&MA Department, Govt of WB , Nagarayan Bhawan , DF-8,Saltlake City
4. The Secretary, Municipal Engineering Directorate, Bikash Bhavan, Salt Lake, Kolkata-700091 for his kind information.
5. The Chief Engineer, Municipal Engineering Directorate, Bikash Bhavan, Salt Lake, Kolkata-700091 for his kind information.
6. The Additional Chief Engineer (S), Municipal Engineering Directorate, Bikash Bhavan, Salt Lake, Kolkata-700091 for his kind information.
7. The District Magistrate, Purba Medinipur for his kind information.
8. The Executive Engineer, Midnapur (East) Division, Municipal Engineering Directorate, Tamluk.
9. The District Information & cultural affair Officer, Purba Medinipur.
10. Office Notice Board.

11. Any Three leading Newspaper for publication.

The Superintending Engineer,
South Circle, M.E. Directorate

INSTRUCTION TO TENDERERS/BIDDERS

SECTION – A

1. *General guidance for e-tendering*

Instructions/ Guidelines for tenderers for electronic submission of the tenders have been annexed for assisting them to participate in e-tendering.

2. *Registration of Tenderer*

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

3. *Digital Signature certificate (DSC)*

Each tenderer is required to obtain a class-II or Class-III Digital Signature Certificate (DSC) for submission of tenders, 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 Tenderer. DSC is given as a USB e-Token.

4. The contractor can search and download NIB and Tender 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 Tender Documents.

5. *Submission of Tenders.*

General process of submission, Tenders 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

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

ii. Scanned Copy of acknowledgement towards earnest money (EMD) as prescribed in the NIB should be uploaded .

iii. Financial Statement (Section – C, Form – II).

iv. Affidavits (Ref:- format for general affidavit shown in "Y" Part "B".)

v. Printed Tender Form and NIB (Sl. 10; Part I) with all addenda and corrigendum ***(download and upload the same Digitally Signed, quoting rate will only encrypted in the Price Schedule under Financial Bid. In case quoting any rate in Printed Tender Form the tender will be summarily rejected).***

vii. Special Terms, condition and specification of works.

viii. Certificate of Bank Guarantee by any Nationalized Bank (if required).

ix. Bank Solvency Certificate.

A-2. Non statutory Cover Containing

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 Register 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 NIB (under sl. no -3).

xi. Electrical Supervisory competency certificate (as required in NIB, Sl-3) from Directorate of Electricity, Govt. of W.B./ competent authority of other Govt. as applicable.

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

B. Tender Evaluation

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

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

iii. Cover (folder) of statutory documents (vide Cl. No. 5.A-1) should be opened first and if found in order, cover (Folder) for non statutory documents (vide Cl. No. – 5.A-2) will be opened. If there is any deficiency in the statutory documents the tender 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 Tender Evolution Committee. Scrutiny of technical proposal and recommendation thereafter and processing of comparative statement for acceptance etc. will be made by the Municipal Engineering Directorate, under the Deptt. of Municipal Affairs, Govt. of West Bengal. Comparative Statement may be forwarded to appropriate authority depending on the value of the work as applicable as per existing norms and guidelines under AMRUT 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 bidder 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. 10 , Part II. To be uploaded Digitally signed by the Bidder.

6. Financial capacity of a tenderer will be judged on the basis of working capital and available bid capacity as mentioned in the N.I.T. 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 Tender Inviting/ Accepting Authority and should guarantee duly specifying the name of the project that in case of contract is awarded to the Tenderer, the Tenderer 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 Tenderer's 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 (tender 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 (tender accepting authority) action.

The bidder whose Bid has been accepted will be notified by the Tender 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 Tender Form will incorporate all necessary documents e.g. N.I.T., all addenda-corrigendum, special terms and condition (Section –C), different filled-up forms (Section –B), Price Schedule and the same will be executed between the Tender Accepting Authority and the successful Tenderer.

The Superintending Engineer,
South Circle, M.E. Directorate,

SECTION – B
FORM –I
PRE-QUALIFICATION APPLICATION

To
Superintending Engineer,
South Circle,
Municipal Engineering Directorate,
Department Of Municipal Affairs,
Kharagpur, West Bengal,

Ref: - Bid

for_____

_____ (Name of work)
_____

_____
___**NIeB No.:**

Dear Sir,

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

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

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

We understand that:

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

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

Enclo:- e-Filling:-

1. Statutory Documents
2. Non Statutory Documents

Date: - **Signature of applicant including title**
and capacity in which application is made.

SECTION – C

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 31.03.2023	As on 31.03.2022	As on 31.03.2021	As on 31.03.2020	As on 31.3.2019	As on 31.03.2018

Signed by an authorized officer of the firm

_____

Title of the officer

_____

Name of the Firm with Seal

Date_____

AFFIDAVIT "Y"

Declaration of the Bidder

(Affidavit to be affirmed on a Non Judicial Stamp Paper of Appropriate Value And Duly Notarized)

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

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

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

Deponent
Solemnly affirmed by the said
……

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

Annexure – A

Information of audited financial statements for the last year to demonstrate the current soundness of the Bidder"s financial position :

1. The Bidder's Net worth for the last year calculated as the difference between total assets and total liabilities should be positive.

2. Bidders, who meet the minimum qualification criteria, will be qualified only if their available bid capacity at the expected time of bidding is more than the total estimated cost of the works. The available bid capacity will be calculated as under:
   Assessed Available Bid capacity = (A×N×2 – B) where

   A = Maximum value of engineering works in respect of Projects executed in any one year during the last five years (updated to the price level of the year indicated in table below under note) taking into account the completed as well as works in progress. The projects include turnkey project/ Item rate contract/ Construction works.
   N = Number of years (i.e.,____year) prescribed for completion of the works for which Bids are invited.

   B = Financial Liability of the bidder to be incurred for existing commitments and on-going works during the period of the subject contract.

To calculate the value of "A"

i) A table containing value of Engineering Works in respect to Projects (Turnkey projects / Item rate contract/ Construction works) undertaken by the Bidder during the last 5 years is as follows:

Sl. No.	Year	Value of Engineering Works undertaken w.r.t. Projects (Rs. In Crores)
1.	Year-5	
2.	Year-4	
3.	Year-3	
4.	Year-2	
5.	Year-1	

ii) Maximum value of projects that have been undertaken during the F.Y. _____ out of the last 5 years and value thereof is Rs._____Crores (Rupees_____). Further, value updated to the price level of the year indicated in Table is as follows:

Rs. _____ Crores x _____(Updation Factor as per Table annexed)

= Rs. _____ Crores (Rupees_____).

Table indicating The factor for the year for updation to the price level is indicated as under

Sl.No.	F.Y. / Calender Year	Updation factor
1.	Year-1	1.00
2.	Year-2	1.05
3.	Year-3	1.10
4.	Year-4	1.15
5.	Year-5	1.20

iii) Net worth for the last year of _____ (name of the company)

=

.....
.....
Signature, name and designation of Authorised Signatory

For and on behalf of
.....*(Name of the Applicant)*

.....
.....
Name of the Statutory Auditor's firm:

Seal of the audit firm:
(Signature, name and designation and Membership No. of authorised signatory).

To calculate the value of "B"

3. A table # containing value of all the existing commitments and on-going workings to be completed during the next ____ years (prescribed time for completion of the works for which Bids are invited) is as follows:

Sl. No.	Name of Work/ Project	Name of the Employer	Percentage of participation of Bidder in the project	Stipulated period of completion as per Agreement/LOA with the Start date	Value of Contract as per Agreement / LOA Rs. ___	Value of work completed Rs. ___	Balance value of work to be completed Rs. ___	Anticipated date of completion	Financial liability to incurred for the said work/ project during the period of the subject contract Rs. ___
1	2	3	4	5	6	7	8	9	10

.....
.....
Signature, name and designation of Authorised Signatory

For and on behalf of
.....*(Name of the Applicant)*

Note:

1. All the documents to be submitted in support of Annexure-A must be duly signed and sealed by the applicant/bidder and authenticated by Statutory Auditor's firm.

2. In case of a Joint Venture, Lead Member of such joint venture shall be required to meet 60% of required Bid Capacity and each of the Joint Venture Members shall be required to meet at least 30% of requirement of Bid Capacity. Bid capacity of all the members in total should be at least 100% of required Bid capacity.

SECTION - D

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

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.

SECTION – A

DESCRIPTION OF THE PROJECT

1.0 GENERAL

The work involves Surveying, Geo-Technical investigation, Planning, Designing &construction of RCC intake dry pit circular well with pile foundation raw water pump house and RCC walk way(3.0 M width) up to the river bank approx. 200m length to draw electrical cable and movement of operating personal etc. having capacity to supply 17.21 MLD (Approx.-865 m3/hr. considering 20 hrs. running a day) at Icchapur Ghat for supplying raw water pipe line along to water treatment plant at 6 km(approx) from the intake pumping station along with 500 KVA substation with necessary civil, electrical(according to I/E rules) & mechanical works related to the project in all respect for drawing of raw water from river Rupnarayan at Tamralipta Municipal Town and other allied works as per irrigation hydraulic survey report , including electrical works with the provisions for receiving power through cable from proposed HT substation near bank of river Rupnarayan at the close vicinity of the plant and after satisfactory completion, 3(three) months trial run and necessary training of maintenance staff provided by ULB & thereafter (subsequently) 5 (five) year operation and maintenance with guarding arrangement of plant on turnkey basis.

2.0 LOCATION

i) Intake jetty location – Latitude: 22 degree 15 ‘ 7” N
Longitude: 87 degree 57 ‘ 7” E

ii) Intake substation location - JL. 53, Plot No-327 Mouza- icchapur , Dist: Purbo Medinipore

3.0 PROPOSED INTAKE DETAILS

As per enclosed drawings attached to Annexure H

4.0 SCOPE OF WORK

A) SPECIFIC 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 offered the rates 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 days from the date of issuance of the Bid documents to the Bidder. The bidder shall submit his/her queries in writing at least three working days in advance from the date of pre-bid meeting.

(ii) The Bid comprises of following major works:

The scope of work includes surveying, Geo-technical investigation, planning, design, drawing and construction of civil works including supply, carriage of all materials with pile foundation for the various units of the RCC circular intake well(designed dia.) and RCC walk way(3.0 m Wide) for drawing electrical cable and movement of operating personnel. Supply, delivery, installation at site and erection & fabrication of all mechanical and electrical equipment including pipes, valves, pumps, motors, blowers etc. and all other electrical and mechanical equipment as per details technical specification & vendor list those may be necessary and specified herein to ensure the supply of 17.21 MLD raw water to the water treatment plant by interconnecting proposed pre-laid raw water rising main 500 mm dia. approx 6.0 KM from the intake pumping station. The scope also includes Trial Run and Testing the Plant for three months, Commissioning (72 Hours), and operating and maintaining 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 or his representative.

INTAKE DRY PIT WELL WITH PUMPING STATION & RCC WALK WAY

1. Design, Drawing & Construction of RCC Intake Dry pit circular well with pile foundation, along with Ironite floor finished with RCC spiral stair case.

2. Design, Drawing & Construction of frame structure outside brickwork Pump house with Ironite floor finished & 25mm thick roof tiles at roof slab.

3. Design, Drawing & Construction RCC walkway (3.0 M width) up to river bank (sub-station) with 25 mm thick IPS flooring or 25 mm thick Chequered tiles, both side hand railing, necessary steps at tail end with other allied work including laying of pump delivery line approximately 200m length(or as designed) D.I. pipeline along the walkway and suitably anchored with walkway support with proper overburden of soil up to the river bank including butterfly valve with valve chamber to interconnecting facility to the proposed raw water rising main (as per approved design & drawing) with other allied work including all necessary, valve support, pump foundation complete in all respect. Further the raw water rising main will be the proposed dia. of DI pipe with approx. 200 M length.

4. The selection of the exact position of the intake well by the successful bidder after comparing the data from the Irrigation Dept. Govt. of West Bengal and data obtained by the agency engaging personnel survey team in consultant with the Dept. to avail the maximum depth of water at lean period which is suitable to fetch 17.21 MLD raw water from the river Rupnarayuan.The position indicated in the bid drawing is purely tentative and indicative.

5. Design & installation of required mechanical arrangement with all components and specific pumps and motors (Vertical Turbine pump) (1Working +1 Stand By) (Approx.- 950 m3/hr. considering 20 hrs. running a day) to feed 17.21 MLD raw water to the water treatment plant and specific blowers (1W+1S) with ducting arrangement up to the bottom of the well to enhance the cooling system of the motors and to avoid suffocation of the operators as per direction of E.I.C.

6. Design & construction of electrical works with control panel including all components considering safety measures by providing indoor illumination, Walkway illumination and lightening arrester, aviation system and laying of cable from proposed HT substation interconnecting to the supply point with necessary supply and installation of earthing system for pump house equipment including lighting protector as per direction of E.I.C

7. Supply, installation testing and commissioning of 500 mm dia full bore magnetic type flow meter with indicator and totaliser. Necessary vendor list should be prior approval of appropriate authority.

8. Details of pump & necessary valves (Butterfly Valve, NRV and other accessories) should be prior approval of appropriate authority.

9. Ventilation system need to be installed along with fire extinguisher, Safety equipment glow sign board etc for Raw water pumping station as well as Electrical sub station.

10. After satisfactory completion of all above works, 3(three months) trial run and necessary training of maintenance staff and thereafter (subsequently) 5(five) year operation and maintenance with guarding arrangement within plant complete in all respect as per direction of E.I.C.

11. All design drawing etc. in this connection will be approved by S.E (South Circle) and EE(E/M), M.E.Dte. prior of starting work and is totally liability of the contractor to approve the same. Other necessary approval (if any) which may be required for execution of the said work i.e., approval of Inland Waterways Authority (National waterways no.1), Central Water Commission, Irrigation Department, Ministry of water Resource (MOWR), Govt. Of India etc. is also liability of contractor and such approval will have to submit to the S.E (Central Circle).

i

5.0 GENERAL SCOPE OF WORK

(A) INTAKE DRY PIT RAW WATER PUMPING STATION & RCC WALKWAY

(i) The successful Bidder has to submit in due course the specific size and capacity of all machineries & equipment related to static & dynamic loads in different operating conditions before approval of structural drawings. All the equipment should be so selected to match with the civil works.

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

(iii) The dimension and center line of pedestals for supporting the Pump motors as well as the valves should strictly be in proper alignment for both Civil & Electromechanical works.

(iv) The center-to-center distance of the pumps and clearance from the wall of intake well should be as per I.S specifications.

(v) The installation of all L.T. electrical equipment's should be strictly as per I.E. Rules and as per IS specification

(vi) The minimum distance from the pump impeller center to suction position is to be maintained in such a level so that no vortex formation takes place in the entry of pump i.e. the flow should be maintained streamlined at the entry point of pump.

(vii) The successful Bidder has to submit parallel operation curves for pumps & the same is to be matched with the system resistance curve of the intake raw water delivery grid to the WTP. Pump selection should be done after surveying of details proposed 500 dia. K9 rising main. Family curves for individual and multiple operations at all possible consequences depending upon the variation in % opening of the butterfly valves are to be submitted.

(viii) The total capacity of the pumping station will be 950 cubic meter per hr. at head (supplied by the bidder after surveying the site condition) in Meter with two pumps in running condition and one pump in standby mode. Running hours of 20 Hrs. /day would yield to a supply of approx. 17.21 MLD as per requirement. The pumps & Motors must be of continuous duty type. The individual pump suction pipelines should be connected to a suction common delivery manifold placed at the bottom of the intake well (supplied by the bidder after surveying the site condition as well as based on irrigation report) required depth. The suction side common delivery line will be connected with the two suction main with butterfly valve which will placed at the lowest water level of the river Rupnarayan. The suction bell mouth should be placed horizontally below the lowest flood level to achieve required amount of raw water throughout the year. The two numbers suction main pipe length, required dia. as well as civil structure is also the bidder scope. The individual pump delivery, common delivery manifold line should be placed on the bottom of the well. The minimum length of delivery manifold should be as per detail technical specification. All the design of the pipelines should be such that to ensure streamline flow.

(ix) The Bidder has to consider all sluice valves, butter fly valves, dismantling joints in individual pump delivery pipe lines as per detail technical specification.

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

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

(xii) All the cabling work required to operate the equipment at intake raw water pumping station will be drawn from the proposed substation outgoing ACB point in the area of the intake pumping station. Power cable of all sizes must be 1.1 KV grade Al. armored 3 or 3.5 core (As required as per design) XLPE cable (Earthen) for all electrical component.

(xiii) One number vacuum pumps of adequate capacity with its allied Accessories shall have to be connected with the pumping unit for emergency purpose.

(xiv) Two nos. sump pump (1W+1S) with sump for collecting and pumped out the pump and valves leakage water.

(xv) The raw water shall have to be delivered through designed dia. rising main (K9) up to the river bank which will be exit from the wall of the intake well by providing wall casting, duck foot bend (If necessary) of required size.

5.0 Limit of Contract:

The limit of contract starts to fix position of the intake well for drawing raw water after providing double suction main with MS Pipe (designed dia. and length) which placed on the suitable civil/ mechanical structure below (maximum)the lowest flood level of the river Rupnarayan which will be connected with the suction side common manifold providing two numbers butterfly valves. The pump suction line shall be connected with sluice valve and enlarger-reducer with the pump suction side. The delivery line of the pumping unit shall be connected with the delivery common manifold of designed dia. of CI pipe after providing reducer- enlarger, NRV, and actuator control butterfly valve and piping duct foot bend etc. The delivery line i.e. laying of DI pipe 200m ahead connection of existing delivery side delivery line by placing a butterfly Valve with temper proof air release valve. The delivery line shall consist of two parts.

a) Laying of approx. 200 M Length DI pipe line from common manifold of Intake well to river bank of Rupnarayan through pipe carrying bridge . Actual length to ascertained during execution of works,
b) Further from river bank up to the proposed/ existing the delivery line to WTP.

In a nutshell limit of contract starts from bell mouth of suction pipe and ends proposed/ existing delivery line of WTP.

The sources of Electric Power would be taken from proposed HT substation by using cable connection of suitable rating.

The **Superintending Engineer,**

South Circle

SECTION-

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 / initialed by the authorized signatory.

4. No eBid proposal will be entertained without the earnest money being submitted as indicated in the eNIB. 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. e-Bids will be opened in presence of the Bidder or their authorized representatives who opt to be present.

7. 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 eNIB under intimation to the Bidders.

8. e-Bid once offered cannot be withdrawn within a period of 120 calendar days from the date set for opening of e-Bids. Any extension of this validity period if required will be subject to concurrence of the Bidders.

9. 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 seven days or at pre Bid Meeting from the date of publishing of Bid documents. Any questions or clarifications regarding Bid Document which is required to be discussed in Pre Bid meeting should be send by the bidder in advance before Pre Bid meeting in the office of the Superintending Engineer (South Circle), Kharagpur, M.E.Dte

10. 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.

11. 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.

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

13. 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.

14. 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.

15. Bidders before uploading the eBid documents shall have to ensure that "Declaration by the Bidder" 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.

16. 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.

17. This set of Bid documents consists of:

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

The **Superintending Engineer,**
South Circle

SECTION - C

General Conditions of Contract

1.0. DEFINITIONS AND INTERPRETATION

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

(a) "Approved" means approved in writing, including subsequent written confirmation of previous verbal approval and "approval" means approval in writing, including as aforesaid However in spite of approval from Competent Authority, contractor is solely responsible for design-cum-execution of the whole project as it is a turnkey job. The contractor takes full responsibility for the construction and commissioning of the plant. This also includes the delivering of the plant in full working order to the owner. The constructor assumes responsibility from beginning to the end. After approval from the competent Authority, if any rectification, addition, alteration, reinstallation of any equipment of any nature is necessary as per site condition or as per requirement of the plant, the contractor is liable to do all needful at his own cost including supplying, delivery of all equipments. In that case, the contractor has to seek fresh approval from the competent authority treating the previous approval as cancelled and null and void. In all case “Approval” has to be treated as provisional approval only.

(b) Authority means the Superintending Engineer (South Circle), M.E.Dte .

(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 thereto 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 Tamralipta 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, Central Circle or his representatives of Municipal Engineering Directorate from time to time or approved in writing by the Superintending Engineer, Central Circle, M.E.Dte., Govt. of W.B.

(k) "Employer" means "**the Superintending Engineer, South Circle, M.E. Directorate, Govt. of W.B** on behalf of Governor of WB.

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

(m) "Engineer's Representatives" means any Assistant Engineer or Assistant of the 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) "Ground Level" means the level of the referred point of the exposed surface of the ground, road or pavement free from extraneous materials;

(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 or other authority legally entitled to the control or manage local funds but also includes the West Bengal State Electricity Board.

(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 Superintending Engineer, Central Circle, M.E.Dte., and Govt. of W.B.

(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.

(ff) “IRWR” means intermediate Raw Water Reservoir in between intake and water treatment plant (WTP).

(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.

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 Executive Engineer 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 Executive Engineer, who shall thereupon confirm, reverse or vary such decision.

ASSIGNMENT AND SUB LETTING

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 Superintending Engineer, 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 labour 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 Superintending Engineer,in terms of the provisions in Clause B-2.3 of the Conditions and Requirements for Biding(omittedportion) 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 the Superintending Engineer shall pay such additional sum as may be reasonable to cover such costs.

6.0 DRAWINGS

(1) Custody of drawing:All the approved Drawings shall remain in the safe custody of the Executive Engineer, 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, East Midnapur Division, M.E. Dte. Govt. of W.B all drawings as provided under the Contract.

(2) One copy of approved drawing 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/municipal 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 the S.E. South Circle, M.E.Dte., on recommendation of Executive Engineer 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 S.E (South) / 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. FURTHER 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 and safety or all Site operations and methods of construction, erection etc.

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 60 (sixty) 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 Superintending Engineer 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 EICshall 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 Dept.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 Dept. ,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 Biding 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.

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 Engineer in charge 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 al1 necessary superintendence during the execution of the Works and as long thereafter as the EIC 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 EIC, 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 EIC, 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 EIC. Such authorized agent or representative shall receive, on behalf of the Contractor, direction and instruction from the EIC 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 EIC

16.0. EMPLOYEES

(I) Contractor's Employees - The Contractor shall provide and employ on the Site in connection with the execution and maintenance of the Works

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

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 labor 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, on hem), 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, employees supervisor or for any other reason deemed fit by the Engineer.

19.0. WORKS & RISKS

19. (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 traveling 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 lt1dcnJmty under the policy being brought or made against the Superintending Engineer, 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. (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 Employerand 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 labor 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 labor, 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 Executive Engineer.

33.0. LABOUR

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

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

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

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

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

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

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

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

(a) The Apprentices Act 1961 (Act 52 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 Labor: As far as possible local labor shall be engaged as unskilled labour.

(12) Fair Wages - The Contractor shall in respect of all workmen employed by him in and for the performance of the Contract pay rates of wages and observe the conditions of employment not less favorable than those provided under the relevant labor 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 Labor Commissioner:The Contractor shall submit, at the request of the Labor Commissioner or of the Assistant Commissioner of the State such returns as may be called for from time to time in respect of labor 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 Labor 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 LABOR 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 labor from time to time employed by the Contractor on the Site and such information respecting Constructional Plant as the Executive Engineer 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, labor 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 fulfill, 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 Engineer or the Engineer's 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 Engineer 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 Contractors' 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 Dimensioned area requirement of the pumping station and sump showing the details of

1.1 Cut-outs at the operating platform.

1.2 Layout of motors, pumps, valves and other electrical units like MCC, Capacitors etc. at different flow level.

2.0 Vertical space requirement showing the levels of -

2. 1 Plummer Block supporting systems

2.2 Centerline of Pump

2.3 Foundation level of pumps & valves

2.4 Centerline and sizes of pump delivery pipes, bends etc.

2.5 Top of the Pump casing

2.6 H.O.T. Crane rail.

3.0 Forces and Moments developed at different locations.

3.1 Static and Dynamic loads of pumps, motors, valves, etc. (showing deed loads separately) & load of various electrical equipment and machinery.

3.2 Moments and stresses developed at different locations.

3.3 Vibrations at different locations expected.

4.0 Foundation details showing bolt sizes and extent of embedding of the foundation bolts.

5.0 RSJ sizes, locations and fixing arrangements for motor support, RSJ/girder requirement for fixing HOT crane as clamp-on chain pulley blocks for attending of values etc. at the pump floor level stating the maximum load that is required to be lifted.

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

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

8. 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 Executive Engineer 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 multify 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.

48.0. MAINTENANCE

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

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

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

49.0. CONTRACTOR TO SEARCH

The Contractor shall, if required by the EIC in writing, search under the directions of the Engineer, for the cause of any defect, imperfection or fault appearing during the progress of the Works or in the period of Maintenance. Unless such defect, imperfection or fault shall be one for which the contractor is liable under the contract, the cost of the work carried out by the

contractor in searching as aforesaid shall be borne by the Employer. If such defect, imperfection or fault shall be one for which the contractor is liable as aforesaid, the cost of the work carried out in searching as aforesaid shall be borne by the contractor and he shall in such case repair, rectify and make good such defect, imperfection or fault at his Own expense in accordance with the provisions of Clause 48 hereof to the satisfaction of the Engineer.

50.0. ALTERATIONS, ADDITIONS AND OMISSIONS

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

a) Increase or decrease the quantity of any work included in the contract.

b) Omit any such work.

c) Change the character or quality or kind of any such work.

d) Change the levels, lines position and dimensions of any part of the Works and

e) Execute additional work of any kind necessary for the satisfactory completion of the works or for deriving satisfaction of the Employer. It is expressly provided that no such variation shall, in any way vitiate or invalidate the Contract.

(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 considered within the contract.

52.0. 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 011 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 will 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

1a) Periodic Payment to the Contractor from works done and measured in terms of the provisions of Clause 55, shall normally be made in compliance with prevalent norms and guideline.

b) The valuation of the Engineer for the purpose of making periodic payments to the contractor through on account bills shall be considered as estimates only and the Engineer reserves the authority to make amendments or modifications thereto through any subsequent bill/bills.

c) Payment may be made on percentage basis as per accepted break up schedule of payment

2) a) Earnest Money, Security Deposit and other retention money

Description	**Amount**	**State where amount payable/pledged to the Authority**	**Refund/Release**
Earnest money	2% of quoted amount	As per eNIB	To the unsuccessful Bidder after award of contract (to the successful Bidder) without any interest. Earnest Money of the successful Bidder shall be covered into Security Deposit.
Security Deposit	8%	To be deducted from the Running Account Bills	After completion of successful O&M period of five year (without interest)
Cess for labor Welfare	1 % of Construction cost	To be deducted from the Running Account Bills in Cash	Deducted and send to Govt. of West Bengal, Labor Welfare Department.

b) All payments to the Contractor shall be subject to deduction of Sales Tax/Work Contract Tax, Income Tax and any other Tax as may be prevalent at the time of payment. For each such deduction the Contractor will be furnished a Certificate to enable him to make requisite adjustment in his returns related to Income Tax/Sale Tax/Works Contract Tax or any other Tax as may be deducted. Contractors, while quoting, are to take into account all taxes, duties etc. as applicable and prevalent on the date of opening. If any other taxes or duties of statutory nature are imposed during the post-Biding period, the said amount shall be reimbursed on production of documentary proof of payment. Similarly for reduction or withdrawl, a corresponding deduction shall be made. In both cases, the decision of the Employer shall be final as to the extent thereof.

c) All payments to the Contractor shall be subject to all accounting and auditing provisions, procedures, rules, regulation, decrees, law etc. legislated, enacted or in force in India and as applicable to the State of West Bengal during the period of the Contract.

5. Final Claims:Not later than sixty calendar days after the issue of the Completion Certificate, the Contractor shall submit to the Engineer a Statement of final account with supporting documents showing in details the value of the work done in accordance with the Contract together with all further sums which the Contractor considers to be due to him under the Contract. Within thirty calendar days after receipt of the final account and of all information reasonably required for its verifications, the Engineer shall issue Final Certificate.

6. Certificate of final acceptance: The Contractor's obligations and responsibilities under the contract will be considered satisfied and the completed permanent. Works accepted when the EIC has issued the Certificate of Final Acceptance to the Contractor.

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 eights 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 fulfillment 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 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 endeavors 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:

(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 labour, 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).

All drawings, specification and copies of drawings are the property of the owner. They are not to be used on other work, and with the exception of the signed contract set, are to be returned to the owner on request at the completion of the work.

75. TENDERER SHALL VISIT THE SITE

Intending renderer 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 tenderer shall provide in their tender 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 renderer 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.

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76. 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 licences, 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. **OFFICE ACCOMMODATION FOR THE SITE ENGINEER**

The contractor shall provide, erect, and maintain at his cost a separate simple office accommodation for the site Engineer of the owner at site. This accommodation shall be well lighted and ventilated and provided with windows, door with a lock. The Site Engineer's office with toilet facilities (one W.C one urinal) the accommodation shall be demolished when directed.

78. DISMISSAL OF WORKMEN

The contractor shall on the request of the owner immediately dismiss from works any person employed thereon by him, who may in the opinion of the owner be unsuitable or incompetent or who may misconduct himself. Such discharges shall not be the basis of any claim for compensation or damages against the owner or their officer or employee.

79. IDLE LABOUR

Whatever the reasons may be, no claim for idle labour, additional establishment cost of hire and labour charges of tools and plants would be entertained under any circumstances.

80. FIRST AID

a) At every work place, there shall be maintained in readily accessible place first aid appliance including an adequate supply of sterilised dressings and sterilised cotton wool. The appliance shall be kept in good order and in large work place they shall be placed under the charge of a responsible person who shall be readily available during working hours.
b) At large work places, where hospital facilities are not available within easy distance of the works, first aid posts shall be established and be run by a trained compounder.
c) Where large work places are remote from regular hospitals, an in-door ward shall be provided with one bed for every 250 employees.
d) Where large work place are situated in cities, towns in their suburbs and no beds, are considered necessary owing to the proximity of city or town hospitals, suitable transport shall be provided to facilitate removal of urgent cases to the hospitals. At other work places,. Some conveyance facilities, such as a car, shall be kept readily available to take injured person or persons suddenly taken ill to the nearest hospital.

The **Superintending Engineer,**

South Circle

SECTION – D

SPECIAL PROVISIONS

1.0. GENERAL

1.1 Extended scope of the contract

The contract comprises the surveying,planning, designing, drawing supplying materials and equipment, construction, testing of the plant, Trial Run for 3 months, commissioning of E/M Equipment's with continuous operation for 72 hrs. (or part thereof) and maintenance for a period of (60) sixty months after successful trial run upon completion of the works and commissioning and except in so for as the contract otherwise provides, the provision of all labour, materials, constructional plant, temporary works and everything (whether of a temporary or permanent nature) required red in and for such planning, design, construction, completion and maintenance so far as the necessity for providing the same in specified in or reasonably to be inferred from the contract.

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

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

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

i) Piling (if required)

ii) Cement Concrete

iii) Reinforcement

iv) Brick Work

v) Structural Steel Work

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

vii) Roof Treatment

viii) Plumbing and Sanitary Works

ix) Pipe Lines and appurtenant structures

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

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

i) Pumps, Sump pump , vacuum pump and air blower

ii) Sluice valves, Butterfly valves, Non return valve, dismantling joint, common delivery lines and penstocks Etc.

iii) Structural Steel Works

iv) Pipes and specials

v) Miscellaneous (to be specified by the Contractor)

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

i) Motors

ii) Cables

iii) Motor control panel, internal illumination, walk way illumination, lightening arrestor and aviation lamp arrangement.

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

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

1.3. Store shed

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

1.4. Land for Contractor's Establishment

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

1.5 Water and Electricity for Construction

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

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

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

1.6 First-Aid Facilities

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

1.7 Fire Extinguish Arrangement

The Contractor shall provide suitable arrangement for fire extinguish. 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.

1.8 Safety Measures

The Contractor shall be responsible for the safety of all workmen and other persons entering or in the works and shall at his own expense and to the approval of the EIC, 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 EIC may direct.

1. 9 Supervisory Staff

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

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

1.10 Joint Survey

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

1.11 Layout and Checking

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

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

1.12 Reference Points

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

1.13 Co-operation with other Contractors

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

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

1.14 Approval of Materials and Equipment to be used

Samples in large enough quantity of materials and descriptive data therefore requiring prior approval shall be furnished by the contractor to the EIC 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, place of origin and item for which it is to be used. Only upon approval, the materials of approved quality shall be brought to site. Samples approved shall be on exhibition at all times, properly stores and prevented from deterioration for the purpose of comparison with the materials brought to site of work from time to time for use in work.

1.15 Testing & Testing Equipment

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

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

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

1.16 Construction Records

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

1.17 Progress Photographs

The Contractor shall at his own cost and expense arrange to take periodic photographs to show the progress of work or interesting features thereof. The time and the position where from a photograph is to be taken should be as per direction of the Engineer or his Representative, Three copies of each of these photographs to an enlarged size of about 25 cm x 20 cm

together with the CD/DVD, shall be supplied to the EIC 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 6.0 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 insta11ations shall be taken without prior approval of the concerned officers

1.18 Satisfactory completion of various items

The sub-works included in the Schedule of Prices are job works on lump sum basis. The various items of the sub-work are to fit in perfectly in the whole plant in every respect so as to form effective working parts of the whole plant as per satisfaction of the EIC. Each sub-work wi11 be considered as complete when it is completed as per specifications and put into commission, as per standards, as a successful component part of the whole plant.

1.19 Checking Quality of Work

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

1.20 Recording Measurements

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

1.21 Reports and Returns

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

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

1.22 Site order Books

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

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

2.0 MATERIAL

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

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

2.3 Cement

The Cement shall be Ordinary Portland Cement 53 of approved make as per vender list Grade complying with IS: 12269; 1987.The unit weight of cement would be taken as 1440 kg/cubic meter in accordance with IS: 875, Part-I-1987.

2.4 Steel

Steel bars for use in reinforcement shall be cold twisted bars of approved make as per vender list complying with IS: 1786; 1985 (Reaffirmed 1990) specifications

3. TECHNICAL ASSISTANCE

Training of Technical Personnel

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

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

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

4. TERMS OF PAYMENT

A) Mechanical Equipment

i) 65% value of the equipment shall be payable on receipt of materials at site subject to submission of authenticated Challan and Test Certificate issued by the manufacturer.

ii) The next 25% value of equipment shall be payable on successful completion of erection of equipment.

iii) Balance 10% value of the equipment shall be payable after successful operation of the plant for 12 (Twelve) months after completion of three month trial run.

B) Electrical Equipment

i) 65% value of the equipment shall be payable on receipt of materials at site subject to submission of authenticated Challan and Test Certificate issued by the manufacturer.

ii) The next 25% value of equipment shall be payable on successful completion of the erection of equipment.

iii) Balance 10% value of the equipment shall be payable after successful operation of the plant for 12 (Twelve) months after completion of three month trial run.

C) Civil Works

i) 90% value of civil works shall be payable against running account Bill.

ii) Balance 10% value of the civil works shall be payable after completion of the entire Civil works, putting the plant into commission and after successful trial run of the plant, provided that the said balance payment for bored piles, if provided by bidder, shall be payable after 180 days from the date of completion of the last pile or last testing whichever is later.

D) Operation & Maintenance cost

i) The operation and maintenance cost shall be payable after minimum 3(Three) months from the completion of Trial Run or extended period of Trial Run followed by commissioning in 5(Five) installment subject to satisfactory performance of O&M. In no case the Contractor would be allowed to raise O & M bills, more frequently.

ii) Payment may be released in installment on pro-rata basis

Note: Security Deposit @ 8 % will be deducted against all payment. This will form 10% altogether (2% of Earnest money deposited earlier and converted into Security deposit after awarding the Contract and 1% of security deposit, to be recovered from running account bill).

E) Security Deposit: (Retention Money)

Retention money will be returned after completion of successful operation & maintenance period for 60 months and after submission of all documents specified in Clause-7.2 of Section F

5. NO INTEREST ON DUES

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

6. DISPOSAL OF THE EXCAVATED MATERIALS

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

7. POSSESSION PRICE TO COMPLETION

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

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

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

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

The Superintending Engineer,
South Circle, M.E. Dte

SECTION – E

GENERAL SPECIFICATIONS OF WORKMANSHIP AND MATERIALS FOR CIVIL WORK

1.0 GENERAL

1.1 General Materials

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

1.1.2 Samples of materials to be supplied and used, by the Contractor in the works shall be to the prior approval of the Engineer-in-Charge. For this purpose the Contractor shall furnish in advance representative samples in quantities and in the manner as directed by the Engineer-in-Charge for his approval. Materials brought to the Site, which in the option of the Engineer-in-Charge do not conform to the approved sample, 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, labour, tools, machinery, plant, pumps, explosives, scaffolding, staging strong props, bamboos, ropes, templates, pages and all appliances and operations whatsoever necessary for efficient execution of work.

1.4 Ground Conditions

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

1.5 Setting Out and Leveling

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, skillful and experienced assistance capable of carrying out the work in accordance with the drawings and specification and to correct levels. The cost this establishment should be included in his rates.

1.12 Method of Measurement

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

1.13 Specifications Referred to

1.13.1 The specification contained herein is 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.

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

IS Code No	Description
IS: 1200	Method of measurement of building and Civil Engineering works.
IS: 1542	Sand for plaster.
IS: 383	Aggregates-Coarse and fine, from natural source for Concrete.
IS: 515	Aggregates for use in Mass Concrete, natural and manufactured.
IS: 456	Code of Practice for Plain and Reinforced Concrete for General Building construction.
IS: 3370	Code of Practice for Concrete Structures for the Storage of Liquids.
IS: 12269	Specification for 53 Grade Ordinary Portland cements.
IS: 1786	Specification for High Strength for Differed steel bar & wires for concrete reinforcement.
IS: 1077	Common Burnt Clay Building Bricks.
IS: 1235	Flooring Tiles, Cement Concrete, Floor Finish

IS: 1443	Cement Concrete, Flooring Tiles, Laying and finishing.
IS: 1661	Cement and Cement Lime Pointing Plaster finishes on walls and Ceilings.
IS: 226	Structural Steel (Revised) Iron Work
IS: 800	Code of Practice for use of Structural Steel in General Building Construction.
IS: 1199	Workability of Concrete
IS:1893 (Part I)	Indian Seismic Code.

2.0 EARTH WORK IN EXCAVATION & FILLINGS

2.1 General

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

2.2 Excavation for Foundation, Trenches, Pit etc.

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

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

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

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

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

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

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

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

2.3 Shoring

Timber shoring whenever required shall be closed boarded with minimum 50mm thick good and seasoned timber planks of sufficient length driven side-by-side to the required depth. The gaps between adjacent timber planks shall such would not allow any flow of soi1 particles, if necessary, the sides of the planks shall be planed smooth to ensure this. Sufficient number of bracing struts, walling etc. 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 ranm1ed. Excavated materials which is surplus or which is consolidated

unsuitable for back filling is 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 43 (Grade-43). No extra payment will be made for using Grade-53 cement or more grade available in departmental store. In case of brand of cement contractor have to choose one brand from given brands by E.I.C in writing prior of starting work & the decision given by E.I.C regarding brand of cement is final and binding.

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.

3.4.2 The High Yield strength differed 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 In case of brand of Steel contractor have to choose one brand from given brands by E.I.C in writing prior of starting work & the decision given by E.I.C regarding brand of steel is final and binding.

3.5 Water

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

3.6 Concrete Proportioning

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

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

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

i) For M 15 concrete - 3.75 cm.

ii) For M 20 concrete - 2.50 cm.

iii) For M 25 concrete – 2.00 cm

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 Labour, materials and equipment required to give successful tests for Water tightness.

3.7 Workmanship

3.7.1 All Concreting work shall be carried out according to the IS: 456, IS: 3370, and other related codes. It should, however, be noted that for every 15 M3 of concrete placed or for every one day's volume of concrete whichever is lower, a minimum of 3 (three) Cubes shall be kept for test purpose, and tested at the Contractor's cost and expenses at a Laboratory as approved by the Authority. The number of test cubes may, however, be altered at discretion of the Engineer-in-Charge. It is compulsory to test 3 (three) cubes in each case.

3.7.2 Structural Concrete

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

Design mix Concrete will be used in Reinforced Concrete Structures and shall be in Grade of M25 for works other than water retaining structure &for water retaining structure (RCC) Grade will be M30 as per IS 456.

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

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

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

On proportioning concrete, the quantity of both cement and aggregate shall be determined by weight, where the weight of cement is determined on the basis of weight per bag a reasonable number of bags be weighed periodically to check the net weight or should be either weighed or measured by volume in calibrated tanks, All measuring 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 show a deficiency in strength up-to a limit of 10%, the concrete shall be rejected. Such rejected concrete work shall have to be dismantled and replaced to the satisfaction of the Engineer-in-Charge by the Contractor free of cost to the Employer. No payment for the dismantled concrete, the relevant formwork and reinforcement, embedded fixtures etc. wasted in the dismantled portion, shall be made. In the course of dismantling, if any, damage is done to the embedded items or adjacent structures, the same shall also be made good free of charge by the Contractor to the satisfaction of the Engineer-in-Charge.

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

All deduction will be made with respect to current P.W.D. schedule of rates according to the direction of E.I.C.

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, centering, formwork and moulds for placing concrete. Shuttering may be of approved dressed timber true to line, not less than 37 mm. thick. Surface to be in contact with concrete are to be planed smooth. Alternatively, sufficiently rigid plywood shuttering or steel shuttering may be used. In every case, joints of the shuttering are to be such as to prevent the loss of liquid from the concrete. In timber shuttering the joints shall, therefore, be either tongued or grooved or the joints must be perfectly close and lined with draft paper polythene films or other types of approved materials. In case of plywood or steel shuttering also the joints are to be similarly lined. All shuttering and framing must be adequately stayed and braced to the satisfaction of the Engineer-in-Charge for properly supporting the concrete, during concreting and the period of hardening. It shall be so constructed that it may be removed without shock or vibration to the concrete. No through bolts are allowed for holding the shuttering in water retaining structure.

3.9.2 Cleaning, Treatment and Removal of Forms

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

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

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

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

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

3.10 Protection and Curing of Concrete

Newly placed concrete shall be protected by approved means; from rain, sun and wind and extreme temperature. Concrete placed below the ground level shall be protected from failing earth during and after placing. Concrete placed in ground containing deleterious substance shall be kept free from contact with such ground or, with water draining from such ground during placing of concrete and for a period of at least 3 (three) days or as otherwise directed by the Engineer-in-Charge, the ground water around newly poured concrete shall be kept to an approved level by pumping or other approved means of drainage at the cost of the Contractor. Adequate steps shall be taken to prevent flotation or flooding. Steps, as approved by the Engineer-in-Charge, shall be taken to project immature concrete from damage by debris, excessive loading, vibration, abrasion, mixing with earth or other deleterious materials, etc. that may impair the strength and durability of the concrete.

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

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

3.11 Concrete Finish

The Concrete surface on removal of form work shall be such that no finish is necessary, If, however, the surfaces is not satisfactory the Contractor shall, if so

instructed, remove unwanted, projecting parts by chipping and smoothening the surface with cement rendering at his own expenses. The shutter marks shall invariably be removed by rubbing with carborandum stone. The Contractor shall therefore take all precaution for avoiding the shutter marks.

3.12 Construction Joints

These shall be in according with IS: 3370.

3.13 Expansion Joints as per IS Code relating to liquid retaining structure

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

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

3.15 PVC Water Stops as per IS Code relating to liquid retaining structure

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

Specific Gravity	1.3 to 1.35
Shore Hardness	60 A to 80 A
Tensile Strength	100 to 150 Kg./Cm2

Minimum Safe Continuous Temperature	750C
Ultimate Elongation	Not less than 275%
Water Absorption	Not more than 5% by weight in a 7 day test.

3.16 Rubber Water Stops as per IS Code relating to liquid retaining structure

The materials must be very durable and tough and as per approval of the Engineer-in-Charge. The ribs shall be sufficient to ensure proper bonding with concrete. The width shall be minimum 225 mm and thickness minimum 6 mm. The rubber water stop must be used in long lengths to avoid splicing as far as practicable. Ends shall have at least 200 Cu M overlaps and vo1canised. The materials shall be natural rubber and be resistant to corrosion tear and also to attacks from acid, alkalis and chemicals normally encountered in service. The physical properties will generally be as follows

Specific Gravity	1.1 to 1.15
Shore hardness	65 A to 75 A
Tensile Strength	250 to 300 Kg/ Cm2
Maximum safe continuous temperature	750C
Ultimate elongation	Not less than 350%
Water Absorption	Not more than 350% by weight in a7 day test.

3.17 Contractor's Supervision

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

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

4.1 The Contractor shall build all brickwork uniformly no one portion being raised more than 1 meter above another at a time. The joints shall not exceed 12 fore executions. 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 plaster at ceiling and concrete surface shall be 10 mm. The thickness of plaster to the fair faces of brickwork shall be 20 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 molding drip course etc., and for extra thickness due to corbelling of brick work in parapet or at any other place. If required, all internal angles shall be rounded off as per drawing or as directed by the Engineer-in-Charge without any extra charges.

5.1.3 Cement and sand shall be measured and mixed dry thoroughly to a uniform color 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 color 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 WhiteWash 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 Snowcem or Similar Decorative Cement Finish

6.3.1 Where specified, external surface shall be finished with two coats of 'Snowcem' or similar decorative cement finish of approved color, shade and manufacture. The surface 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 'Snowcem' or equivalent to be mixed will be strictly as per manufacturer's specification. The mixed 'Snowcem' or equivalent 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 'Snowcem' or equivalent application shall be wetted at the end of the day with a fine water spray.

6.4 Painting to Steel Works

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

6.4.2 Ready mixed synthetic enamel paint of 'Jenson & Nicholson' 'British Paints', 'Shalimar Paints or similar other approved make and approved color 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 PROOFING WORK

7.1 Unless otherwise specified, damp proof course shall be 25-mm thick cement concrete (1:2:4) with stone chips graded 10 mm to 3 mm with 3% Cico or similar approved water proofing compound conforming of IS: 2645 by weight of cement. The proportioning, laying etc., shall be done 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 provided 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 Central Building Research Institute (CBRI)/ National Chemical Laboratory (NCL)/ The Council of Scientific and Industrial Research/New Delhi (CSRI)/ National Test House, Kolkata or similar such Government/ Public Sector Undertakings.

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

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

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

8.5 Application

The two components of polyurethane based water proofing system should be mixed as per manufacturer's specification before application. The tack coat should be applied by brushing or roller to the entire surface in normal temperature and 406 hours setting time should be allowed before application of the second coat. The record and final coat of polyurethane based mixed waterproofing sealing over the priming coat to be applied at normal temperature and curing time between 36 to 48 hours should be allowed.

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

8.6 Guarantee Period

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

8.7 Defects Liability Period

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

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

9.3 The Marble flooring containing marble Slab/tile of 12 to 15 mm thickness in all room floor, lobby, stair, landing & treads,working space etc. over 20 mm (avg.) thick base of Cement mortar (1:2) laid with white cement slurry @ 4.4 kg/Sq.M before placing marble& jointed with white cement slurry@ 2.0 kg/Sq.M with necessary pigments including grinding and Granite polishing as per direction of Engineering -in -Charge With Makrana plain pink / Adranga Pink / GarbhGulabi / Udaypur pink / Udaypur Green / Black Bhaslana and Area of each Slab/tile exceeding 0.3 Sq.M but not exceeding 0.6 Sq.M.

9.4 Kota stone flooring containing 12 mm to 15 mm thick kota stone slab in wall, dado, walk way in 15 mm thick [avg] cement mortar (1:3) including making suitable arrangement to hold the stone properly by brass / copper hooks including pointing in cement mortar (1:2) (1 cement : 2 marble dust) with admixture of pigments matching the stone shade, including grinding and polishing all complete as per direction of Engineer-in-charge including cost of

materials, labour, scaffolding, staging, curing complete. [Using cement slurry for bedding @4.4 kg/Sq.M and for jointing @1.8 kg/Sq.M]

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

10.0 IRON MONGERY

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

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

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

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

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

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

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

10.2 Metal Casement

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

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

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

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

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

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

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

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

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

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

10.2.11 Where specified, mosquito fly proof brass wire screen of approved gauge and mesh shall 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 'Folo operator' for opening to any position and closing. Additional intermediate members be fixed to the frames to receive the fly screen so that the clear span of the screen does not exceed 300 m or as approved by the Engineer-in-Charge.

10.2.12 All windows shall be provided with grills of approved design made of 25 mm x 6 rum M.S. Flats and the other clean openings not exceeding 100 mm. (Grill weighing above 16kg per sqm).

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 color and shade over a coat of approved anticorrosive primer.

10.3 Collapsible Gate

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

10.4 Rolling Shutter

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

11.0 STRUCTURAL STEEL WORK

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

Finished steel shall be free from cracks, lamination and other visible defects. Section shall be adequately protected from rusting and scaling. Rivets and bolts, nuts and washers shall be of mild steel and comply with requirements of relevant IS Codes. Steel used for rails shall have tensile strength of about 50-60 Kg/Sq. mm. and yield point at 26 Kg/Sq. mm. The electrodes for welding shall conform to IS: 8l4. All steel work shall be fabricated and erected as per IS: 800 and IS: 806. Welding shall be carried out as per IS: 8l4, IS: 815, IS: 816 and IS: 823, all of the latest editions.

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

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

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

12.0 CABLE TRENCHES

12.1 The cable trenches should normally be of dimension 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.

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

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

13.0 POCKETS & HOLDING DOWN BOLTS

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

14.0 CHEQUERED PLATES ETC.

These shall be manufactured from structural steel conforming to IS: 226. They shall be of the specified size, thickness and pattern as per relevant drawings or as directed by the Engineer-in-Charge. Cover plates will generally be of chequered plates with or without stiffeners as detailed in the drawings. Floor convenience, the Contractor shall prepare

detailed floor plans of the layout of cover plates for floors and platforms so as to include all openings, cuts etc. and so as to match the patterns of adjacent cover plates/gratings. Where necessary, the floor will have to be made leak proof by properly welding cover plates. If necessary, packing shall 'be welded to the bottom of cover plates to raise the cover plates on sides, so as to provide necessary slopes as shown in the drawings or as directed by the Engineer-in-Charge in the floors and platforms to drain away any liquid failing on the floors and platform. Necessary gutters at the ends of platforms shall be provided for sloping floors and platforms as shown in the approved drawings or as directed by the Engineer-in-Charge. Krebs of flats shall be provided where necessary, around openings and cuts in order to prevent liquids falling to lower floors or platforms.

15.0 HAND RAILING

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

16.0 SANITARY INSTALLATIONS

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

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

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

17.0 MANHOLE COVERS

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

18.0 TIMBER DOOR

The timber door shall be of 1st Class CP Teak Wood for both frame (100 mm x 100 mm) and shutters (49 mm thick). All such doors shall be fully paneled. 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 fibers, 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 color of the timber shall be uniform throughout, firm and shining with a silky luster when placed and shall not emit dull sound when struck. The doors shall be made as per approved drawings and as directed by the Engineer-in-Charge and the timber shall be sawn in direction of the grains and shall be straight and square. The door fittings shall be highly polished as per direction of the Engineer-in-Charge.

19.0 M.S. PIPELINES

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

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

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

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

P.S.C./N.P.-2 Class Pipes will be laid on suitably designed 1:3:6 concrete bedding of 150 mm thickness. The pipes will join by rubber rings. Bends and specials will be of mild steel. The P.S.C./N.P.-2 Class pipes will be joined with M.S. special and machined ends will be wrapped and coated with an approved protective coal tar based insulting tape of 4 mm.

average thickness over one coat of approved primer. The inside surface will be provided with 3 (three) coats of non-toxic paint over one coat of primer.

21.0 HAND OPERATED OVERHEAD CRANE

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

22.0 SLUICE GATE/PEN STOCK GATE

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

23.0 C.I. SLUICE VALVE

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

24.0 C.I. COWL VENTILATOR

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

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

25.1 Manhole Cover

Heavy duty plastic fiber reinforced concrete manhole covers with frame should conform to relevant IS Code. The clear opening for access to the M.S. Ladder for going inside the reservoir shall be 600 mm. and the overall dimension of the heavy Duty Manhole Cover shall be specified by the Tenderer conforming to relevant IS Code. The manhole cover with frame shall be of 'Double Seal Type'. Location of manhole covers and frames are specified in the tender scheme drawing and the Bidders are to include the cost thereof in their offer.

25.2 M.S. Ladder

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

25.3 Rung Ladder

Where over specified, shall be formed out of 20 mm diameter M.S. Rods. The rods forming Rung Ladder shall be properly bonded inside the R.C.C. walls. The spacing of Rung Ladder shall not exceed 300 mm. and the size of the rung formed shall be 300 mm wide x 150 mm deep. The rods are to be painted with anti-corrosive paint with suitable primer as per manufacturer's specification to be approved by the Department.

26.0 LIGHTENTING ARRESTOR AND AVIATION LIGHT

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

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

27.0 MOTOR FLOOR AND CONTROL ROOM

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

28.0 WRAPPING COATING

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

29.0 TRIAL RUN

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

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

30.0 OPERATION AND MAINTENANCE

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

take over the plant from the Contractor for its operation and maintenance independently. The Contractor's training personnel shall give special attention to this.

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

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

31.0 GUARANTEE PERIOD

The Contractor shall stand guarantee for the successful operation of the plant for 60 (Sixty) months period from the date of the certified commissioning as stated in clause C-48 & 49 within which any defects and short coming due to faulty design of the plant, defective mechanical and electrical equipment or defective construction will have to be made good without any extra cost to the Authority. During the guarantee period the Contractor shall ensure thorough checking of the plant at least once every month and arrange for immediate rectification of any defects detected during this special drive by his experts.

32.0 GUARANTEES

The Contractor shall give the following guarantees

32.1 Civil and Structural Works

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

32.2 Plant and Equipment

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

and / or workmanship. The equipment shall operate satisfactorily and performances and efficiencies shall not be less than the values guaranteed by the manufacturer and endorsed by the Contractor.

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

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

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

33.0 IMPORTANT GUIDELINES AND SPECIFICATIONS

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

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

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

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

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

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

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

34.8 For all water retaining structure, grade of Concrete shall be M30.

34.9 All components (Civil,Electrical and Mechanical) should be designed in congruence with the relevant data and accordingly the same should be incorporated in the drawing which are sufficient go draw 17.21 MLD water from Rupnarayan River and to Deliver the same to proposed WTP which are approximately 6.0 KM away from in take and after due execution if any component fails to meet the requirement of the project as mentioned in the e bid ,it has to be modified or replaced by the L1 bidder in his own cost

The **Superintending Engineer,**
South Circle

SECTION - F

General Technical Specification

1.0 SITE CONDITION

The site of the circular intake well with raw water pumping station shall have to be constructed about 200M away from the Rupnarayan river bank (near Ichapur) will be in the river bed which is submersed throughout the year. The Bidder shall verify the location of the intake raw water pumping station by inspection of the site and shall apprise himself of the local condition before submitting the Bid and also verify the H.F.L. / L.F.L from competent authority and also to get acquainted with bearing capacity of soil in proposed site.

2.0 SUB-SOIL REPORT

Sub-soil investigation was carried out by soil-experts engaged by the ULB at the site of the proposed intake raw water pumping station.

The Bidders must carry out soil investigation before submission of bid by making bore hole at work site as per IS code at his own cost .and The successful Bidder after getting acceptance shall have to undertake fresh investigation of soil at the exact location of the structure at his own cost to design the foundation properly. Records of such sub-soil investigation such as borehole logs, soil samples, SPT values etc., shall be done by the contractor duly witnessed and authenticated by the Engineer in Charge or his competent authorized representative.

3.0 BID DRAWINGS

The General Arrangement of the intake raw water pumping station will be reflected in the enclosed site lay out plan by the bidder. The various levels and dimension intake raw water Pumping Station is to be fixed by the Bidders.

4.0 DESIGN CRITERIA

4.1 The basic layout of the intake pumping station shall be as per Bid Drawings. The elevation of the intake pumping station shall be of suitable Architectural design based on the Bid Drawings. The Successful Bidder shall submit the Architectural Elevation of the intake well with walk way and the pumping station before issuing the work order and duly approval by the Superintending Engineer, South Circle,M.E.Dte.

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

a)	Loading Standards	IS: 875
b)	Earthquake Resistant Design	IS: 1893-2002& IS: 4326
c)	Reinforced and Plain Concrete	IS: 456
d)	Foundations	IS: 1080, IS: 2950 IS: 2911 & IS: 2974
e)	Liquid Retaining Structures	IS: 3370
f)	Structural Steel	IS: 800
g)	Reinforcement	
	Mild Steel	IS: 456 & IS: 432
	Ribbed Tor Steel	IS: 1786 & IS: 1139
h)	Masonry and Brickwork	IS: 1905 & ISS: 2212
i)	NationalBuilding Code of India	
j)	Design & Construction of Pile Foundation	IS: 2911

5.0 DESIGN PARAMETERS

5.1 Loadings

A) Intake Structure

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

B)	i)	Live Load on Roof	150 Kg/Sq.m.
	ii)	Live load on pump house Floor	500 Kg/Sq.m.
	iii)	Live load on Control Room Floor	300 Kg/Sq.m.
	iv)	Weight of each Empty Pump (approx.)	2000 Kg.
	v)	Weight of each Motor (approx.)	2000 Kg.
	vi)	Weight of 500 mm diameter Sluice Valve (approx.)	1200 Kg.
	vii)	Weight of 400 mm diameter Sluice Valve (approx.)	900 Kg.
	viii)	Load due to Electric Panel (approx.)	1200 Kg/Sq. m.
	ix)	Weight of 500 mm diameter pipe (approx.)	400 Kg/m

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

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

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

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

Load of M.S Chequered Plates	50Kg/Sq m.
For trench covers over opening in Floor	500 Kg/Sq m.

Loading from 10.00 M.T H.O.T	As per Crane
Operated (H.O.T) Overhead Crane	Manufacturer's specifications

While designing the sidewalls intake pumping station a surcharge of 500 Kg/Sq. is to be taken into consideration.

The Bidder has to design in such a way that the permissible limit of vibrations of Roto dynamic Equipment shall be within the limit as specified in IS: 11724-1985.

The R. P. M. of pump Motor set may be not less than 750 R.P.M. Sync, subject to confirmation award of equipment contract.

N. B. For calculating earth pressure on the walls of Pump house, the worth value among co-efficient of active earth pressure (Ka) and that of Earth pressure at rest (K_o) is to be considered. Standard backfill materials with conservative soil data are to be considered. No extra claims are to be entertained in this regard.

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

i. The natural frequency of the Foundation System shall be analyzed and the mass of the Foundation System shall be considerably larger than the mass of the whole machine.

ii. Dynamic Analysis due to insufficient clearance between impeller and casing of Pumps should be checked and frequency out of this type of vibration need to be made as per relevant IS Code.

iii. Dynamic Response check of the block foundation may be carried out as per relevant IS Code.

iv. Permissible amplitude of Vibration of displacement as per IS Code 2974 (Part-IV), is to be calculated and the design will be checked accordingly.

v. Permissible stresses in Soil/Concrete be suitably as per IS Code.

vi. Natural frequency of Foundation System shall be such as will avoid resonance with the Operating Speed of the Machine. The natural frequency of the foundation system should not be within +20% of the operating speed of the machine.

vii. The foundation system shall be so dimensioned that the resultant force due to mass of the machine and mass of the Foundation passes through the Center of gravity of the base area of the Foundation.

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

6.0 ARRANGMENT OF ROOF & LEAKAGE TREATMENT:

6.1 The Bidder shall consider the provision of pressure Grouting if profuse water leakage from the wall of intake pump house cum Pumping station by injecting method with applying Sika Intraplast EP or similar type of material as approved by E.I.C.

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

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

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

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

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

The Contractor will not be permitted to commence the Actual Work at site unless the EIC on written recommendation to concerned Superintending Engineer of Municipal Engineering Directorate approves detailed design and working drawings. Four copies of the approved design and six copies of the approved drawings are to be furnished by the Contractor free of cost for use by the Employer during execution of the work. Any additional copies of same drawings, if required, should also be submitted by the Contractor free of cost at the request of the E.I.C.If the drawings are done with Auto Cad, then copy of the folders containing drawings in CD/DVD may be submitted for records only. If required on the urgent basis the soft copy of any drawing is to be sent by E- Mail to "Office of the Executive Engineer" as per verbal discussion or Telephonic discussion within 2 hours.

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

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

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

a) Six copies of all approved Completion drawings. These drawings shall be on black and white prints of thick paper and there shall be one transparency of each drawing. These drawings are to be submitted with in a presentable form as directed by the Superintending Engineer of Municipal Engineering Directorate. In addition to this, CD/DVD's with folders of these drawings drawn in Auto CAD or scanned copies are to be submitted.

b) Four copies of final designs in properly bound from as directed by the Superintending Engineer.

c) Four copies of detailed specification and schedules of the completed the intermediate raw water pumping station and intake pumping station.

d) Six copies of Instruction Manuals for the Operation, Maintenance and overall of plant.

i) The Instruction Manuals shall contain the following basic categories of information in practical, complete and comprehensive manner prepared for use by operating and/ or maintenance personnel:

a) Relevant information as regards initial installation,

b) Instruction for operation, maintenance and repair,

c) Recommended inspection points and period of inspection.

d) Ordering information for all replaceable parts, etc.

ii) The information shall be organized in a logical and orderly sequence. A general description of the system including important technical characteristics shall be included in order to familiarize operating and maintenance personnel with the system.

iii) Necessary reproducible drawing and/or other illustrations shall be included or copies of appropriate certified drawings shall be bound in the manual. Test, adjustment and calibration information, as appropriate, shall be included and shall be identified to the specific equipment. Safety and other warning notices and installation, maintenance and operating cautions shall be duly emphasized.

iv) A part list shall be included showing part nomenclature, manufacturer's part numbers and/or other information necessary for accurate identification and ordering of replacement parts.

v) If a standard manual is furnished covering more than the specific equipment purchased, the applicable model (or other identification) number, parts number and other information for the specific equipment purchased shall be clearly identified.

vi) The instruction Manual shall include list of all special tools and tackle furnished with complete drawings and instructions for use of such tools and tackle.

vii) The Instruction Manual shall also include recommendations for consumable supplies e.g. packing, lubricants, etc., for the plant installed as well as for chemicals for treatment and laboratory reagents.

viii) All the pages of the Instruction Manual shall be clearly legible and prepared on good quality paper.

ix) The Instruction Manual shall need the approval of the Superintending Engineer of Municipal Engineering Directorate.

All the copies of the Instruction Manual shall be presented in durable and bound form as directed by the Superintending Engineer, South Circle, Municipal Engineering Directorate.

7.3 Release of Security Deposit (Retention Money)

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

SECTION - G

DETAILED TECHNICAL SPECIFICATIONS

1.0 SPECIAL NOTES

1.1 The layout of the intake well pumping station as shown on the drawing attached is not binding on the Bidder but is only indicative.

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

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

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

1.5 If not mentioned elsewhere in the Bid documents, the contractor shall provide the following arrangements:

a) The Hydraulics of intake raw water pumping station shall be erected that the raw Water from the river Rupnarayan be such that water flows through the suction main at the time of low flood level to the suction common manifold. The total quantity of the raw water shall be pumped out at lowest flood level as well as highest flood level considering 25 % overloading in respect of 17.21 MLD surface water treatment plant at Tamralipta Municipal Town. All the units of treatment plant have already been designed considering 20 hours pumping raw water from the intake pump station.

1.6 All valves, sluice gates, etc. shall be of reputed make and shall conform to available IS specifications where name of manufactures do not appear in the List of Venders. In case of non-availability of relevant I.S. specifications it should conform to British Standard Specification or American Standard Specification and electrically actuator control.

1.7 The circular intake dry pit raw water works being a process plant it is imperative that the layout of the plant inclusive of all Civil, Mechanical and Electrical Components should meet the requirements of Indian Factory Act, Indian Explosives Act and all other relevant statutes of the State and Central Government.

1.8 The pumping unit shall be placed on the bottom of the circular intake dry pit well. The motor control unit and 2(two) nos. air blower with ducting arrangement shall be placed at the upper portion of the pumping station above High Flood Level. A stair case shall have to be placed for easily reach to the bottom of the dry pit well floor.

2.0 ITEMS OF WORKS

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

a. Intake Raw water pumping arrangement, R.C.C.(3.0 M width) walkway and ventilation system (civil & electro-mechanical part).
b. 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 at his/her own cost.
c. Illumination of the intake pumping station, RCC walk way, lightening arrestor and aviation lamp fixture should be provided as required and direction of E.I.C.

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

3.0DESIGN SUBMITTED BY THE SUCCESSFUL BIDDER

3.1 Circular intake Dry pit well with pumping station and RCC(3.0 m width) walkway

The circular intake dry pit well with pumping station shall be erected around 200m from the Rupnarayan river bank and around 5.5 km (approx.) from the proposed surface water treatment plant at Tamralipta municipality. However the exact position shall have to be determined by the successful bidder by undertaking actual survey during execution and data available from competent Authority. The circular intake dry pit well with pumping station will accommodate three (3) number pumps (two working and one as standby) placed at the bottom of the well (to be designed) and will be horizontal execution type with the suction, delivery line and common manifold for suction and delivery of the pumping unit. The raw water delivery line made of CI shall have to be placed and passes through the wall of the intake well and laying through the river bed of minimum depth of 1.00 M bellow the bed level along with the walk way and anchored with walk way supports. Three nos. wall casting shall have tobe provided for suction line of the common delivery unit which will be connected to the pump suction line placed inside of the pumping station and for the raw water delivery rising main. The pump house will accommodate 3(three) nos. horizontal centrifugal axial spilt casing pump. The motors will be installed at the same level. The suction side

valves and the delivery lines components shall be installed at the same floor level.One stair case shall have to be placed for easy access to the pump motor floor. There will be one entry points to the pump house fitted with rolling shutters. One HOT crane of 10 MT Capacity is also included for loading / unloading of pumps & motors and other equipment as specified in technical details.

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 sets.

The two numbers suction main shall be drawn from the designed length and dia. placed on the supporting pillar (if required) with removable horizontal suction bell mouth. To arrest the suspended materials and other aquatic animal a screen rack arrangement shall have to be provided in the suction bell mouth. The screen shall have to be fabricated from corrosion resistance material. The total area opening in a screen should preferably by 200 % of the area of intake pipe. Fine screens are provided to exclude small fish and other small objects. These are usually of woven wire mesh with openings not more than 6 mm square to avoid carrying of suitable solids into the intake point. Submerged ports should be designed and controlled to prevent air from entering the suction pipe by keeping depth of water over the port at least thrice the dia. of port opening. The base slab of the supporting pillar shall be designed to withstand full downward load taking no relief from sub-soil water pressure and uplift pressure during construction and afterward due to subsoil water and also longitudinal and lateral thrust developed by the flow of the fluid of river Rupnarayan.. All possible load combination should be considered in order to achieve designed value. The subsoil water level shall be taken as well as the total thrust developed by the river flow at G.L. while designing the supporting structure of the suction main. The base slab and side wall of the intake pumping station shall be designed as water retaining structure and shall be concrete of grade not less than M-30 to a minimum cement as per IS (latest) mixed designed code. A 75 mm thick binding layer of mix not leaner than M15 shall be provided. Special water proofing treatment shall be applied to this structural member as specified in technical details.

Adequate ventilators and windows shall be provided for sufficient ventilation and for entry of natural light of the control panel room and blower room of the pumping station. 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. Opening for eight exhaust fans (fans included) 600 mm diameter area to be provided with removable M.S. louvers. First class brick work with cement mortar (1:6) will be used in all superstructure (pump house). Superstructure panel wall should have 20 mm thick cement plaster (1:6) and 15 mm thick plaster (1:4) faced outside. All inside walls of the pump house have three coats of white wash. All external walls shall be provided with two coats of Weather coat (exterior) or equivalent approved color. The ceiling shall be rendered smooth with 10 mm thick 1:4 cement plaster and shall have three coats of white wash. The building shall have roof in RCC construction of mix not leaner than M-20 (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 outer brick walls shall be of minimum 250 mm thickness.

The column of the building shall be designed to withstand not only the load of the building but also a load of 10 MT capacities H.O.T. crane including loading. The cross and longitudinal travel of the crane shall be such that a suitable minimum clearance is left for the crane hook to avoid any angular lift or lowering at the furthest points. 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 or 25 mm thick roof tiles as directed by E.I.C.

The foundation system of the intake and RCC walk way shall be as per Soil Investigation Report. Sub-soil water level and also HFL shall be taken under consideration during designed of intake well and RCC walk way. All the structure shall be designed to withstand full down ward load taking no relief from subsoil pressure both during construction and afterwards.

An Air ventilation system (with two nos. blower) and 8 to 9 air changes shall have to be placed on motor control room to entry and exit of air from the bottom of the intake well.

A sump of designed dimension shall have to be constructed at the bottom of the well for collecting the gland leakage water and delivered to the river Rupnarayan.

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.

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 and clearance of the site

After completion of the work, the entire site all round the intake structure cum pumping station, RCC walk way 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 of the plant is put into trial run. The site shall be graded and levelled to the required level.

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.

The **Superintending Engineer,**
South Circle

SECTION H

ANNEXURE – I

KoPT report regarding feasibility study of selection of intake jetty in the river Rupnaryan is enclosed herewith for reference.

Recommended Location for Water Intake Jetty at Village: Ichhapore, P.O.: Ganja Narayanpur, P.S.: Nandakumar, Dist.: Purba Medinipur having coordinates [Shore connection Point: (Lat: 22 Deg 15 Min 03.9 Sec N, Long: 087 Deg 57 Min 3.9 Sec E) and Jetty Face: (Lat: 22 Deg 15 Min 06.3 Sec N, Long: 087 Deg 57 Min 06.3 Sec E)]
in connection with the Proposed Water Supply Scheme of Tamralipta Municipality, Tamluk, Purba Medinipur
Lat: 22 15 03.9 N
Long: 087 57 03.9 E
Shore Connection Point
100 m length (Approx)
Lat: 22 15 06.3 N
Long: 087 57 06.3 E
Jetty Face
087 57 6 E
087 57 8 E
087 57 10 E
22 15 4 N

The relative advantages and disadvantages for the above mentioned locations are given below:

Locations	Advantage	Disadvantage
Location-I (Lat:22°15'7" N Long: 87°57'7" E Near Icchapur, under Purba Byabarttarhat GP)	• Stable deep water zone • Availability of water in all state of tide. • No dredging is required	• Being 4 km away from the Water treatment Plant, additional pipeline is required.
Location-II (Lat:22°16'15.8" N Long:87°55'51.2" E Near Chak Kamina, under Ward-18)	• Close to the Water Treatment Plant.	• Unstable zone • Siltation prone area • Availability of water in all state of tide is uncertain. • Dredging may be required to get water in all state of tide.

6. Recommendation:

For uninterrupted availability of water, Location-I is recommended for construction of Water Intake-Jetty from hydraulic point of view.

LIST OF TOOLS OF ELECTRICAL EQUIPMENT

Mechanical instrument			
Double Ended Spanner (6 mm to 25 mm)		:	3 Sets
Screw Driver (6 mm to 25 mm)		:	3 Sets
Sliding Pipe Wrench			
150 mm		:	3 Nos.
250 mm		:	3 Nos.
300 mm		:	3 Nos.
350 mm		:	3 Nos.
Hand Drill (6 mm to 19 mm)		:	3 Sets
H.S. Drills (1.5 mm to 10 mm)		:	3 Nos.
Round Rough File	350 mm	:	3 Nos.
Flat Rough File	350 mm	:	3 Nos.
Steel Tape	2 Meter	:	3 Nos.
Hacksaw	300 mm	:	3 Nos.
Hammer with handle			
1 kg		:	3 Nos.
2.5 kg		:	3 Nos.
Cold Chisel	200 mm x 20 mm	:	3 Nos.
Centre Punch		:	3 Nos.
Engineering Square	200 mm	:	3 Nos.
Spirit Level		:	3 Nos.

Electrical Equipment

Multi Range Tong Tester	:	1 No.
500V Megger	:	1 No.
Multi Meter	:	1 No.

LIST OF VENDORS

Sl No	Equipment / Instrument	Make
1.	Pumps	KIRLOSKAR/WORTHINGTON/KSB /MATHER & PLANT
2.	Motors	ALSTOM/SIEMENS/KIRLOSKAR/BHARAT BIJLEE/ABB/CROMPTON GREAVES
4.	Electrical component	LARSEN & TOUBRO/SIEMENS/ABB
5.	Motor Control Centre	L&T/ SIEMENS/SELWIN/ABB
6.	Power distribution board	DO
7.	Hoist	INDEF/ROPEMASTER/HAFA/BATLIBOY /SUREKHA
8. Valves (Sluice/Butterfly/NRV)		KIRLOSKAR/IVC (NASIK) /KSB/AUDCO/CRAWLE & RAY

9.Isolation Penstocks		JASH/IVC (NASIK)/MECHATECH INDS/P.S ENGINEERING
10.	Pressure Gauge	H.GURU/BELLS/MANOMETER INDIAMETER
11.	Ammeter, Voltmeter	AE / IMP/ L&T
12.	Control Switches	SIEMENS / L&T / CHEMIN
13.	Push buttons, Selector Switches, Indicating Lamps	DO
14.	Air Circuit Breakers	GE/LARSEN & TOUBRO/ SCHINDER
15.	Power Cable (Aluminum)	INCAB/UNIVERSAL/GLOSTER/NICCO/FINOLEX
16.	Control Cable (Copper)	INCAB/ UNIVERSAL/ NICCO/ FINOLEX
17.	HRC Fuse	LARSEN & TOUBRO/SIEMENS/GE
18.	Contractors	LARSEN & TOUBRO/SIEMENS/GE
19.	Overload Relays	SIEMENS/GE/LARSEN & TOUBRO/AVK-SEG & CONTROLS (I) LTD/CUTLER HAMMER
20.	Local Start/Stop Push Button Station	SWITCHGEAR AND ACCESSORIES/ SIEMENS/L&T
21.	Current Transformers	CROMPTON/BHARAT BIJLEE/EMCO/KAPP
22.	OC/EF & Under voltage Relays	EE/LARSEN & TOUBRO

23.	Capacitor	CROMPTON/KHATAU JUNDER/NCEF/UNISTAR
24.	Light Fitting including Lamps & Tubes	PHILIPS/BAJAJ/CROMPTON
25.	Ceiling Fans & Cabin Fans	GEC/ CROMPON/RALLI
26.	Exhaust Fans	GEC/CROMPON/ BAJAJ
27.	15-A Industrial Plug Socket outlets	ANCHOR
28	Multi-range Tongue Tester	MOTWANE
29.	Avo-meter	MOTWANE/HITACHI
30.	500 Volt Meggar	HITACHI/MOTWANE
31.	Paints	ASIAN PAINTS/NEROLAC/BERGER
32.	Epoxy Resin	CIBA - GEIGY
33.	Fibre Glass	Mat FIBRE GLASS PILKINGTON
35.	Pedestal Fan (Industrial type)	BAJAJ / CINNI / GEC
36.	PVC Door	SYNTEX.
37.	Air Blower	KAY

Signature of Bidder

Superintending Engineer
South Circle, ME. Dte

DRAWINGS

It is herewith for Bidders ready reference. They are requested to visit the Site physically and verify with the copies of 'Site Plan' of the proposed Intake Pumping station", for Tamralpita Municipal Town enclosed the dimensions of the proposed Plot and to judge all other conditions if any, which may affect their Design and proposal. (Enclosed with this NIB)

SECTION-I

Technical Specification for Motors

A-SCOPE

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

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

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

B-STANDARDS

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

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

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.

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 horizontal pumping unit 10-15 % of the pump BHP) of 415 V ± 10%, 3 phase,50 Hz ± 3 %, not less than750 RPM (Synchronised) and also suitable for drive the pumping units. At the time of selection of motor unit 10 % derating factor shall have to be considered.

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 times start and stop in a day with minimum time gap of 20 minutes for one stop after prolong operation and restart the same. The motor shall also be capable of one immediate hot restart and three equip-spaced starts per hour. The motor shall also be suitable for long period of inactivity.

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 (SPDP) and well ventilated.

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.

8. Motor above 50 KW shall be designed for Autotransformer 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)

9. Motor shall be designed for Star-Delta (rating bellow the above rating) 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.

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

11. 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 .

12. The motor shall be Screen Protected Drip Proof (SPDP) types of protection grade conform to IP 45.

13. 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%)

14. 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.

15. 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.

16. 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.

17. 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.

18. 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.

19. 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.

20. Motor terminals box shall be detachable type and located in accordance with IS. It should be suitable for terminating 2 nos. 1.1 KV grade PVC (AL) conductor armoured cable along with the lead cable for Power factor 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.

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

22. The frame of each motor (above 75 KW) 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.

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

24. 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.

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

26. 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.

27. 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.

28. Motor including fan shall be painted with corrosion proof paint.

CHECK LIST OF THE MOTORS BEEING OFFERED

(Submitted by the successful bidder immediate after issuing the work order)

General

1. Manufacture :
2. Rated output in KW /HP :
3. Numbers of pole :
4. Speed :
5. Numbers offered :
6. Approx. weight of the motor
7. Painting :
8. Earth terminal lifting lug provided Yes / No
9. Type of enclosure :
10. Installation : Horizontal
11. Shaft orientation and mounting :
12. Degree of Protection :
13. Technical leaflet /literature provide: Yes / No
14. Type of duty & duty designation :
15. Whether the motor is capable for
    Operation after one hot restart
    And/ or equip-space hourly restart : Yes. /No

Supply condition

16. Rated Voltage (Volts) :
17. Allowable Variation of voltage (%) :
18. Frequency (Hz) :
19. Allowable Variation of frequency (%):
20. Number of phases :
21. Stator connection :

Currents

22. Full load current :
23. No load current :

24. Starting current (%) of full load current:

Efficiency

25. Full Load Efficiency :

26. Efficiency at 75 % of load :

27. Efficiency at 50 % of load :

Power Factor

28. Full load power factor :

29. No load power factor :

30. Power factor at 75 % load :

31. Power factor at 50 % load :

Method of starting

32. Direct on line start :

33. Star-Delta start :

34. Auto-transformer start :

Torque

35. Starting Torque (% of full load Torque) :

36. Maximum Torque (% of full load Torque) :

Acceleration time (Second) from dead stop

37. with 100% Terminal voltage :

38. with 85% Terminal voltage :

39. Safe stall time :

Class of insulation

40. Reference Temperature (Ambient) ^{0} C

41. Temp. Rise in ^{0} C by

Resistance method & class in which limited:

Space Heaters

42. Number

43. Rating (watt)

44. Voltage, phase& frequency

45. Whether separate terminal box provided for:

Bearings

46. Driving end

47. Non Driving end

48. Anticipated life (hours)

49. Recommended lubricants & Qty.

50. Whether separate lubricant nipple provided

51. Interval of lubricant hours

Winding &Bearing Temperature Decoder

52. Whether separate Terminals box provided or not

C – DRAWINGS, DATA& MANULS

After award of the contact for approval:-

- Dimensional general arrangement drawings.
- Foundation plan and loading
- Cable end box details
- Space requirement for rotor removal.
- Thermal withstand curve hot & cold.
- Starting and speed characteristics curve at 80% & 100% voltage.
- Complete motor data.
- Erection and maintenance manual.

D- TESTS

Testing at factory

Upon completion, each motor shall be subjected to standard routine tests as per IS .In addition, type test of at least 50% of order number and as per choice of the consumer, shall be performed. Further any special tests called for in the driven equipment specification shall be performed. The manufacture/Bidder has to bear all expense for such testing to witness the test for maximum two representatives (not bellow the rank of SAE) of the dept. to the manufacturer premises within shortest possible time as per direction of EIC.

Six (6) copies of routine and type test certificate shall be submitted for approval prior to despatch of the motors from the manufacturer factory.

Checking before installation

Check clean and dry

Air gap check

Tightness of fastener (nuts, bolts, locking clips)

All safety guard

Earth connection lead

Lubrication points

Paint finish

Ventilation path fitters etc. are to be checked.

Correctness of name plate and diagram plate

Motor terminal box

Coupling and driving unit.

BTD and RTD Terminal box check.

E. Power Factor Improvement Capacitor& Series Reactor

440 volt 3 phase star connected capacitor bank (KVAR rating to be calculated considering motor kilo watt & rpm from data sheet submitted by the bidder) for each motor to improve power factor up to 0.95 lag. The basic unit of the capacitor will be connected to the separate power contractor which placed in the motor control panel as specified in ATS/star-delta stater panel. If not possible the capacitor bank will be installed on foundation channel and open type steel rack. The internal connection, bus bar, live parts insulator bushing will be covered a dust and vermin proof enclosure, having cable entry box and earthing arrangement at rear side of the panel / motor end as per direction of EIC. The capacitor will be MPP-HD (Metallised polypropylene Heavy duty) type with discharge resistance act as a safety device.

1% dry type series reactor(above 75 KW) shall have to be connected in between capacitor bank and the power contractor for limiting the inrush current surge in switching ON-OFF & filter odd harmonics. The reactor will be suitable for supply system of 415/440 Volt 50 Hz supply system. The reactor will be provided both incoming & outgoing cable end box.

F INSTALLATION

1. Transport of materials from store to erection site.
2. After opening the packing case, inspection of materials is required, if any damaged is occurred during transportation necessary rectification is to be done, if require touch up paint should be done where necessary.
3. All alignment levelling grouting anchoring and adjustment including inter panel locking as necessary in accordance with manufactures Any chipping / levelling insertion of packing plates minor attendance of board internals etc, as necessary for the above is in bidder scope.
4. Retightening the busbar and rechecking of the control panel wiring are in the bidder scope.

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SECTION-J

TECHNICAL SPECIFICATION OF PUMPS

A-SCOPE

The dry pit circular intake well pumping station is to be designed for two (1W+1S) pumps to run in solo for supplying raw water from intake to WTP (around 5.5 KM) through proposed 500mm dia. DI rising main. Normally One (1) pump will be working while the remaining pump will serve as standby. Delivery of pump is to be fed to a common delivery manifold.

B-STANDARD

1. The pump shall be Vertical Turbine Pump with horizontal execution type and suitable for pumping the raw water from the river Rupnarayan near Ichapur mixed with silt and other materials.
2. The casing shall be split in such a fashion that the suction and delivery branch of the pump will be internally cast with the bottom half of the casing .The purpose being one half of the casing shall remain fixed in position with the suction and delivery line while the other half of the casing will be withdrawl so that when removed, the entire pump internal will be exposed for inspection or repairing

purpose. Two halves of the casing volute will be matched with the template, so that there is no overlapping of steps in volute. This is required not only to achieve good efficiency but also to avoid operational / repair & inspection problem.

3. The impeller of the pump will be located centrally with the pump casing and shall be fixed in a position on the shaft with the key as well as sleeve and sleeve nuts. Sleeves and sleeves nuts will not allow the impeller its position axially along the shaft to cause mechanical damage and operational problem .In order to smooth running and freedom from vibration impeller /impellers are dynamically balanced. The impeller shall be locked rigidly on the shaft by a long threaded nut which is further locked by an eccentric screw.

4. A liberally designed shaft should be covered with a shaft sleeve in such a fashion to prevent frequent replacement of the shaft.

5. The bracket shall be provided with a bronze and two springs attached with synthetic rubber seals. If the tips of the lower seal be damaged due to the abrasive action of ingredients in the effluent, the upper seal will still continue to function. This Sealing arrangement is a departure from the asbestos packing arrangement.

6. A rigid /flexible coupling must join the pump shaft with the motor shaft. This couplings work provides dismantling of the pumps without disturbing the motor position vice-versa.

7. The vibration level should be 50 microns both in horizontal & vertical direction, sound level of maximum 65 db during running condition of pump & motor. The pump should be supplied with base plate, soleplate, grounding pad, lifting lug, eyebolts, anchor bolts, nuts etc. Reverse direction of rotation of pump must be restricted by providing non-reverse ratchet. The pump shall have provision for fixing pressure gauge, vent pipe, air release valve.

C-DESIGN

1. The design, manufacturing, performance of the Horizontal 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.

   IS 1520 horizontal centrifugal pump for clean, cold, freshwater. IS 9137 Code for acceptance test for centrifugal, mixed flow & axial pump.BS 5316 Acceptance tests for centrifugal, mixed flow and axial pump. PTC 8.2 Centrifugal pumps-Power test codes.

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

3. 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.

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

D- PERFORMANCE REQUIREMENTS

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.

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. 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 in the pump suction sump.

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.

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.

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.

E- CONSTRUCTION

1. Pump shall be axially split case, single/double volute, double/ single suction type and shall be constructed in a manner that they are placed on their foundation with their shaft in horizontal axis.

2. The casing shall be a single/double volute, double suction design and hall be so constructed that when it will be placed on its existing foundation the integrally cast with one half of the casing so that the other half of the casing can be removed without having to disturb the suction and discharge pipelines. A suitable fixture shall be provided with each pump for easy removal of one half of casing, which will have no connection with the pipelines, for inspection and / or replacement of the Rotating Elements.

3. The impeller shall be single/ double entry type and dynamically balanced.

4. Casing wearing rings shall be provided with torque and groove arrangement to prevent rotation and shall be easily removable.

5. The impeller shaft shall be ground finished on its entire length and shall be protected with sleeves so that the shaft itself cannot come into contact with the actual liquid pumped.

6. Sleeves shall be keyed onto the shaft and located by grub screws to prevent relative rotation between the sleeve and the shaft. The impeller shall be kept in position on the shaft by means of two sleeves, which in turn shall be locked by means of suitably designed nuts.

7. Stuffing box shall be an integral part of the casing and shall be fitted with lantern rings. The lantern rings shall be sandwiched between gland packing. The packing inside the stuffing box shall be held in position by glands.

8. The glands shall be designed to facilitate easy removal for inspection and replacement of packing.

9. Adequate capacity thrust bearings ball droller shall be provided to take the full axial thrust of the pump as well as the weight of the pump-rotating element. Thrust bearing shall be placed in the non-driving end of the pump and shall be grease lubricated anti friction type and ball bearing shall be placed in the driving end of the pump and shall be grease lubricated anti-friction type.

10. Discharge branch pipe up-to the terminal point under this specification shall be flanged and bolted and shall be complete with gaskets, nuts and bolts and shall screwed as specified in data specification sheet

11. A dismantling joint will be provided at the pump suction, as such, the pipe assembly will be subject to an additional thrust. This thrust loading is to be transmitted to the foundation bolts of the pump assembly.

12. The pumps and motors shall have separate supporting arrangements. The pump shall be supported on the foundation work. Installation

As per technical specification and instruction manual of the manufacturer

F-TESTS

GENERAL

1. All pressure parts shall be subject to hydraulic testing at a pressure of 150% of shut off head or 200% of rated head (effective head) whichever is higher, for a period not less than 30 minutes.

2. 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.

3. Tests shall preferably be conducted with actual drive motors furnished.

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

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

TEST AT SHOP FLOOR

1. Each pump shall have to be tested to determine the performance curves of the pumps. These tests are to be conducted, in presence of Employer or his representative, as per the requirements of the Hydraulic Institute Standard/ASME Power Test Code PTE 8, 2/BS-599/I.S.S., latest edition.

2. The Contractor shall conduct necessary sump model test for establishing optimum sump dimensions/flow correcting devices and establish the suitability of suction conditions.

3. The Employer or his authorized representative shall be given full access to all tests, Prior to performance tests, the Contractor shall intimate the Owner allowing adequate time so that if the Employer or his representatives can witness the test. The test witnessed by the E.I.C or his authorised representative at shop floor not below the rank of S.A.E. The total cost of to and fro journey (possible least path) including cost of stay, fooding & lodging charges etc. will be borne by bidder itself as per direction of EIC.

4. The Bidder shall guarantee the effective head at the specified designed capacity and also the corresponding pump efficiency, pump input power, unless otherwise mentioned, the Bidder shall specify the allowable tolerance considered by him on the guaranteed performance.

5. The Bidder shall indicate the guaranteed efficiency of the pumps offered by him. While carrying out shop performance tests, the permissible limits of errors in measurement shall be in conformity with Class-B of BS: 599 without any penalty whatsoever. Apart from that a negative tolerance of maximum (-) 3% on quoted efficiency shall be acceptable only with penalty. Variation more than (-) 3% will render the pump liable to rejection, If the shop performance tests indicate any failure of the pump to achieve the guaranteed efficiency, the Contractor will be given a time, to be decided by the Owner, to make up the deficiency at his cost by incorporating necessary modification, alteration and replacement.

6. The manufacturers shall conduct all tests required to ensure that the equipment furnished shall conform the requirements of this specification and in compliance with requirements of applicable Codes and Standards. The particulars of the proposed tests and the procedures for the tests shall be submitted to the Employer for approval before conducting the tests. The pump is to be tested on the test bed at contractors' workshop in presence of the Superintending Engineer Authority representatives of one.

7. Where stage inspection is to be witnessed by Employer in addition to above, the bidder shall submit to the Employer at the initiation of the contract, the deadline of PERT-CHART showing the manufacturing progress and indicating the periods where inspection of the Employer or his authorized inspection agency is required at the manufacturer’s premises.

8. Since stage inspection is to be witnessed by Employer, the various stages of inspection, together with the Program shall be submitted to the Employer. The inspection and test procedures shall also be submitted for Employer's approval.

G-PAINTING

1. Surface of all parts shall be cleaned to remove scale, dirt, oil, water, grease and other foreign objects prior to final assembly of the equipment. All openings shall be covered to guard against damage and entry of foreign objects.

2. All surfaces shall thoroughly be cleaned in a manner approved by the manufacturer for necessary paint coating to be applied on the surface, In case of any prevalent Standard/Codes on selection and application of painting/coating, the same shall be strictly adhered to. The colour code for finished painting on the external surface shall be subject to Employer's approval. Necessary finish paintings including touch up paints, if not applied at shop, shall be done by the Contractor from sealed containers for site application.

3. All parts shall be properly boxed, created or otherwise protected for transportation to suit the mode of transportation. Exposed finished surfaces shall be thoroughly greased before transportation.

H- TOOLS AND TACKLE

1. The Bidder shall quote separately for a complete and unused set of all special tools, wrenches, etc. including toolboxes, specifying the quantum of requirement, for erection, maintenance, overhaul or complete replacement of equipment under this specification. A complete list of tools necessary shall be enclosed with the Proposal.

2. The Price quoted for tools shall not be considered for evaluation of Bid.

I-SPARE PARTS

1. The Bidder is to supply spare parts as per list enclosed vide list of spare parts.

2. The spare parts as mentioned are to be supplied within the completion period of the contract.

3. Cost of spare parts as above arc to be mentioned separately.

4. Replacement of spare parts during contract period would be borne by the Bidder at their own cost. The Bidder is required to provide a list of spare parts for a period of two years for further maintenance.

J-DELIVERY

1. The schedule of the project demands early delivery of the equipment's

2. The delivery date shall be indicated by the Bidder in the Progress Schedule showing the time required for different phases of the work under the scope of this specification taking the date of issue of Letter of Intent as datum.

3. The Bidder shall guarantee the delivery date subject to penalty.

K-DRAWINGS, CURVES & INFORMATION

1. Characteristic curves of pumps showing effective head, pump input power, efficiency, submergence/NPSH, against capacity ranging from shut off condition to at least 125% of rated capacity.

2. Speed vs. torque curve of the pump corresponding to recommended mode of pump starting, superimposed on speed vs. torque curves of the motor, corresponding to 85%, 90%, 100% rated voltage and also extending over quadrant I & Quadrant II covering reverse flow conditions, if applicable.

3. Diagram showing the type of lubrication system, etc.

4. Complete descriptive and illustrated literature on the equipment and accessories being offered.

5. Experience list for the similar type of equipment supplied, which should indicate name of customer, date of ordering, and value of order date of commissioning, pump parameters and number.

6. A comprehensive write up or brochure on the details of manufacturing and test rig facilities in the shop of the manufacturer.

7. The successful bidder shall furnish the following drawings/data for Employer's approval after award of the contract.

8. All data furnished during bidding stage including details furnished above shall be treated as final and binding on the Contractor if, however, any, minor change is essential during detail design stage for any improvement II1 the system, such changes shall be carried out only after obtaining approval of the Employer.

9. The G.D2 valves of the impeller of the pump and Rotor of the motor at not less than 750 R.P.M. (syn.) are to be supplied.

L-INSTRUCTION MANUALS

1. The instruction manual shall present the following basic categories of information in a comprehensive manner prepared for use by operating and/or maintenance personnel:

2. Instruction of Erection

3. Instruction for pre-commissioning check-up, operation, abnormal conditions, maintenance and repair.

4. Write up on Controls and interlocks provided.

5. Recommended inspection points and periods of inspections.

6. Schedule of preventive maintenance.

7. Ordering information for all replacement parts.

8. Recommendation for type of lubricants, lubricating points, frequency of lubrication and lubricant changing schedule.

9. The information shall be organized in a logical and orderly sequence. A general description of the equipment including significant technical characteristics shall be included to familiarize operating and maintenance personnel with the equipment.

10. Necessary drawings and/or other illustrations shall be included or copies of appropriate finial drawings shall be bound in the manual. Test, adjustment and calibration information as appropriate shall be included and shall be identified to the specific equipment. Safety and other warning notices and installations, maintenance and operating cautions shall be emphasized.

11. A parts list shall be included showing part nomenclature, manufacture's part number and/ or other information necessary for accurate identification and ordering of replacement parts.

12. Instruction manual shall be securely bound in durable folder.

13. If a standard manual is furnished covering more than the specific equipment purchased, the applicable model (or other identification) number, parts number and other information for the specific equipment purchased shall be clearly identified and highlighted. Sectional drawing to suitable scale and characteristic curves for the particular equipment supplied must be included in the Instruction manual.

14. The Instruction Manual shall include the list of spare parts that are required for 2 years normal operation and maintenance for equipment. It shall also include list of all special tools and tackle furnished with complete drawings and instructions for use of such tools and tackles.

15. The instruction manual shall need approval of Employer in the same fashion as that for drawings.

M-DEVIATIONS

1. The Bidder is required to submit with his proposal a detailed list of any and all exceptions taken to this specification by filling up the Deviations Sheet. In absence of such a list it will be understood and agreed that Bidder's proposal is based on strict conformance to the specification in all respects. These requirements, however, are not intended to prohibit Bidders from offering alternate quotation for equipment which they consider to be equal or superior to that specified for the intended service and for which he believes he can show economic and/or technical advantages, provided that he is not allowed to add to the Vendors list and is confined to items not appearing therein.

N- PROPOSAL DATA

1. To complete the proposal, the Bidder must fill up the following from sheets as per instructions given in the Tender Documents.

2. Each Bidder shall supply the data requested in Proposal Data paragraph as above by typing in appropriate places on each page. These filled in data sheets must be properly signed by authorized representative of the Bidder or Manufacturer as verification of the data submitted. These signed pages in their entirely shall be returned with and shall be part of the Bidder's formal proposal. The Bidder shall completely fill in the above information required for each of the above-mentioned sheets. Failure to comply with this requirement may result in the rejection of the tender.

O-DATA SHEET/ CHECK LIST OF THE PUMPS BEING OFFERED

(By the successful Bidder immediate after issuing the work order)

GENERAL

1. Manufacturer
2. Model Number
3. Type of Pump :
4. Non Pull-out : Yes/No
5. Impeller Type : Closed/Semi Open/open
6. No. of Pumps offered :
7. Efficiency of Pump at peak flow condition :

8. Efficiency of Pump at medium flow condition :

9. Efficiency of Pump at lean flow condition :

PERFORMANCES

1. Guaranteed capacity - M3/hr. in peak flow :
   Without tolerance in single operation &
   Parallel operation

2. Guaranteed head (total bowl head) - MWC at :
   Peak flow discharge, without tolerance in single
   Operation& parallel operation

3. Guaranteed Pump efficiency, without in single :
   Operation & parallel operation tolerance in peak
   head/ flow

4. Input to the Pump (KW) in peak head/flow :
   in single operation & parallel operation without
   tolerance

5. Pump input power at worst operating :
   condition on the range of operation (without
   positive tolerance)

6. Pump input power at shut off :

7. Range of operation of Pump :

8. Recommended Motor KW :

9. Pump rated speed (RPM) :

10. Pump specific speed of particular trim at D.P. :

11. Pump shut off head :

12. Minimum submergence required in MWC at :
    Worst flow condition

13. Are the pumps suitable for parallel operation :

14. Whether non-Reserve Ratchet is provided in pump or not :

15. Type of lubrication for pump :

16. Whether pre lubrication arrangement Provided. :

PUMP NPSHR

1. -do- at highest water level condition :

2. -do- at lowest water level condition :

3. -do- in the operating range, without positive Tolerance :

4. Pump duty: continuous intermittent :

5. Pump shut off head :

FLEXIBLE JOINTS AND SHAFT

1. Flexible Coupling :

2. Type :

3. Make :

4. Factor of Safety adopted :

5. Degree of Flexibility :

6. Extent of Play allowed :

7. Shaft diameter (Extension if required) :

8. Material :

9. Factor of Safety adopted :

THRUST BEARING

1. Type :

2. whether separate thrust bearing for pump:

motor provided or not

3. Method of lubrication :

4. Whether the thrust bearing is capable for worst : loading of both phases

5. Axial thrust at duty point (kg) approx. :

6. Whether thrust bearing temperature detector provided :

MATERIAL OF CONSTRUCTION

1. Impeller :

2. Casing :

3. Casing Ring :

4. Pump shaft :

5. Coupling for pump Motor :

6. Shaft Sleeve :

7. Sole Plate :

8. Impeller Ring

9. Seal Ring :

EXPECTED LIVES UNDER NORMAL OPERATION AND MAINTENANCE

1. Impellers :

2. Pump Bowl Casing :

3. Shaft (If Required) :

4. Thrust Bearing

P-CHECKING BEFORE INSTALLATION

Check clean

Tightness of fastener (nuts, bolts, locking clips)

Eye bolt, lifting lug present or not

Cooling arrangement damaged or not

Base plate, Sole plate, Foundation Bolts, nuts, sleeve etc. present or not.

Flexible couplings present or not.

Vent and drain with isolation valves present or not.

Correctness of name plate.

Paint finish

Q. VACUUM PUMP

The one numbers vacuum pump shall be wet water ring type CI (CI/bronze impeller) type construction with pipe lines, specials, valves, base plate, fittings to connect with the main pumping unit to create vacuum for lift the water to the pump axis within 10 minutes and also included the clear waterline to the vacuum pump with necessary valves & storage water tank of sufficient capacity and also include the water main line to the tank with necessary valves and pipe lines also.

The driving motor shall be suitable for driving the pumping unit operate at 3 phase 415 volt 50 Hz AC supply squirrel cage type TEFC complete with DOL starter. The suction and delivery line 50 mm and max discharge in such a manner to create the vacuum in 10 minute considering max vacuum 380 mm of Hg.

H SUMP PUMP

Provision of two numbers of sump pumps have made considering one unit will operate other would remain as standby. All seepage water from glands would be accumulated in a sump of dimension approximate 1.5 meter x 1.0 meter x 0.6 meters. The capacity of each pump would be $30m^3/M$ at a head of 15 meter. The drive motors would be of adequate rating of 415V ± 10%, 50Hz ± 3% and 2900 rpm to cater the load of the above pumps. The delivery pipes of individual pumps will be connected to a common manifold near the pump & the length of the manifold would be such that the water can be drained in a nearby location, outside the pump house within a distance of 10 meter maximum. The NRV and the pit valve shall be placed in each pump delivery line and one no pit valve shall be placed in deliver line which generates from the common header. All GI pipes and specials within the bidder scope. The Bidder has to provide suitable capacity

DOL starter for individual pump motor set and placed in the suitable place for easy operation. The power will be taken from the control panel through switch fuse unit.

The Portable submersible dewatering pump motor set will be suitable for dewatering gland leakage muddy water. Submersible motor will be oil filled. The pump will be fitted with suitable mechanical seals, ball bearings etc. and shall be capable of performance detailed bellow when running 2900. The pump will be fitted with cast iron /bronze impeller fitted in cast iron casing.

Pumps and motor shall be closed coupled and motor will be placed on the top of the pump. This arrangement will ensure that in the sump can be drained to the maximum extent possible, so that the level of water in the sump is only a few cm above the pump inlet.

The motor windings will be insulated with oil and water resistance materials. The pump and motor unit shall be capable of running dry even when the motor oil seals fail draining out the oil from the motor and running which vertically no water in the sump

Installation

As per technical specification and instruction manual of the manufacturer

INSTALLATION OF PUMP MOTOR SET

1. Pumps and motors are normally despatched to the site in dismantled condition, sole plate, rotating element and all other equipment like shaft couplings and housing, stool etc. are packed separately. After receiving the materials at site all boxes should be opened and materials checked against respective packing. The protective coatings and wrappings should be removed before erection-if necessary.

2. Checking /preparation of foundation block if necessary should be done.

3. The pump assembly, including the solo plate should be level up by using Engineer's sprit level about 0-05 mm type in 254 mm and I beam type straight edge placed on the mechanical surface of the solo plate and adjust the thickness of the packing by simming until the assembly is levelled.

4. When the solo plate is levelled and positioned with find datum, levels foundation bolts may be grouted.

5. Once the solo plate is levelled the pump half casing may be lowered on solo plate accurately in holding bolts and tighten the nuts.

6. Fix another pump half of flexible coupling on driving end side. Recheck the level on pump half coupling .Any adjustment, if necessary, can be made by shimming between solo plate and packer plate.

7. The motor unit are placed and coupled with pumping unit and check the alignment by dial gauge

8. Following variation which can be tolerated. Angular alignment – 1-0.07 and Radial alignment not to exceed-0.1 mm

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SECTION-K

Motor control panel cum power distribution panel

1.0 GENERAL

The motor control panel cum power distribution board is intended to receive electrical power, effectively control the motor operation having facility both local/ manual operations of the motors at suitable places located nearer to the individual motors providing against mal functioning of the motor as well as to protect downstream load from the system fault and to distribute power to the other areas of activities. The design manufacture and testing commissioning of MCC cum PDB and various components / equipment thereof covered by this specification shall comply with the latest issue of I S Specification and I.E Rules.

2.0 TECHNICAL SPECIFICATION OF MEDIUM VOLTAGE PANEL

Medium voltage switchboard is required to provide power to motor feeder, lighting station feeders etc. The panel shall be suitable for 415 V± 10%, 50Hz ± 3%, 3 phase, 4-wire supply system and Degree of Protection IP-54 & 50KA breaking capacity. The MV panel shall be 2 mm. CRCA sheet steel enclosed, floor mounted type, self-supporting, fully compartmentalized, dust & vermin proof, cubicle pattern draw out/ non draw out type and all the compartments would be interlocked in such a way ,the door could not be opened unless the switch is in OFF position. It shall be finished painted with powder-coated paint after necessary chemical treatment for rust free surfaces and application of anti-rust chemical coating. The base frame of the panel shall be made of ISMC-75 channel. The panel shall be dead-front type with concealed type hinged doors at front and bolted cavers at the rear. It shall have rear access and the cable termination arrangement shall be provided at the rear of the respective feeder modules where type undrilled cable gland plates would be provided for this purpose. The vertical dropper bus bars shall be placed in between two vertical aligned feeder modules. The bus for the panel shall be made of E91E graded Aluminium alloy insulated with 1.1 KV grade heat shrink type PVC colour coded sleeve. The rating of the bus bar shall be below the 1000A then traditional System R Y B shall be adopted. Interleaved bus bar(R-Y-B-R-Y-B instead of RR-YY-BB) shall have to be provided for each phase and neutral at the top of the chamber continuous to avoid skin effect and proximity effect and also avoid unnecessary heat development, this system shall be adopted when the connected load 1000 amp onwards. The current density of the bus bars shall not exceed 1 Amp/Sq.mm The bus bars shall be supported on non-hygroscopic type resin modulated insulators and the distance between insulators shall be so designed to make the bus bar system capable of withstanding a short Circuit fault current of 50KA (R.M.S) shall be fully shrouded to avoid accidental contact with the live bus bars. The minimum clearance between busbars and busbar to earth shall be as per I.S specifications. Incoming Breaker termination shall be done with extended bus bar arrangement. The cable termination chamber shall be provided with cable supporting clamps. Each incoming Breaker shall receive 2 nos. 1.1 KV 3.5 core not less than 195 sq. mm armoured Al Cable. For outgoing feeder the cable allay shall have to be provided in such a fashion that the cable will be taken out easily. The control wiring with 50 % spare of the panel shall be done with 1.1 kV made PVC insulated, 2.5 sq.mm flexible copper wires with finned copper lugs and ferule marking at each end. Wire bunches routed through horizontal and vertical wire ways which provide support and order. All hinged door shall be earthed with flexible copper wire. Lifting arrangement should be provided for lifting the panel at the top of the panel.2 nos. space heaters with rotary switch shall be provided in bottom of the panel board.

All sheet metal shall be thoroughly deleted for de-rusting, resealing and shall be painted with two coats of red oxide primer prior to final painting. Final painting would be done by synthetic enamel paint.

The Incoming side comprising with the followings for each

Air Circuit Breaker (ACB) (When accumulated load above 75 KW)

One (1) incomer of required Amps, electrically operated draw-out type 4 pole ACB breaking capacity 50KA and quick make break with trip free mechanism with the followings for receiving the power from proposed HT substation point by cable connection.

- 1 no -96 sq. mm flushes mounted type (higher then breaker amp) Ammeter with selector switch and CTs. (Breaker Amp/5 Amp)
- 1 no -96 sq. mm flushes mounted type 0-500 V Voltmeter with selector switch and protection fuses.
- 1 no -96 sq. mm flush mounted type Power factor Meter.
- 1 no -Digital feeder protective relay with the function 3 phase over current & earth fault relay with high set
- 3 nos. - Universal Voltage LEDs indicator for breaker on.
- 1 no- Circuit identification label
- 1 no.- Universal voltage LEDs indicator for breaker trip & trip set reset button

Moulded case circuit breaker (MCCB) (When accumulated load factor bellow 75 KW)

One (1) incomer of required Amps, rotary handle Hand operated non draw-out type 4 poles MCCB breaking capacity 50KA and quick make break with trip free mechanism with thermal & under voltage release with the followings for receiving the power from proposed HT substation point by cable connection.

- 1 no -96 sq. mm flushes mounted type (higher then breaker amp) Ammeter with selector switch and CTs.(Breaker Amp/5 Amp)
- 1 no -96 sq. mm flushes mounted type 0-500 V Voltmeter with selector switch and protection fuses.
- 1 no -96 sq. mm flush mounted type Power factor Meter.

The outgoing side comprising with the followings for each (When the motor rating exceeding above 75 KW)

Air circuit Breaker (ACB)

Minimum 400 Amps, Hand operated draw-out type 3 poles N- Linked ACB breaking capacity 50KA and quick make break with trip free mechanism for motor control purpose with the followings for each breaker unit.

- 1 no –Numerical microprocessor based programmable motor protection relay with sense receiving from the BTD and RTD of the motor and ON the blower after pre-setting the temperature as per designed with auto manual selection mode.
- 3 nos.- Universal voltage LEDs indicator for breaker on.
- 1 no.- Universal voltage LEDs indicator for breaker trip& trip set reset button.
- 1 no- Circuit identification label

- 1 no. 96 sq. mm flushes mounted type (higher the breaker Amp) Ammeter with selector switch and CTs. (Breaker Amp/5Amp)

Moulded case circuit breaker (MCCB) (When motor load bellow 75 KW)

One (1) no required Amps, rotary handle Hand operated non draw-out type 4 pole MCCB breaking capacity 50KA and quick make break with trip free mechanism with thermal & under voltage release with the followings for each feeder.

- 1 no -96 sq. mm flushes mounted type (higher then breaker amp) Ammeter with selector switch and CTs.(Breaker Amp/5 Amp)
- 1 no. - Universal voltage LEDs indicator for breaker trip& trip set reset button.
- 1 no- Circuit identification label
- 3 nos.- Universal voltage LEDs indicator for breaker on.

Auto transformer starter (ATS) for each motor.(when motor KW exceeding 50 KW)

Air break fully autotransformer starter shall be equipped with automatic contractor (rating of the contractor selection – utilization category-AC-4and rating shall be 2 to 3 times of the motor full load current with necessary potential free auxiliary contractor and hold on coil voltage 220/240 volt.) suitable for starting and running of the motor. Natural / oil cooled autotransformer, suitable for motor starting duty, 6 start per hour with 65%,75%and 85% tapping with first filling of oil. 3-12 second time delay timer for automatic change over from reduced voltage to full voltage by adopting "watch dog circuit" theory. 3-20 second time delay timer for the protection if the changeover not occurred. Start stop push button will be interlocked in such a fashion that the start push button shall not be functioned at running condition of the motor until unless motor stop. . Suitable rated control fuses. CT operated thermal over load relay. Relay for single phase, under and over voltage, phase reversal protection. Universal voltage LEDs indicating lamp for start stop and trip. Set reset push button. Suitable rating Ammeter with selector switch.. Temperature scanner/recorder connection with BTD &RTD motor 6+2 + spare channel with tripping device which trip the motor.

Another set of contractor (rating of the contractor selection – utilization category-AC-4 and rating shall be withstand capacitor surge current with necessary potential free auxiliary contractor and hold on coil voltage 220/240 volt.) shall be provided for inter connecting the capacitor bank. The hold on coil of the contactor shall be connected with the timer circuit in such a manner that the capacitor will be on covering the accelerating time of the motor.

The capacitor & series reactor bank shall be in house / outside with the panel board after considering site condition and as per direction of EIC

Motor Protection Circuit Breaker (MPCB)/ Moulded case circuit breaker (MCCB) for each motor feeder (bellow 50 KW)

2 to 2.5 times of motor full load Amp.3 pole N-linked MPCB with short circuit & over load protection (Rotary Knob Type) of breaking capacity 50KA with trip indicating auxiliary contact with universal voltage LED indicating lamp with under voltage release 230V AC and door coupling handle including shaft with front mounting type auxiliary contact 1NO+1NC.for motor control purpose with the followings for each breaker unit.

- 3 nos. - Universal voltage LEDs indicator lamp for on of the motor protection breaker (MPCB/ MCCB).
- 1 no.- 96 sq. mm flushes mounted type (higher than the breaker rating) Ammeter with selector switch and CTs.(breaker Amp/5 amp)
- 1 no. - Universal voltage LEDs indicator for breaker trip& trip set reset button.

- 1 no- Circuit identification label

Fully Automatic Star-Delta starter (FASD) (when motor KW bellow 30 KW) for each motor

Three (3) nos. air break contactor (rating of the contractor selection – utilization category-AC-4 and rating shall be 2 to 3 times of the motor full load current with necessary potential free auxiliary contractor and hold on coil voltage 220/240 volt.) shall have to be connected with the 6 nos. lead of the motor terminals for forming the star-delta starter suitable for motor starting duty, 6 start per hour. 3-12 second time delay timer for automatic change over from star connection to delta connection. Start stop push button will be interlocked in such a fashion that the start push button shall not be functioned at running condition of the motor until unless motor stop. Suitable rated control fuses. Suitable thermal over load relay range with 1 OFF and reset type, Relay for single phase, under and over voltage, phase reversal protection shall have to be incorporated in the circuit. Universal voltage LEDs indicating lamp for start stop and trip. Set reset push button.

Another set of contractor (rating of the contractor selection – utilization category-AC-4 and rating shall be withstand capacitor surge current with necessary potential free auxiliary contractor and hold on coil voltage 220/240 volt.) shall be provided for inter connecting the capacitor bank. The hold on coil of the contactor shall be connected with the timer circuit in such a manner that the capacitor will be on covering the accelerating time of the motor.

The capacitor & series reactor bank shall be in house / outside with the panel board after considering site condition and as per direction of EIC.

Moulded case circuit breaker (MCCB)/ Motor protection circuit breaker (MPCB) for each Motor feeder motor Rating bellow 3KW

2to 2.5 times full load current of the motor Amp.3 pole N-linked MCCB with short circuit & over load protection(Rotary Knob Type) of breaking capacity 50 KA with microprocessor based release with auxiliary NO+NC contact, under voltage release240V AC door coupling rotary handle with extension shaft with the followings for each MCCB

- 3 nos.- Universal voltage LEDs indicator lamp for ON (MCCB).
- 1 no. 96 sq. mm flushes mounted type (higher the breaker rating) Ammeter with selector switch
- 1 nos.- Universal voltage LEDs indicator for breaker trip& trip set reset button.
- 1 no- Circuit identification label

Direct on line starter (DOL) for each motor

Direct on line starter with single phase protection feature and also thermal overload relay range of 1 OFF and reset type. The contractor rating will be such a manner that have to withstand the full load current of the motor as well as starting current 7 to 8 times of the full load current of the motor and starting duty 6 start per hour. Start- stop push button will be interlocked in such a fashion that the start push button shall not be functioned at running condition of the motor until unless motor stop .

Switch Fuse unit (SFU) for different feeder

Number And Amp (calculated according site condition) 3 pole N-linked AC-23A utilization category Switch fuse unit for illumination and spare with the followings for each unit.

- 3 nos.- Universal voltage LEDs indicator lamp for on .
- 1 no. 96 sq. mm flushes mounted type 50 Ammeter with selector switch

- 1 no- Circuit identification label

3.0 Checklist of Medium voltage panel being offered (separate sheet for individual panel used)

(Submitted by the successful bidder immediate after issuing the work order)

A. Make :

B. Rated voltage / Rated current : 415 Volt Amp

C. Short circuit current withstand

Capacity In KA : 50 KA

D. Sheet Steel Thickness

E. Degree of Protection. : IP-54

F. Busbar Rating &Breaking Capacity 50 KA : ------ Amp.

G. Busbar type :

Incomer.

H. Incomer Type : ACB / MCCB

I. Rating of the incomer : -------- volt, ------- amp.

J Number of Incomer : One / Two

Relay.

K. Protective relay Type : Draw out / Non draw out type

L. Relay voltage :

M. Relay feature (O.C & E.F) : Yes /no

N. Used in feeder Incomer/ motor : yes / no

Outgoing feeder

O. Outgoing Type : ACB / MCCB /MPCB

P. Nos. of outgoing :

Q. Rating of the outgoing : -------- volt, ------- amp

R. Starting device in built or not : No / Yes (if yes)

S. Type of starter : Star-Delta / ATS / DOL

T. Protective relay Type (Motor) :

U. Capacitor reactor bank (Motor) : Individual / Bank

V. Switch fuse unit Number &rating :

W. Cable alley Number & Position ;

X. Size Length Breadth Width in mm :

4.0 Testing (In presence of Dept. Eng.,)

- Visual inspection for checking the panel components its voltage, current rating breaking capacity etc. as per approved drawing.
- The insulation test as Indian Electricity Rules
- The Relay tripping test as per specification
- The contractor shall supply 6 copies of certified copies of test report (factory)

5.0 INSTALLATION

a. Transport of materials from store to erection site

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

c. All alignment levelling grouting anchoring and adjustment including inter panel locking as necessary in accordance with manufactures Any chipping / levelling insertion of packing plates minor attendance of board internals etc, as necessary for the above is in bidder scope.

d. Retightening the busbar and rechecking of the control panel wiring are in the bidder scope.

6.0 NUMBER OF PANEL

Number of LT PDB - one number.

CABLING

1.0 GENERAL

All 415V (LT Cable) power cable shall be 1.1 KV grade stranded aluminium conductor PVC insulated armoured and the control cable shall be of copper conductor, PVC insulated, armoured/XLPE insulated armoured . All power cable and control cable shall be laid neatly in covered masonry trench, fabricated cable trays. While selecting the cable size suitable de-rating factor shall be considered. Tenderer shall furnish a cable lamination plan giving type, size and length of the cable proposed to be used.

Cables used for clarifier power supply shall have at least one spare cable shall have to be draw. Both the free end of the cable shall be properly sealed protection against damaged.

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

The LT control cable shall be of 660 volt grade, PVC 1.5/2.5 sq.mm multi stranded, multicore screened cable of electrolytic copper conductor. Two spare cores shall have to left for future provision

2.0 Cables and laying

The cables shall be 1.1 KV grade 3.5/3 2/1 core XLPE AL conductor cable of suitable size and length as per requirement for electrical loading. The selection of the size of the cable will be considering voltage drop, 1.5-2 times of the normal current drawl by the load and de-rate factor of the cable when laid in ground, cable spacing and temperature of the ambient. All cable should as per relevant ISS specification

The cable will be ,if, necessary laid in underground trenches dimension for trench must be 450 mm width x 760 mm average depth, with brick protection on the top of the cable with 16 nos. bricks per meter and filling up the trenches with shifted soil, levelling up and restoring the surface to the satisfaction of the Engineer-in-Charge. Where cable is laid in masonry trench/metal trays, the cable trenches (when applicable) shall be filled up with sand or covered with chequered plate/RCC slab according to the direction of Engineer-in-Charge. Where necessary cables shall be supported on clamps of approved type and shall be properly protected with G.I. conduit or other protective covering as per direction of Engineer-in-Charge. Length of each type of cable should be assessed from G.A. drawing as well as physical verification from site.

3.0 GLAND & SOCKETS

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

b. 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.

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

4.0 WIRE MATERIALS OF ELECTRIFICATION.

The wire for electrification indoor & outdoor should be PVC aluminium fire proof & weather proof sheathed wire. PVC conduit wiring should be done for electrification the pump house, control room illumination in such a manner that illumination level will be suitable for night maintenance work i.e 120-200 lux. The ceiling fan (48 inch,52 inch) with electronic regulator , exhaust fan of 450mm size , man cooler fan for each motor and other luminaries should be provided as per direction of E.I.C. The wiring should be done by using distribution box and loading of one circuit never greater than 8 points as per I.E rules. Necessary power plug point shall have to be provided as per direction of E.I.C. All luminaries' fittings shall be industrial corrosion proof.

Industrial type fluorcent lamps with vitreous enamelled reflector of complete with chokes, starters etc. of renowned and approved make shall be used in all places of the intake pumping station of both the deck.

6.0 EARTHING

The total electrical installation shall be effectively earthed by providing earthing arrangement. Each earthing station shall consists of 2 (two)G.I pipe of 40 mm dia. and 3.50 meter length sufficiently deep from the ground level and 2 meter away from the any civil structure and shall be acceptable any front side of the buildings and minimum distance between two the earthing station shall be maintained 3meter. The nos. of earthing station shall have to be done until unless the earth resistance value bellow 1 ohms.

Preparation of earth pit with necessary excavation and ground compaction/ foundation work with required masonry / bricks works including precast removable pit cover & necessary supply of coke breeze or charcoal, salt bricks, cement aggregates, gravels& sand. Making required hole in pit and wall for conductor with necessary hardware non corrosive type clamp nuts bolts etc. shall be provided.

After preparations of the pit underground horizontal counter poise (40mm MS rod) to be laid of a depth generally 1500 mm bellow the ground level or a greater depth as may be encounter to suit the site condition. Necessary drilling / digging for installation of UG vertical electrode and connection with horizontal counter poise to be done at four sides of the pump house. The riser pig tail from ground grid shall consists of one no 40 mm dia. rod / Gl flat and shall be projected 300 mm above the ground level for location . All ground conductor connection below ground level shall be made of electric arc welding of 25 mm X 6 mm copper flat (necessary equivalent G.I flat as use of copper is restricted by G.O.I) All UG welded joints shall be treated with red led paint and afterwards should be coated with bituminous paint to prevent corrosion.

After installation of UG earthing network, back filling with suitable soil up to required level and compaction to be done. Back filling soil may be required to carry from nearly place / excavated soil.

Chipping / Floor finishing as necessary to ensure that over ground earthing conductor is bellow finished floor already exists.

All the electrical equipment shall have to be two separate earthing connection from the Ring main by 25 mm X 3 mm copper flat (necessary equivalent G.I flat as use of copper is restricted by G.O.I)

The lightening arrestor with two nos. separate earthing avengement and aviation of lighting arrangement shall have to be in the intake well.

7.0 TUBE LIGHT FITTINGS-

The tube light fittings should be industrial corrosion proof with lamp and their fittings and fixing wiring should be done as per direction of EIC .The upper deck of the pumping station shall be illuminated minimum 4 nos. Tube light fittings but 12 nos. of twin tube light fittings shall be provided for illuminating the lower deck of the intake well.

8.0 WALK WAY LIGHTING-

Walkway lighting should be done 6 M height placed 6 m along the walk way fittings like post of lantern with control gear (70 W). The fittings shall be placed on 6 M GI pole with necessary foundation and earthing arrangement and cabling also.

9.0 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 control deck of the pumping station.

10.0 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 4 nos. exhaust fan are to be provided in upper deck

11.0 FIRE EXTINGUSHER

Fire extinguisher (Dry type) of 4 numbers with same sand bucket shall be provided in panel room for fire management purpose.

12.0 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 labour. 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

- Meggar test

Superintending Engineer
South Circle, ME. Dte

SECTION – L

M E C H A N I C A L W O R K

1.O MECHNICAL WORKS

The specification covers the design, manufacture, testing, supply erection and commissioning of the Horizontal split case horizontal pump with ventilation system at intake. The equipment shall be designed and manufacture and tested in accordance with latest I.S specification and code of practice published by the Bureau of I.S whenever available.

1.1 SLUICE VALVES

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 30 minutes. Materials of construction test certificate & ultrasonic test report shall be provided during supplies. The suction side sluice valves shall be non-rising/rising-spindle type with electrical actuator arrangement for easy manual operation.

1.2 BUTTERFLY VALVES

The butterfly valves shall be CIDF, long wiper type, PN 1.0, 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 shall have suitable and adequate capacity of gearbox for electrical actuator control with hand wheel and indicating pointer.

1.3 NON RETURN VALVE

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 30 minutes. Materials of construction test cet1ificates & ultrasonic test report shall be provided during supplies. The suction side sluice valves shall be rising-spindle type with gearing arrangement for easy manual operation.

1.4 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.

1.5 PUMP DELIVERY/SUCTION SIDE 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/Suction side piping shall be connected to the common delivery manifold as per the layout. Necessary gaskets of suitable thickness shall have to be provided to all flange Joints complete with all necessary nuts, bolts, washers etc. The length shall be ascertained from the layout and the exact dimensions of the valves/specials. The Bidder should also provide the necessary arrangements to encounter the horizontal back thrust and the details as per the pump manufacture's recommendation shall be clearly indicated in the layout drawing.

The common delivery manifold shall be of requisite diameter and shall be of S. W. M.S. of not less than 6 mm thick. The common manifold shall have blank flange on both sides/one sides with adequate stiffening. The length of the manifold must be extended at least one meter on both sides after the interconnections with the delivery pipe lines from the pumps at the two extreme ends to provide DJ, B/F valve & blank flange. The maximum distance of the manifold from the outer wall of the pump house would be within 3m.

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

(Necessary surface finish for proper painting and wrapping coating shall be made by the contractor and careful laying shall be done so as to prevent damages during laying).

1.6 HAND OPERATED OVERHEAD CRANE AT EACH PUMPING STATION

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

1.7 STEEL STRUCTURE

All steel structure shall conform to IS: 226-1962 except for M.S steel plate over 20 mm thickness which shall conform to IS: 2062-1962. Rails will be carbon or medium manganese steel, conforming to latest IRS-T-12 or IRS-T-18 specification. For detailing and construction of welded connections all provisions of IS: 816 (latest) shall apply. All rivets and bolts are to be generally of 20 mm or 22 mm dia. except where otherwise required or noted. Where no load is shown in the trusses, bracing or latticed members, minimum 2 nos. 20 mm dia. rivets or equivalent welding to be provided. Bolted connections shall be provided at temporary sides and ends where extensions are indicated. All connections are to be riveted, welted or fitted with high strength friction grip bolts except for hand rails and cat walkways which may be bolted (Black bolts). Unless otherwise stated, all bolts under different tension are to be provided with one spring washer.

1.9 BOLTS AND NUTS

M.S bolts and nuts shall conform to IS: 1363, 1364 and 1367(latest). All nuts and bolts and washers coming in contact with shall be galvanized by a process which does not make the threaded uneven. All bolts, nuts and washer coming in contact with liquid or in corrosive atmosphere shall be made of S.S 316 or nylon depending upon the nature of the service.

1.10 OPEN THREAD MESH PLANTING

The contractor shall supply and install galvanized (hot dipped after fabrications) mild steel open thread mesh flooring at pipe trenches and of the rotating bridge decking including all kerbing. The planting shall be designed to withstand a maximum uniformity distributed shall be designed to withstand a maximum uniformity distributed load 1000 kg/sq m. The plating shall be divided into panels weighing not more than 50 kg and each complete with nosing all round. Cut outs shall be provided and trimmed so that the plating.

1.11 COUPLING

The bidder shall be provided the coupling for motors and pumps together with a suitable guard complying with BS :1943 and BSC :3004. The materials of the guard shall be of anti-spark types. Couplings shall incorporate all necessary flexibility for axial, lateral and torsional movements to deal with shock vibrator and driving equipment of the transmitted load.

1.12 JOINING

The joining shall be made with compressible rubber IS : 638 of thickness 3 mm, bolts and nuts. The bolts and nuts shall be of mild steel and these shall conform to IS: 1362 and 1363 unless otherwise specified.

1.13 GROUNTING

The bidder shall include in his price all cost of labour and materials for grouting in all fixing ,piping and etc. at the time of construction. The contractor shall make arrangement for delivery of such items which will be grouted in the building work in time so that construction work can process smoothly without hampering of the construction work.

1.14 SUPPORT AND FIXING

All supports, fixing bolt, screws, and other fixings shall be provided by the contractor and its price be inclusive of such items.

1.15 DRIVING UNIT AND SUPPORT

Each driving unit shall be supported on a cast iron or fabricated steel frame on guide rails as appropriate. The fabricated frame shall be constructed to afford adequate access to the coupling between the driving motor and driving unit.

1.16 DISIMILAR METALS

Where metals of dissimilar character will required to be used in the construction , precautions should be taken to prevent deteriorations of the structure due to electrolytic action.

1.17 BEARINGS

Bearings shall be of type, size and construction to ensure that the plant and equipment of which they form part shall operate efficiently and continuously under normal operating conditions without overheating and with minimum inspection and attention. Housing and enclosure of bearing assembly shall be suitable for the worst condition in which they are required to work. All ball and roller bearing shall conform to the International Boundary Plant (ISO). Linear and bushes of plain bearing shall be easily renewable. Provisions shall be made for easy lubrications of all contact surfaces having relative movement. Contact surface of bearing and the lubricant shall be such that there is no corrosion, electrolytic action or excessive wear.

1.18 LUBRICATIONS

In designing the equipment, consideration shall be given to ensure the adequate lubrication is achieved with the minimum of attention. The central turntable assembly / wheel bearing shall be pre-packed with ample quantity of grease of appropriate grade and as for as practicable parts shall so designed that these are not required to be lubricated more frequently than once per month. Adequate provision shall be made for the lubrication of the bearings from convenient point on the bridge decking. All equipment pipelines and fittings for lubrications system shall be manufactured from corrosion resistance materials. Lubricant oil , grease and graphite packed and seals which requires manual repacking, shall be clearly visible and also easily accessible. Unit to be filled with oil shall be arrangement for easy filling without spillage. Protection shall be made to prevent excess lubricant dripping into floor or platform and floor, where connections have to break frequently and loss of oil is possible, connections shall be self-sealing. The grade, type and frequency of lubrications to be used shall be stated on metallic lubrication parts permanently attached to the plant. Lubricating oils and grease shall be designated by approved trade name or in terms of materials, vegetable, animal or blends of this basis together with their viscosity and flash point characteristics and not as “Light” or “Heavy”.

1.19 ELECTRICAL ACTUATOR

The delivery side sluice valves and the butterfly valves shall be electrically operated auto / manual syncropak type actuator with local remote control system and each shall be completed with suitable head stock, motor, starter with reversing control gear, limit switch, torque switch shall be fitted on an indicator board showing the exact amount of valve opening. They will also automatically cut off at the extreme end of valve gate travel. The valve shall also be provided with necessary arrangement for operating the valve manually in case of emergency. The safety interlock switch will automatically cut off the current in case the valve is operated manually.Self powered local and remote digital display of percentage opening of the valves is to be incorporated.

- Make
- Type
- Capacity with rating of Motors
- Whether provided with limit & Torque Switches, if so, torque limit
- Protection Group (IP)
- Whether suitable for outdoor & temporary submergence duty/indoor type
- Whether equipped with suitable component & termination arrangement for transmitting signals for displaying valve opening % indicating in the valve opening indication meters.
- I.S Standard to which it conforms

1.20 HAND WHEELS FOR VALVES/PEMSTOCK

Hand wheels shall be cast iron and shall have cast on the upper site of the rim the mark “OPEN” and “SHUTT” with appropriate direction of valves and penstock installed outdoor. Indoor valves and penstocks shall be provided with brass direction indicator plants fixed at the centre of the hand wheels with G.M caps and nuts where hand wheels are not provided.

1.21 UNLOADING, HANDLING & STORAGE

The contractor shall be responsible for the delivery at site of all equipment, material and supplies required for the fulfilment of the contract up to handing over the plant to the ULB. The contractor shall at his own cost and responsibility transport or shift to plant site, all materials, equipment and other component furnished for the purpose of this contact. All movement of materials and equipment to and from storage shall be at the expense of the contractor. Space for storage facilities will be provided by the ULB at the site as workable. If contractor does not promptly shift and place for use in the premises, where is the work to be done , any materials, equipment or supplies delivered , the ULB may be do so , and charge all the cost thereof to the cost thereof the contractor and in any event the ULB shall not be responsible for any damages, arising out of ,or in any connected with each shifting, or placing of the same. The bidder shall after further shifting or placing of the same. The contractor further after shifting, unpack the materials , verify the contents against invoice and notify storage or breakage to the engineer within one week of the receipt of materials and equipment at site, failing which the contractor held responsible for any consequence. If required by the engineer, the plan method of transportation of equipment shall be submitted to the Engineer for approval. This approval shall be submitted to the Engineer for approval. This approval shall not relive the Bidder of any responsibilities for the safety of the Equipment and personnel.

1.22 BIDDER OBLIGATIONS

Over and above the responsibilities of the contractor stipulated in the documents, following obligation fulfilled by the bidder.

The contractor shall satisfy the Engineer that adequate provision has been made

a. To carry out his instruction fully and with prompt attitude.
b. To ensure that parts required to be inspected before use are not use before inspection and to ensure that adequate supervision is provide at all stages of the work and each portion of the work and each portion of the work is checked before erection.

The contractor shall make necessary arrangement including provision of suitable space and facilities for testing, for inspection at any stage of manufacture of plant and equipment by the Engineer or his authorize representative as and when deemed necessary by the Engineer; the time schedule for any inspection will, however, follow the inspection scheduled suggested by the contractor and agreed upon by the Engineer during scrutiny of the delivery plain. Irrespective of any inspection and tests made by the Engineer the contractor shall be entirely responsible for the execution of the testing or inspection. At least 21 days' notice shall be required for the inspection to be carried out.

1.23 SHOP TEST

Shop test shall include all tests to be carried out at Bidder's work , works of his agent at manufactures works and at works where raw materials supplied for manufacture of equipment

The test to be carried out shall not be limited to the tests mentioned bellow:

a. Composition of all materials, casting, forgings etc.
b. Hydraulics test for pressure vessels, tanks, pumps casting etc.
c. Hydraulics test for valves, specials etc.
d. Test to check in faults in rubber lining as per IS: 4682 or its equivalent and painting.
e. Static and dynamic balancing of the impellers.
f. Performance test of (Head, Capacity, and BHP) pump (all type) and air blower.
g. Test on motors as per IS: 4029, IS: 325.
h. Other test that may be provided in different I.S.S
i. Other test provided elsewhere in the Bid.
j. Any other tests considered necessary by the Engineer.
k. All test certificate and reports shall be submitted to the S.E for approval. All test are normally carried out in presence of the Engineer or his Authorized Representative. However, waiver may be allowed in specific by the Engineer at his discretion.
l. The engineer or his Representative shall be given to full access to witness the test. The contractor shall inform the S.E allowing adequate time so that E.I.C or his Representative can witness the test. The manufacturer / Bidder has to bear relevant costs of such inspection by two Representatives of MED/ULB to the manufacturers factory and arrange accommodation & to and fro return ticket (as per eligibility).
m. No component or equipment shall be despatched unless accompanied by approval & test certificate and report. The approval shall be given provided the corresponding drawings/ technical particulars are already approved and the Engineer or his Representative agents have witnessed the test or a letter of inspection waiver is issued by the E.I.C

1.26 SITE TEST

After erection at site, all components / equipment as described below shall be tested to prove satisfactorily performance and / or fulfilment of functional requirement without showing of defect as individual equipment and as well as a system. The bidder makes all arrangement for testing and informs the Engineer for witnessing the following tests, which again, are not exhaustive.

a. All pipes and fittings and valves, after installation will be tested hydraulically at a pressure (as per relevant IS), at least 1.5 times the maximum attainable pressure in the system, to check against leakage & tightness.
b. All manual operated valves /gates shall be operated throughout 100 %, of the travel and these should be function without any trouble.
c. All pump motor shall be run with the specified fluid from shut off conditions to valve wide open. During the test condition the pump motor set shall run without any production of undue vibration , leakage through gland, temperature rising in bearing part, noise, flow pulsation etc.
d. . Visual check on all structural components , welding , riveting rubber lining, FRP lining etc. and if doubt rise will be tested again.

e. All hoist and its components shall be subjected to double the full working load during all motions without showing any distress.
f. All test instrument and equipment duly calibrated shall be furnished by the bidder to the satisfaction of E.I.C

1.27 COMMISSIONING AND PERFORMANCE TESTS

The contractor shall undertake the complete responsibility for successful erection and commissioning of the plant and demonstrate successful performance test.

The commissioning of the plant shall be involve the following steps of operation

a. Testing of each unit on no load, to make complete to check complete check of its mechanical operation, alignment, clearance and rigidity and making necessary adjustment or alteration required to make such unit properly mechanically with tolerable vibration and sound levels, tolerance being reduced for no load operation.
b. After the mechanical check has been made, as stated above the equipment shall be energized and run progressively from no load to full load within limits of vibration and sound etc.
c. Therefore trial run of the plant under completion shall be taken at normal load operating condition for which the respective plant is designed for.
d. The initial performance test shall be carried out at least 24 hour continuous operation.

Superintending Engineer
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SECTION – M

GENERAL TECHNICAL SPECIFICATION FOR

R. C. C. PILE FOUNDATION

GENERAL:

The Design of the tenderer should be based mainly on cast-in situ Bored reinforced concrete piles on driver piles if site situation so arises subject to the approval of EIC.

Sub-soil investigation was carried out by the bidder..

This information is given as guidance and is indicative only, and for any variation in strata at any location at site during actual execution of work, the employer shall not be held responsible nor shall the contract be null and void on this count. In case of any variation in cut off level, necessary adjustment of safe working load will be made as per IS stipulation.

The specialist firm may quote any proprietary system of piling subject to approval of the Engineer-in-Charge consistent with the load, moment and forces to be encountered by each pile.

The successful bidder shall submit with his tender drawings, calculations explaining his scheme draw up specification and submit the schedules of prices following the format of the schedules of prices accompanying these tender documents.

DESIGN AND CONCRETE QUALITY

The safe working loads of the RCC cart in site bored piles should be that as computed as per IS: 2911 on the basis of sub soil parameter of site with a minimum factor of safety 2.5 (compression) and 3.00 (up lift) applied there on. For boring/driving pile under water are stipulation as well as irrigation department & M.E.D suggestions will be strictly honored. The grade of concrete of all types of R. C. C. pile shall be minimum M-25/IS stipulation unless otherwise specified elsewhere. The cement content in concrete to piling work shall be minimum 400 kg/M^3 with ordinary Portland cement. Water cement ratio and slump shall be as per I. S. Specification for relevant piling work. Maximum size of coarse aggregate shall not exceed 20 mm.

Grading and other requirement of coarse and fine aggregates, water and concrete shall be as specified for reinforced cement concrete work under this Contract.

1.3.2 The average basis length of the piles is to be assumed from cut off level to the tip of the pile (however for piles with muff the basic length shall be from tip of the pile up to underside of muff). The final length with be decided by the Contractor with approval of the Engineer on the basis of driving/boring resistance actually observed at site. It will be the responsibility of the Contractor to prove by subsequent load test/pullout tests that the adopted length of pile shall carry the specified safe load, tension and the resulting deflections being within the permissible limits. In no case extra claim over the originally quoted price will be entertained for any increase in number/length/cross sectional area/reinforcement of piles and in the site of other foundation structures if requires if required at the time of execution after the load tests of piles. Similarly no deduction in payment will be made from the lump sum price quoted for decrease in number/length/cross-section of area/reinforcement and in the size of other foundation structures at the time of execution or after the load tests of piles provided that the complete safety of the Structures is fully assured.

1.3.3 For Intake Jetty pile foundation should have permanent steel casing/approved alternative methodology. Scour depth below bed level will be a major guiding factor. All relevant provision of I.S. code for R.C.C. Structure on river bed (under water) will have to be strictly followed. However Tenderers may suggest other methodology without deviating from major objectives & cost keeping the working well within I.S. standards. In any case he has to be ensured the stability of the structure.

1.3.4 Tenderers/ contractor will be given full liberty to opt for design mix as per satisfaction of E.I.C. with minimum cement content as mentioned.

1.4 SPECIFICATION FOR BOREDCAST-IN-CITU PILES:

Unless specified otherwise in the following paragraphs, stipulations of relevant section of I. S. 2911 (latest edition) shall be followed. However in case of any conflict of stipulations laid here in and IS code of practice occurs, IS stipulations will stand as final subject to satisfaction of EIC.

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The tenderer shall submit within his tender the layout and number of piles based on allowable load carrying capacity, tension on the pile section design by him.

1.4.2 Boring equipment and accessories shall generally conform to IS: 2911 relevant section. Boring may be done by either rotary or percussion equipment or grassing equipment using reverse or direct non circulation method. In case of unstable soils the boring tools used shall be such that suction effects are minimized.

Stabilization of the sides of bore hole shall be done by the use of bentonite slurry or casing. The size of cutting tool shall not be less than the diameter of the pile by more than 75 mm.

In case of boring with casing, the casting shall be used from the ground level. The casing shall be kept ahead of boring in cases where there is danger of carrying in due to subsoil entering into the borehole or where soil is loose.

While boring below sub-soil water, precaution shall be taken so that no boiling of the bottom of the hole occurs due to difference in hydrostatic head.

1.4.6 Concreting of bore holes shall start soon as possible after its completion. Should a borehole, be left without concreting for more than two hours it shall be cleaned thoroughly as directed by the Engineer-in-Charge before placing concrete. Concrete under water shall be placed by means of a tremie pipe. It shall, however, be ensured that concrete entering the tremie pipe does not get mixed up with the slurry and ¼ kg of granulated vermiculite shall be poured in the tremie pipe before pouring concrete as directed by the Engineer.

1.4.7 The tremie pipes and funnel shall be filled and lifted just 15 cm above bottom before releasing the concrete column to facilitate flushing out of the bottom. The concrete levels in the tremie shall be checked every meter in order to judge the difference, if any, between the theoretical quantity that should have been placed and the actual quantity that has gone in. This is to locate the position of cut off during boring.

In addition to the normal precautions to be taken in tremie concreting as per relevant Section of IS : 2911 the following specifications shall be particularly applicable for the use of tremie concrete in pipes.

i) The concrete shall be coherent, such in cement (not less than 400 kg/m^3) and of slump not less than 150 mm IS stipulations.

ii) The hopper and tremie shall be closed system.

iii) The tremie shall be large enough with due regard to the size of the aggregate. For 20 mm aggregate the tremie pipe shall be of diameter not less than 200 mm.

iv) The first charge of concrete shall be placed with a sliding plug pushed down the tube of it or with a steel plate of adequate charge to prevent mixing of concrete and water. However, the plug shall not be left in the concrete as a lump.

v) The tremie pipe shall always penetrate into the concrete with an adequate margin of safety against withdraw of the pipe surged to discharge the concrete.

vi) The pile shall be concreted wholly by tremie and the method of deposition shall not be charged way up the pile to prevent into laitance from being trapped within the pile.

vii) All tremie tubes shall be scrupulously cleaned after use.

Normally concreting of the piles shall be carried out without any interruption. In the exceptional case of interruption in concreting, but which can be resumed within 1 or 2 hours, the tremie shall not be taken out of the concrete. Instead, it shall be raised and lowered slowly, from time to time to prevent the concrete around the tremie from setting. Concreting shall be resumed by introducing a little richer (5% additional amount) concrete with a higher slump for easy displacement of the partly set concrete.

If the concreting cannot be resumed before final set of concrete already placed, the pile so cast may be rejected or accepted with modifications at the sole discretion of the Engineer-in-Charge or his representative.

In case of withdrawing of tremie out of the concrete, either accidentally or to removed a blockage in the tremie, the tremie may be reintroduced in the following manner to prevent impregnation of laitance or sewer laying on top of the concrete already deposited in the bore.

The tremie shall be gently lowered on the old concrete with very little penetration initially. A vermiculite plug shall be introduced in the tremie. Fresh concrete of slump between 150 mm. And 180 mm. shall be filled in the tremie which will push the plug forward and will emerge out of the tremie displacing laitance/sewer. The tremie will be pushed further in steps, watering fresh concrete sweeping away laitance/scum in its way. When tremie is buried by about 60 to 100 cm. concreting may be resumed.

1.4.8 The top of concrete in a pile shall be brought above the cut off level to permit removal of all laitance and weak concrete before capping to ensure good concrete at the cut off level for proper embedment into the pile cap. Where cut off level is less than 1.5 M. below the working level concrete shall be cast to a minimum of 500 mm. Above cut off level. For each additional 0.3 m. increase in cut-off level below the working level additional coverage of 50 mm. minimum shall be allowed. Higher allowance may be necessary depending on the length of the pile as directed by the Engineer-in-charge. When concrete is placed by using tremie material, concrete shall be cast to the piling platform level to permit overflow of concrete for visual inspection or to a minimum of one meter above cut-off level. In the circumstances where cut off level is below ground water level the need to maintain pressure on the freshly laid concrete equal to or greater than water pressure shall be formed out and accordingly the length of extra concrete above cut-off level shall be determined and provided in works.

1.4.9 During piling, the sequence of construction and installation of piles shall as per direction of the Engineering-in-Charge.

1.4.10 In case defective piles are formed during construction, they shall be removed or left in place whichever is found convenient without adversely affecting the performance of the adjacent piles or the pile cap as a whole. Additional piles shall be provided at Contractor's cost to replace them as per direction of the Engineer-in-Charge and in this respect the Engineer-in-Charges' decision shall be final and binding upon the contractor. Any deviation from the designed location, alignment or local capacity of any pile shall be noted and adequate measures shall be taken well before concreting of the pile cap, etc. if the deviations are beyond the permissible limit. All such alternations shall be done at Contractors' own cost and expenses and to the entire satisfaction of the Engineer-in-Charge.

1.4.11 Piles shall be installed accurately as per approved design and drawings. For vertical piles a deviation of 1.5 percent from vertical line shall not be exceeded. Piles shall not deviate more than 75 mm. or one tenth of diameter whichever is more (in case of piles having diameter more than 600 mm) from their designed positions at working level of the piling rig.

In case of piles deviating beyond the above mentioned limits and such an extent that the resulting eccentricity cannot be taken care of by a redesign of the pile cap & pile trees, the piles shall be replaced or supplemented by one or more additional piles by the contractor at his own cost and expenses along with any additional cost for pile cap, etc. being borne by him.

1.4.12 While manual chipping may be permitted after casting of pile, pneumatic chipping, if permitted by the Engineer-in-Charge, shall not be started before 7 days under any circumstances.

1.4.13 Main longitudinal reinforcement in the length of the piles and links or spirals shall be provided as per the approved drawing. Longitudinal bars where possible shall preferably be in one length. Every care shall be taken in handling of the reinforcing cage so that its shape is not damaged .

1.4.14 When working adjacent to existing structure every care shall be taken to avoid any damage to such structures, in the case of bored piles care shall be taken to avoid effect due to loss of ground. In the case of deep excavations adjacent to piles proper protection shall be provided to safeguard against the lateral movement of soil stratum or releasing the confirming soil stress.

1.5 During piling work the following data shall be recorded along with any other data as may be directed by the Engineer-in-Charge. These data shall be submitted to the Engineer-in-Charge in triplicate copies on completion of installation of each pile.

i) Sequence of installation of piles in a group.

ii) Dimensions of the pile including reinforcement details and mark of the pile

iii) Details of mild steel liners where provided along with the details of stiffeners

iv) Depth bored and founding level along with a bore log depicting the nature of strata encountered during boring.

v) Time taken for penetration of every 15 cm during last 2 m depth before founding level.
vi) Method of cleaning bottom of hole at founding level before concreting.
vii) Time taken for concreting.
viii) Cement consumption and slump of concrete.

ix) Cut off level/working level/R. L. of top concrete.

1.6 During execution at any stage if any variation is required to be made to suit the site on E.I.C to be technically satisfied and His decision will be regarded as final. 1.6.2 Any of data /information given if not found reasonable (this will also include data of parameters) will be given during detail engineering.

Tenderers/contractor therefore revised to consult with manufacturer/ experts at his own cost, if so felt, to reach more in figure for Tendering purpose. The same is also advised for any other data supplied. But in no case It will be Treated as a Fault of Tendering Authorities Superintending Engineer, South Circle . If any found in Variance in same chapter/ section or anywhere of tender document, is to be into the notice of the tendering Authority & His interpretation/ decision will be consider as final.

1.7 LOAD TEST ON PILES

1.7.1 The load tests shall be carried out as per IS : 2911 unless specified otherwise in the following paragraphs. The tests shall be carried out on test pile and a selected representative pile as approved by the Engineer-in-Charge. Sufficient time shall be allowed before tests to permit adjustment on the soil conditions following disturbance from the method of installation. The period between installation of the test pile or any other pile in the vicinity and the test loading of the pile shall be least 28 days.

1.7.2 The test load shall be applied by jacking against Kent ledge or any other structure approved by the Engineer-in-Charge. No working pile shall be permitted to be used for any loading for load test on pile. The design of the Kent ledge shall be such as to prevent instability, particularly in the event of a sudden change in the load reaction from the pile. The reaction from Kent ledge to be made available for the test shall be at least 25 percent more than the final test load to be applied. The test shall be carried out at cut off level or at maximum 1.5 m below G. L. as directed by the Engineer-in-Charge. Anchors, if provided, for load test shall be at specified distance away from test pile as per relevant I. S. Code of Practice and there shall be minimum two anchors at two ends of the pile.

Details regarding the testing arrangement shall be submitted well in advance to the Engineer-in-Charge for his approval. Load tests shall only be undertaken after obtaining the approval.

1.7.3 The jack is to be hydraulically operated. The load applied to the pile shall be recorded either by a gauge in the hydraulic system or a proving ring duly calibrated from an approved laboratory before load tests. The sensitivity of the full load and in any event, the accuracy and sensitivity of the system is to be checked against an approved instrument.

A test certificate and fresh calibration chart as obtained from an approved laboratory for jack as well as pump supplying hydraulic power shall be produced before the Engineer-in-Charge well in advance before use for any load testing pile.

1.7.4 The settlement of the pile shall be recorded by three dial gauges recording to 0.02 mm and placed at equal distance around the test pile. The dial gauges shall be fixed on datum bars whose ends rest upon non-movable supports. The supports for datum bars with reference to which the settlement of the pile would be measured shall be at least 5d (d being the diameter of the circular pile of the side of the square pile) away and clear from the test piles, subject to a minimum of 1 .5 meters.

1.7.5 The testing equipment employed shall be capable of loading a pile to failure or to three times the design loading.

1.7.6 Before testing the top of the pile shall be clipped off carefully till sound concrete is encountered. The projecting reinforcement shall be cut or bent suitably and the top finished smooth and level with plaster of paris, when required or as directed by the Engineer-in-Charge. A series 25 mm thick bearing plates shall be placed on the head of the pile for jack to rest as directed by the Engineer-in-Charge.

1.7.7 The Contractor shall have to perform rotating load test on working piles on load as

decided and selected by the Engineer-in-Charge and the results must satisfy the requirements of the test. At least one working pile of each diameter shall be tested. The test shall be carried out at cut-off level or at such level as per direction of the Engineer-in-Charge. The Contractor shall also have to carry out initial test on a non-working test pile as described below:

A. Initial Test on a Non-working pile:

i) The test load shall be applied in equal increments of amount one-fifth of the estimated safe load as directed by the Engineer-in-Charge. Each state of loading or unloading shall be maintained till the rate of movement of the pile top is not more than 0.02 cm per hour in the case of clayey soils and 0.1 mm per hour in 2 hours whichever is greater.

ii) The estimated safe load shall be maintained for 24 hours and settlements shall be observed and recorded every hour during the period.

iii) Time-settlement observation shall be made at the commencement and completion of each increment. The rebound observation shall be made with suitable unloading as per direction of the Engineer-in-Charge.

iv) The loading shall be continued till the settlement of the pile top equals one tenth of the diameter of the pile stem (one tenth of the side in case of square piles) or the load is two times the estimated safe load on the pile, whichever is earlier.

v) The safe load on pile shall be the minimum of the following:

a) Two thirds of the final load at which the total settlement attains value of 12 mm unless it is specified that a total settlement different from 12 mm is permissible or required in given case on the basis of nature and type of structure in which case the safe load shall correspond to actual total settlement permissible or required.
b) Fifty (50) percent of the final load at which the total settlement equal one tenth of the pile diameter of the size of the pile.

B. Routine Test on working pile:

Load on the pile in routine test shall be applied upto and a half times the estimated safe load carrying capacity of the pile. The loading procedure and settlement observations shall be the same in initial test described hereinabove. The safe load on the pile shall be the minimum of the following:

a) Two third of the final load at which the total settlement attains a value of 12 mm unless it is specified that a total settlement different from 12 mm is permissible in a given case on the basis of nature and type of structure.
b) Fifty percent of the final load at which the total settlement equals one tenth of the pile diameter of size of the pile.

1.

C. Lateral Load on working pile:

i) The Contractor shall have to carry out lateral load test on one vertical working pile. Reaction may be obtained from suitable set up as approved by the Engineer-in-Charge and hydraulic jack shall be inserted in between the loading set up and pile in order to apply the lateral load. Thrust pieces need be inserted on either end of the jack to fill up the gap. Lateral deflections shall be measured at cut-off level or at maximum 1.5 M below G. L. as directed by the Engineer-in-Charge by means of dial gauges fixed to immovable supports.

ii) Loading shall be applied in increments of about 20% of the estimated safe load till the rate of deflection reduces to 0.02 mm per hour in the case of clayey soil and 0.05 mm per hour in the case of sandy soils or 2 hours whichever is earlier.

iii) Displacements shall be measured by issuing at least two dial gauges spaced at 30 cm and kept horizontally one above the other on test pile. Where it may not be possible to place one of the dial gauges on the line of jack axis, then the two dial gauges shall be kept at a distance of 30 cm at a suitable height and the displacement interpolated at load point from similar triangles To fix dial gauges on the pile surface, uneven surfaces shall be chipped of and 25 to 30 mm square glass piece shall be fixed to provide a smooth surface. The dial gauge tips shall rest on the central portion of the glass plate.

iv) The safe lateral load shall be the least of the following:

a) Fifty (50) percent of the final load at which the total displacement increases to 12 mm.

b) Final load at which total displacement corresponds to 5 mm.

c) Load corresponding to any other specified displacement due to performance requirements.

1.7.8 All pile test data i.e., load, displacement and time shall be recorded in a suitable chart along with other information about the pile in a manner as directed by the Engineer-in-Charge.

From the data, curves shall be drawn showing load displacements and displacement time and safe load shall be indicated on the graphs.

All data and curves shall be submitted to the Engineer-in-Charge in triplicate copies along with the originals.

If on load testing, it is found that the capacity of the pile is more than the designed capacity nothing shall be paid extra for such extra capacities.

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SECTION- N

Detailed Specification For Fabrication of Steel Pipes and Specials and Other Allied Works

GENERAL

1.1 The work shall comprise of supplying all labour and materials cost and providing all tools and plants, machineries, equipment and instruments necessary for proper fabrication of pipes and specials including necessary testing thereof at the Contractor's stack yard/workshop and also providing necessary stack yard if required for stacking and storing of the steel plates and pipes properly till dispatch to the work sites. Any materials net covered by that specification should comply with the Indian Standard Specification and in the absence thereof with the British Standard Specification or any other approved standard.

1.2 Twelve (12) mm. thick steel plates of nominal size 4000 mm (L) x 2500 mm (B) will have to be procured by the Contractor from SAIL or any other steel plant by their own.

1.3 **The work shall include:**

(a) Cutting, where necessary, and shaping steel plates and rolling the same to proper diameter and / shape and welding of longitudinal seams for fabrication of the pipe barrels as per specifications and direction of the Engineer-in-Charge.

(b) Jointing the individual pipe barrels by circumferential arc welding as per specification and direction of the Engineer-in-Charge to form pipes of required length to suit the site conditions.

(c) Cutting, shaping and rolling of steel plates for fabrication of specials as per specification and direction of the Engineer-in-Charge by longitudinal and circumferential arc welding, as would be necessary.

(d) Fabrication of flanged plates (25 mm thick) with drilling or required diameter bolt holes and joining the flange plates with pipe barrels by welding.

WORKSHOP AND STOREYARD

2.1 The Contractor shall have to set up a workshop, if he does not already possess a suitable workshop for fabricating the pipes at a convenient plate to be approved by the Engineer-in-Charge. The workshop shall be fully equipped with necessary machinery and equipment for cutting, shaping and bending of plates to proper size and shape and for jointing by automatic are welding to form required pipes and specials. The workshop shall also have proper facilities and equipment/instruments for carrying out the necessary shop-tests.

2.2 An independent enclosure properly fenced and guard at Contractor's cost shall be maintained within or near about the Contractor's workshop or near the worksite where the fabricated bare pipes and/or the coated pipes may be stacked.

2.3 Also a separate store and/or stack yard shall be provided by the Contractor at his

own cost for storing valves, steel materials, flanged adaptors and cement, etc. (as may be supplied to the Contractor by the Authority), safety and securely.

2.4 The Engineer-in-Charge and other staff authorized for supervision for the work shall have access to the Contractor's workshop, stack yard or store as mentioned above at any time. "Identity Card" or "Gate Pass" system may be introduced for the purpose.

2.5 Not only the fabrication but also the coating and wrapping operation shall be carried out under a properly constructed shed. The storing of the coated pipes shall also be under shed.

CUTTING

3.1 The plates shall be cut to proper dimensions by oxyacetylene cutting and machine finishing or by shearing and guillotine machines, but in the latter cases the Contractor shall supply specifications and particulars to the Engineer-in-Charge and obtain his approval, before the method is adopted.

3.2 In case of specials the Contractor shall have to use templates and guided cutting torches for cutting plates.

3.3 All plates shall be kept perfectly in a horizontal plane at the time of cutting. Any plate found to be wrapped or to have permanent corrugations should not be used.

3.4 The plates shall be given the necessary chamfering at the edges. The ends of all the pipes shall also have the necessary chamfering (for hand welding at site from outside and inside).

3.5 The edges shall be made even by suitable grinders.

3.6 The tolerance on dimensions of plates cut by flame shall be guided by IS 6431.

BENDING

4.1 The plates cut to the exact sizes shall be put into the plate-bending machine to form barrel shells of the required diameter, by cold rolling.

4.2 Proper size and number of rollers shall be used to give the plate uniform curvature from end to end.

4.3 It shall be the responsibility of the Contractor to check and demonstrate the proper curvature of the bent plates. Any finished barrel found defective in shape shall have to be rectified by the Contractor to the entire satisfaction of the Engineer-in-Charge.

SPECIALS

5.1 The working drawings of the specials shall have be prepared by the Contractor well in advance and approved by the Engineer-in-Charge. The specials shall be fabricated by cutting plates to the required shape obtained by developing the form of the specials on a plastered bed. The cut shall be made by templates on guide cutting torches so as to obtain a proper cut. No hand cut shall be permitted.

5.2 The bends shall be either single piece ones or composite ones, and require prior approval of the Engineer-in-Charge before fabrication. The composite bends (made of more than one of pieces having an angle of more than 6° shall be made of cut pieces as per approved drawings.

5.3 The tapers shall be of one or more streaks. Each streak of and timer shall have a stiffening ring in the center fixed circumferentially. This shall be of the pipe thickness as the same and shall be 75 mm wide. The dimensions of tapers shall be as per approved drawings. No taper shall be sharper than 15° (angle enclosed at the apex of the cane of which the taper is in strum). All the tapers shall be tested hydraulically same way as the bare pipes and specials.

5.4 Loose flange rings shall be prepared to correct inner and outer dial. And bolt holes shall be correctly drilled.

5.5 The blank flange shall be prepared to the correct dimensions and with necessary stiffeners etc.

5.6 The manhole covers, saddle pieces, plug plates and tee pieces shall have to be prepared, as per approved drawings, made for providing 600 mm dial manholes in the pipeline. These manhole covers, made from 12 mm thick M.S. Plates, are to be fixed at the top of the pipe with necessary saddle piece of approx. 225-mm. heights complete with flange welded properly.

ASSEMBLY

6.1 The rolled barrel shells shall be placed on a platform for tack welding. Before tacking is resorted to, those shall be properly examined to ascertain the correctness of the shape and also the gap between the ends shall be properly maintained. Spiders and tightening rings shall be used for the purpose.

6.2 The rolled barrel shells, adequately tacked, shall then be subjected to automatic arc welding (for welding of the longitudinal seams) to form barrels.

6.3 A lot at such barrels, comprising a maximum of thirty consecutively formed barrels is subjected to normal lists for testing as derailed in clause 8 herein below of this specification. Only on successful completion of the tests for welding a lot is passed for further fabrication.

6.4 The barrels from only a passed lot shall be taken to the assembly platform and the requisite number of barrels shall be joined together to form each piece of pipe may be of lengths up to 7.5 meters as the Contractor may decide keeping in view the convenience of handling and transport. The lengths of pipes have to be decided after due survey of the site condition and maneuverability.

6.5 The barrels shall be so arranged that the longitudinal joints will be staggered at 90^0. The barrels tacked together shall have uniform roots and gaps for full penetration of the weld.

6.6 The tacked barrels shall then be subjected to automatic arc welding, to form pipes.

6.7 The assembled pipes shall be correctly cylindrical at and the faces shall be true to shape. A suitable arrangement for testing the correctness of the faces shall be provided by the Contractor at his own cost at the assembly stage.

6.8 The numbering of barrels and pipes shall be done by suitable punches, as directed by the Engineer-in-Charge. The cost thereof shall be included in the fabrication item given in the schedule. No extra payment can be made in this respect.

WELDING

7.1 The circumferential as well as longitudinal joints shall be welded properly so as to obtain strength of at least equal to that of the parent metal.

7.2 Before commencement of work, the Contractor shall submit complete design(s) of the welding procedure(s) to the Engineer-in-Charge for approval. Prior to the start of production Welding a detailed procedural specification shall be established and qualified to demonstrate that welds having suitable mechanical properties and soundness can be made by this procedure. The quality of welds shall be determined by destructive and non-destructive testing. For any field when minimum 4 (four) runs of welding shall be provided three (3) runs from inside and one (1) run from outside. All necessary arrangements viz. wooden or steel boxes, etc, are to be made by the Contractor at his own cost for welding from outside at the bottom side of the pipes when laid in each with proper facility for inspection by the Engineer-in-Charge or his authorized representative. The Contractor shall consider this important point while quoting their overall rate for the work. Any local sand filling necessary for this purpose will however, be paid separately as per scheduled item in the Bill of Quantities.

7.3 The details of each qualified procedure shall be recorded. This record shall show complete results of the procedure qualification test. These procedures shall be adhered to during construction except, where a change is specifically authorized by the Engineer-in-Charge as provided for in 7.4.

7.4 The Procedure Specification Shall Include The Following:

(a) Process: (the specific arc welding process using automatic, semi-automatic or manual where applicable) process or a combination of these processes.

(b) Joint Design (shape or gorses or angle of bevel, size of root face and root opening, shape and size of fillet welds type of back up if used).

(c) Electrodes and fluxes (size and classification numbers of electrodes as per ISS Minimum number and sequences of beads).

(d) Electrical characteristics (current and polarity, voltage and amperage for each size electrodes.

(e) Position (Roil of position welding).

(f) Direction of welding vertical up or down.

(g) Number of welders (minimum number of root bead welders; minimum number of subsequent bead welders).

(h) Time lapse between passes (Maximum time between completion of root head and start of second bead maximum time between completion of second head and start of other beads).

(i) Type of line up clamp, if used (Internal, External or none required).

(j) Removal of line up clamp (after root bead w61ding is 50% complete after root head welding is 100% completed).

(k) Cleaning (power tools, hand tools).

(l) Preheat, stress relief methods, temperature, temperature soon control methods, ambient temperature range.

(m) Shielding Flix (Type and size).

(n) Speed to travel (cm. per minute).

(o) Sketches and tabulations (sketches on separate sheets showing the joint design and held bead sequence together with tabulations of the date required under items b, c, & d).

7.5 A welding procedure must be re-established as a new procedure specification and must be completely re-qualified when any of the changes listed below are made in the procedure. The changes other then these given below may be made in the procedure without the necessity for re-qualification provided the specification is revised to show these changes.

(a) Change in welding process.

(b) Change in joint design.

(c) Change in pipe material.

(d) Change in position (for butt welds only): a change from vertical to horizontal on vice versa.

(e) Change in pipe size wall thickness (for groove) welds a change from one diameter and wall thickness group combination to, another and for fillet welds, a change from one wall thickness group to another group).

(f) Change in electrodes (type and/or size).

(g) Decrease in number of root head welders.

(h) Change in time lapse between passes.

(i) Change in direction (vertical down to vertical up or vice versa).

(j) Change in shielding gas (from one gas/mixture to another gas/mixture).

(k) Change in flow rate (decrease or increase).

(l) Change in shielding, flux (Change in type on size flux particles).

(m) Major change in speed of travel.

7.6 Subject to an approved weld design with the pattern of procedures established qualifying tests:

(a) The longitudinal seams of the rolled barrel shells shall be welded by submerged

arc welding conforming to IS 4353.

(b) The circumferential joints between the barrels should be welded by semiautomatic arc welding machines. Manual arc welding in specific cases may be allowed by special permission of the Engineer-in-Charge.

(c) The circumferential joints between pipes and between pipes and specials, at field, shall be done by manual arc welding and shall conform to IS 823.

7.7 All electrodes shall conform to relevant Indian Standards Published by Indian Standards Institution. Particular mention is made of IS 814 and IS 815, and IS 3613 and IS 7200 in this respect.

7.8 For shop welding as well as for welding at site the Contractor shall have to carry out the work taking every precaution for safety. The safety and health requirement equipment for protection and fire precautions to be adopted shall conform to IS 818, IS 1179 and IS 3016 respectively.

7.9 All the production welding at shop and welding at site shall be carried out only by certified welders, who have passed the requisite welder qualification tests by using a previously qualified welding procedure.

7.10 The welder qualification tests shall be arranged, under the direction of the Engineer-in-Charge, at the Contractor's factory workshop. The costs of all labour and materials, equipments, tools and plants shall be borne by the Contractor.

7.11 The training and testing of metal arc welders shall conform to IS 817.

7.12 Notwithstanding whatever has been mentioned above if any of the following essential variables are changed the welder using the new procedure shall be re-qualified, through qualifying tests.

(a) A charge from one welding process to another welding process.

(b) A change in the direction of welding from vertical up to vertical down.

(c) A change in the electrode from one classification group to another classification group.

(d) A change in position other than that already qualified.

(e) A change in the joint design.

7.13 All qualifying tests shall be carried out under the supervision of the Engineer-in-Charge or his authorized representative.

7.14 For manual welding, the circumferential welding of the joints of a should preferably carried out by pair of welders so that by observing proper sequence distortion cab be

avoided.

7.15 For manual welding, a joint entrusted to a particular welder or to a pair of welders shall be completed by that particular individual on by the pair (as the case may be) in all respects including the back sealing run.

7.16 For manual welding in specific cases as permitted by the Engineer-in-Charge, all the circumferential joints of all lots of pipe fabricated at shop, shall be carried out and completed by not more than a pair of welders. If however, the pipes welded by an individual or a pair (as the case may be) falls short of the normal length of a lot (i.e. 75 meters approximately), such pipes shall form a separate lot for the purpose of testing for welded joints.

7.17 No helper or other unauthorized person shall be permitted to do any welding work whatsoever.

TESTING

8.1 Each piece of pipes and specials etc. shall be subjected to tests for welded joints and hydraulic pressure as specified in the following sub-paragraphs.

The shop tests for welded joints, whenever necessary shall be done at the Contractor's own cost. The Contractor shall quote his overall rate for the work accordingly. The joints shall be tested in accordance with IS 3600.

8.2 Test pieces at the rate of the one for each specified tests shall be taken from a lot composed normally of thirty barrels (each having a nominal length of 2.5 meters), and similar test pieces shall be taken from a lot normally comprising ten pieces (each pipe having nominal length up to 7.5 meters) and fabricated drum only passed barrels.

8.3 If however, both the longitudinal and the circumferential joints are welded by the same procedure specification (duly established) test pieces at the rate of one for each specified tests shall be taken from each lot of ten pipes (each having a nominal length up to 7.5 meters) fabricated. In this case, clause 8.2 shall be inoperative.

8.4 Field welded joints shall also be subjected to the normal tests for welded joints. However, the Contractor shall be paid for such tests of field joints as per relevant item in the Bill of Quantities. For this purpose each set shall comprise one tensile test, one bend test and one nick break test.

8.5 In addition to above, ten (10) number of "RADIOGRAPHY" tests (non-destructive test) are to be carried out for field welded joints at the Contractor's own cost. The Contractor shall quote overall rate for the work accordingly.

8.6 The test pieces shall be taken out from the position as may be indicated by the Engineer-in-Charge, and shall be immediately machined and tested. Similarly the Engineer-in-Charge shall select the positions of Radiography tests.

8.7 The shape of the test pieces, removed from the pipes, shall be such that it would yield test specimens of the required dimensions and at the same time leave the hole in the pipe with rounded corners. All such holes shall be patched up by inserting plates of suitable size & shape & welding manually. Care shall be taken in preparing these replacements plates so as to get a good weld in proper position.

8.8 If a test specimen shows defective machining or develops of laws a not due to welding, it may be discarded and another specimen substituted with the approval of the Engineer-in-Charge.

8.9 The tensile test shall be done as follows:

a) From the test piece, collected from the pipe as may be indicated by the Engineer-in-Charge the test specimen shall be taken perpendicularly across the weld. The welded seam shall be at the middle of the test piece.

b) The test specimen shall then be shaped, in accordance with IS 223 of 1950. The dimensions shall be as specified in IS 3600, with the test specimen/being made of flat and its sides machined.

c) The protruding welded portion from inside the and outside shall be removed by machining or grinding before the specimen is tested in accordance with IS 1608-1972.

d) The welded joint shall have tensile strength not less then the tensile strength of the parent metal.

8.10 The bend test shall be done as follows:

a) The test specimens for the bend shall be prepared from the test pieces collected from the same lot of barrels and/or pipes.

b) The test specimen shall be shaped and machined in the same way, as done for the tensile test specimens. The dimensions shall be as specified in IS 3600.

c) The test specimen shall be tested at the factory of the Contractors in presence of the Engineer-in-Charge or his authorized representative. The specimen shall stand cold-bend through 180°C around a pin, the diameter of which is equal to 4 $1/_2$ times the thickness of the plate. The side of the specimen representing the inside of the pipe shall be placed next to the pin, with the welded joint approximately at the center of the bend.

d) The bend test shall be considered acceptable if no crack or defect of a dimension greater than 1.3 mm measured along the weld and greater than 1.6 mm measured across the weld is present in the weld or between the weld and the fusion zone after bending.

8.11 The nick break tests shall be done as follows:

a) The preparation of test specimen, the testing and recording of test results shall conform to IS 3600.

b) The exposed surface of each specimen shall show complete preparation and fusion.

c) The fracture shall have a clean appearance and the weld metal is free from voids,

slag inclusions to an acceptable limit.

d) The nick break test shall be considered acceptable if: -

i) There shall be no more than six gas pockets per 625 m^2 of surface area with the greatest dimensions not exceeding 5 mm.

ii) Slag inclusions shall not be more than 0.8 mm in depth nor 3 mm or one

half (1 $1/_2$) nominal wall thickness (whichever is smaller) in length and there shall be at least 12 mm of sound weld between two adjacent slag inclusions.

8.12 For failure of a test specimen, the operator or the welder (as the case may be) shall be warned for the first failure. If a second failure takes place the operator or the welder (as the case may be) shall not be permitted to continue welding work any further. A suitable substitute shall be given immediately by the Contractor.

8.13 If there be other reasons for the failure of the test specimen, rather than from any lapse on the part of an operator/welder, in the opinion of the Engineer-in-Charge, then such reason(s) shall be removed forthwith by the Contractor.

8.14 Records showing the names of welder's operator working on individual joints shall be recorded, along with other data.

8.15 For failure of test specimens in tensile and/or bend tests the following procedures for retest shall be adopted.

a) In case of longitudinal welds, two more test pieces shall be taken from the same lot, for each failure (Le. 2 nos. for tensile failure, 2 nos. for failure in bend and 4 nos. for failure in both tensile and bend). If anyone of the test specimens prepared for retest fails subsequently, the lost shall be rejected and extensive gauging and repairing shall be carried out by the Contractor at his own cost in accordance with direction of the Engineer-in-Charge. The gauged and repaired lot can only be accepted after successful tensile and/or bend test (as the case may be).

b) In case of circumferential welds a similar procedure shall be followed.

c) In case of circumferential welds at fields, two more test pieces (for each failure) shall be taken (from the specified length for of approximately 50 meters of pipes laid in trench) for retest. If any of the test specimens prepared three room for retest fails subsequently (in that particular type or types of tests in which failure occurred previously) then all the joints in the strength shall be provided with additional strips externally with requisite filled welds, as may be directed by the Engineer-in-Charge. If all the additional test specimens show successful test results in retest, then only the joint from where the test piece was initially taken (and failed) shall be provided with the additional strips externally. Northing shall be paid for any additional strips mentioned here and the Contractor shall bear the entire cost.

8.16 All charges in connection with taking out test pieces, preparation of test specimens, machining and shop tests, including refill works shall be borne by the Contractor. No extra payment will be made on this account. The Contractor shall quote his overall rate for the work accordingly.

8.17 The tensile test of the test specimen, if not possible in the Contractor's shop, shall be carried out at a laboratory as may be directed by the Engineer-in-Charge at the Contractor's own cost and he shall quote his overall rate for the work accordingly.

8.18 Each pipe, after fabrication, shall be subjected to hydraulic test. The pipes shall

withstand a hydraulic pressure of 14.5 kg/cm^2 (200 psi) without showing any sign of weakness leakage, posing or sweating.

8.19 The pressure of 14.5 kg/cm^2 shall be steadily applied by an approved ram pump and shall be maintained for at least ten (10) minutes in each case.

8.20 The pipe conveying the pressure shall be fitted with an accurate pressure gauge, approved by the Engineer-in-Charge.

8.21 Each pipe shall be hammered with sharp slow along its full length with a hand hammer/weighing about 1 kg (2 Ibs) when it is under hydraulic test.

8.22 Defects in welds such as sweats or leaks shall be replaced after obtaining necessary permission from Engineer-in-Charge in writing otherwise the pipe shall be rejected. The repaired pipe shall be retested successfully before acceptance.

8.23 The demonstration of hydraulic test shall be given in presence of the Engineer-in--Charge or his authorized representative. All charges for hydraulic testing in the shop shall be borne by the Contractor and no extra payment will be made on this account. The Contractor shall quote his overall rate for the work accordingly.

FINISHING

9.1 Before subjecting the fabricated pipes to coating and wrapping it shall be checked

that:

a) All the pipes are correctly finished and are free of cracks, surface flaws, laminations and all other defects.

b) All the pipes are cylindrical concentric and straight axially.

c) All guests, temporary tasks, and other protrusions (if any) have been removed or chipped off carefully from the pipes without damaging the parent metal.

9.2 If, however it is found that any metal from the plate (i.e., parent metal has been removed, the Contractor shall repair the surface by depositing mental welding to the satisfaction of the Engineer-in-Charge).

9.3 For chiseling and grinding, either electrical or pneumatic chisel sand grinders shall be used.

9.4 The repairs of minor defects by welding or otherwise shall be permitted but such repairs shall be done only after being permitted by the Engineer-in-Charge in writing.

9.5 Any pipe or part thereof that develops injurious defects due to shop working or

other operations there shall be rejected. The rejected pipe or part thereof shall be taken over by the Superintending Engineer, (south Circle) but a penalty will be levied (as mentioned elsewhere) upon, the Contractor for so causing the damage.

9.6 The external circumference of the pipe, particularly at the ends, shall not deviate from the theoretical circumferential lengths by more than 5 mm.

STACKING

10.1 The stacking of the pipes and specials in the factory yard shall be done in a planned way so that those could be removed conveniently for subsequent operations.

10.2 Props shall be provided near end of the pipes to maintain in the correct diameter of the pipes during stacking and subsequent transport for other operations. The props shall be placed near the ends of the pipes and specials, where coating will not be applied at the shop.

10.3 The stacking ground in the yard shall be such as will not get water logged with any possibility of water logging, the pipes and specials shall be supported on sleepers sand shall be well above the high flood level.

DETAILED SPECIFICATION FOR COATING AND WRAPPING

General

11.1 The work shall consist of cleaning both the inner and outer surface of pipes and specials followed by the application of a priming coat to these surfaces. The outer surfaces of the portion of the pipe line which will be buried underground shall then be provided with a coat of coal tar enamel over the primer coat followed by wrapping of the pipes and specials with a fiber glass mat externally and then finished with another coat of coal tar enamel over the glass-glass wrapping. The inside surface of the entire pipeline including specials and outer surfaces of pipes and specials in intake jetty structure portion (i.e. the portion of pipe line which is not buried underground shall be provided with three coats of a special anticorrosive and non-toxic paint as approved by the department).

11.2 The Contractor shall supply all labour and materials along with the necessary tools and plants, machinery, equipment and instruments as needed to complete the job and for performing the tests as specified herein below.

11.3 All materials to be used and also their applications shall conform to American Water Works Association (AWWA) Specifications C-203-57/66/73/78 unless specified otherwise herein under. The physical and functional characteristics of such materials shall conform to the requirements indicated in American Society for Testing Materials (ASTM) Standard Designations or in AWWA. C-203-57/66/73/78.

Cleaning the pipe and special surfaces

12.1 All oil and grease from the inside and outside surfaces of the pipes and specials shall be removed thoroughly by flushing and washing, using suitable chemical solvent and clean ranges.

12.2 Both the inside and the outside surface of the pipes and specials shall there after be thoroughly cleaned of all mill scale, rust, dirt, weld scales, weld burns, dust, moisture etc. by sand blasting in general or by scraping and cleaning with pneumatically/electrically actuated stiff wire brush as may be approved by the Engineer-in-Charge. Air supply to sand blasting equipment must be free from oil and moisture. The cleaning shall expose the bare metal surface. Manual hand cleaning will not be allowed.

12.3 Notwithstanding that a length of 150 mm of the pipe/special at both the ends is excluded from coating and wrapping initially, the cleaning operation, to be done at the Contractor's workshop shall cover the entire length of the pipes/specials in respect of their inner and outer surfaces. Nothing shall be paid extra for cleaning the bare ends of the pipes/specials again at site prior to application of field coating and wrapping.

12.4 The cleaning operations in respect of both the inner and outer surface of the pipes and specials shall be carried out simultaneously and completed to the entire satisfaction of the Engineer-in-Charge.

13. Materials

13.1 Materials manufactured by reputed firms (Shalimar Tar Products/Lloyd Tar Products) and conforming to the specification, mentioned in the relevant clauses herein below shall be used. Details of such materials to be used shall be recorded properly as directed by the Engineer-in-Charge.

13.2 The primer shall consist of processed coal tar pitch and refined coal tar oils only suitably blended to produce or effective bond between the metal and the coal tar enamel at the external surfaces and also between the metal and non-toxic paint at the internal surfaces. Primer shall not contain bonzol or any other toxic and/or highly volatile added pigments, or interfiles or other substances and shall show no tendency to settle out in containers. It should be free from bubbles, voids or other imperfections. The primer shall be applied in a smooth and even film. The main characteristics of the primer shall be as follows:

i) Drying time touch of 30°C and normal humidity (70%)	Less than one hour
ii) Maximum Boiling Point	215°C
iii) Penetration of residue, ASTM 05-597 100 gm. wt., 5 sec.,	25°C Under 7
iv) Softening Point of residue, ASTM 036-26	104°C (Min.)
v) Specific Gravity at 25°C	1.1 to 1.14
vi) Viscosity at 30°C through 4 mm Cu (Standard Tar Viscometer)	25 to 30 sees.
vii) Distillates up to 160°C	2% to 4% VN
viii)Tar Acid	12%

13.3 The coal tar enamel shall be composed of a specially processed coat tar pitch combined with inert material filler. No asphalt for either petroleum or natural base shall be acceptable as part of the ingredients. The enamel shall have the following:

		MIN.	MAX.
i)	Softening Point	105°C	125°C
	(Ring & Ball) ASTM 0-36-26	220°F	257°F
ii)	Filler (Ash) - ASTM 0271-48	25%	35%
iii)	Specific Gravity at 25°C - ASTM D5-52	1.40	1.60
iv)	Penetration - ASTM D5-52		
	a)100gm.wt.,5 sec at 25^0 C	10	20
	b) 50 gm. wt., 5 sec at 45°C	15	55
v)	High Temperature Test	1.50 mm	
	AWWA C-203 at 70°C Maximum		
	Sag 24 hours-		
vi)	Low Temperature Test	None	
	AWWA C-203 at $2S^0$C Maximum		
	6 hours Cracking		
vii)	Electrical Resistance	No Breakdown	
	10,000 Volts/6M. Amp		
viii)	Viscosity - ZAHN No.4 at 230°C	10	15
ix)	Impact Test at 5^0C/650 gm. wt.	-	10 Sq. inch
	/2.44 m direct, impact, disbanded area		(64.5 cm^2)
x)	Normal Application Temperature	230°C	250°C

13.4 Before use, the Contractor will be required to furnish test certificates of the specified manufacturers in respect of the physical and functional characteristics of each batch of primer and enamel to be procured for the intended use.

13.5 The glass-glass mat for wrapping shall be flexible, insert, inorganic non-wicking, non-hygroscopic and uniform mat composed of chemically resistant borosilicate fiber glass tissue moni-filaments distributed in a random open porous structures bonded together with a thermosetting (phenol type) resin shall be compatible with the hot coal tar enamel. The fiber glass tissue shall be longitudinally reinforced by continuous filament glass yarn embedded in the mat at 10 mm (3/8") nominal contress.

13.6 The fiber glass shall have the following physical characteristics :

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a) No disbonding of individual glass fibers shall occur during or following the embedding process;

b) The fiber glass shall not cause buddling under the conditions of application;

c) The mat shall be sufficiently porous, so that it can be embedded in the hot coal tar enamel as it is applied to the exterior of the pipe;

d) The mat shall be free from thin spot, pimples, formations, uncured binder spots, wrinkles, torn edges, dust oil and grease.

13.7 The fiber glass mat shall also conform to the following characteristics:

i) Weight	45.50 gms/M^2
ii) Nominal thickness	0.4 mm to 0.5 mm
iii) Longitudinal tensile strength	
500 mm x 150 mm (20" x 6")	45.36 Kgms (100 Ibs) minimum
iv) Tear strength in the transverse direction	3.6 Kgms (8 Ibs)
v) Porosity	the glass mat shall have a porosity of not more than 1.54 mm (0.06") water gauge measured as pressure difference across the sample at an air velocity of 1.02 IV1ISec.

vi) Temperature resistancy shall be unaffected under load in hot bitumen at 230°C (530 F) for one minute.

vii) Moisture absorption % by wt. relative humidity of 95% and 1200^0F for 24 hours.

Fibre-glass mat sold by reputed manufacturers may be used provided at satisfied the above specification and is also approved by the Engineer-in-Charge. However, before use the Contractor shall provide manufacturer's test certificate for each batch of fibre-glass mats procured.

14. Operational Procedures

14.1 The priming operations shall not be conducted during rain or fog, unless protected from the weather by suitable housing.

14.2 The primer shall be applied on pipe surface cleaned as per clause 2 herein above and must be dry at the time of applying, the specified primer.

14.3 The application of the primer in the Contractor's shop shall be by mechanical means and shall be in accordance with instructions for application as supplied by the manufacturers of the primer. The apparatus to be used for application of primer shall be approved by the Engineer-in-Charge.

14.4 The entire surface of the pipe, except for a length of 150 mm at each end should be primed without any patch left out. The use of coal tar primer that becomes fouled with foreign substances or has thickened through evaporation of solvent oils will not be permitted. After application, the coal tar priming coat shall be uniform and free from floods, runs, sags, drips, holidays or bare spots. All bare sports or holidays shall bear recoated with an additional application of primer. All runs, sags, floods or drips shall be removed by scraping and cleaning and the cleaned area shall be retouched.

14.5 Suitable measures shall be taken to protect wet primer from contact with rain, fog, mist, spray, and dust or, other foreign matter until completely hardened. The coal tar enamel or non-toxic paint shall there after be applied to the outer and inner surface.

14.6 Prosily primed pipe shall be placed on clean, square cut skids and shall lot be allowed to come in contact with the ground or with any other foreign matter. It shall remain on skids until lifted or cradled for the coating and wrapping operation.

14.7 All primed-pipes, which have an excessive coat or dust accumulated over them before the primer is dry or which have been exposed to weather for more than twenty four (24) hours after priming shall be re-primed free of cost as per instructions of the Engineer-in-Charge.

14.8 The minimum and maximum allowable drying time of the coal tar primer between application of primer and application of coal tar enamel shall been accordance with instructions issued by the manufacturer of the primer unless otherwise directed by the Engineer-in-Charge. If the enamel is not applied within the maximum time after priming, as required by the manufacturer or as directed by the Engineer-in-Charge, the pipe shall be re-primed with an additional light coat of primer or at the discretion of the Engineer-in-Charge the entire prime coat shall be removed and the pipe re-primed for which no claim will be entertained,

The primer shall be kept in tightly sealed container when not in use to prevent evaporation.

14.9 The enamel shall be broken into pieces suitable for the heating equipment used, on a platform or suitable place free from dirt, weeds and other forms of contamination. The broke enamel shall be placed in a melting kettle and shall be melted and brought up to application temperature as rapidly as without injury to the enamel.

The enamel heated in supply kettles shall not exceed the temperature and melting periods recommended by the coating manufacturers and, if done so, will be rejected. Operating kettles shall not be used as a continuous source of supply adding un-melted enamel during the time they are in use but shall completely be empted of one charge and cleaned, if necessary, before the next charge of un-melted enamel is except when mechanically agitated kettles are used.

14.10 The enamel being prepared for use by automatic coating machines shall be agitated in melting kettles having continuous mechanical agitators. If shall melting mettles without mechanical agitators are used, with the approval of the Engineer, the melted enamel in the kettles shall be stirred at an interval not more than 15 (fifteen) minutes during heating with metal agitator. Wooden puddles or stick shall not be used for stick. Accurate thermometers shall be mounted on heating kettle in such a way as to be red clearly. The thermometer bulb shall within 100 mm from the bottom of the kettle and shall have temperature range from 200°F to 600°F. The automatic coating machine shall be such as will allow coating to be applied by pouring over the pipe, which is revolving at a specified low speed and spreading to the specified thickness of coating, which is normally between 1.5 mm and 2.5mm.

14.11 The enamel heated in the kittled shall be strained through 1/16" (1.5 mm) mesh strainer located in such a way that it can be readily cleaned and applied at a temperature specified by the manufacturer to give best results under conditions of weather. The primed surface shall be cleaned to remove dust or other foreign materials before applying the enamel. The coating and wrapping of fiber glass shall be applied with a machine.

14.12 First coat of hot coal tar enamel shall be applied over the primed surface to a minimum thickness of approximately 1.5 mm. The Engineer-In-Charge shall cut samples/test the thickness of coating and further work of outer coating shall have to be taken up only, after the inner coating has been approved by the Engineer-in-Charge.

14.13 Simultaneously with the first coat of coal tar enamel fibre glass mat shall be mechanically applied in a continuous and free machine or in a lathe type machine. Sufficient tensile shall be applied to the rolls of fibreglass mat to embed it in the enamel before the enamel sets or cools. The fibre glass mat shall be of suitable uniform width for smooth spiral application. The over lap of the fibre mat shall not be less than 1/2 inch (12 mm). The cover will be in single layer except at the overlapped edges.

14.14 Immediately after application of the glass mat, the final coat of coal tar enamel shall be applied.

The thickness of final coat of enamel shall be so adjusted that the total dry thickness of coating and wrapping is maintained between 3.6 mm and 4.5 mm. The coating must be free of pinholes, bubbles or holidays. The Engineer-In-Charge shall cut samples from he coating from time to time to determine the thickness and bond of coating.

After final coating the insulation of the pipes and specials shall be wrapped properly as per direction of the Engineer-in-Charge with Kraft paper of approved quality and conforming to relevant IS specification before transporting the insulated pipes and specials to work site.

14.15 The enamel which drops down during application and which is free from dust or

sand may be collected and embed with chunks of solid fresh enamel in the proportion of 1:9 (101 d: 9) if approved by the Engineer-in-Charge. However no dripped enamel to be reused shall be heated directly without mixing with good quality enamel into he above mentioned proportion.

14.16 For field application of coating & wrapping the following procedures shall be adopted:

a) The pipe ends should be thoroughly cleaned by sand blasting or by scraping with pneumatically/electrically actuated stiff wire brush. Surface shall be free from any grease, oil, moisture, dirt or any other materials that may impair the proper bonding of the coating.

b) Primer shall be applied with brushes to obtain a smooth uniform coating free of runner drips when the primer has dried, one coat of dry enamel shall be applied and glass fibre wrap shall be applied and glass.

15. ALL/ any of data given if not found reasonable (this will also include data of Design Parameters) will be given during detail engineering. Tenderer/ contractor therefore are advised to consult with manufacturer/ experts at his own cost, if so felt, to reach more Correct figure for Tendering purpose. The same is also advised for any other data supplied/missing. But in no case it will be treated as a Fault of Tendering Authorities If any data is found in Variance in same chatter/ section or anywhere of tender document, is to be brought to the notice of the tendering Authority & His interpretation/ decision will be considered as final.

16. All work will mainly be guided by provision as stipulated in I. S. Code of practice.

However in case of any deviation due to site suitability or any other unforeseen reason.

Alternative design/proposal to be attempted subject to the satisfaction of E.I.C.

Superintending Engineer
South Circle, ME. Dte