Volume – 1

INVITATION FOR BID

&

INSTRUCTIONS TO BIDDERS

Supply, installation testing and commissioning of WATER TREATMENT PLANT AND SEWAGE TREATMENT PLANT Works complete in all respect for Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi.
## BID Documents

### Contents

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Description</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Press Notice</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>List of Important Dates</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>BID Documents issued to</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Invitation for Bids</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Instruction to Bidders</td>
<td>11</td>
</tr>
</tbody>
</table>
F No.11-13/GA/2015-FSSAI
Food Safety and Standards Authority of India
Dated, the 15th September, 2015

PRESS NOTICE

Bids in the prescribed form are hereby invited on behalf of Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi.

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Name of Work</th>
<th>Approx. Cost</th>
<th>Earnest Money</th>
<th>Time Limit for Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply, installation testing and commissioning of HVAC Works complete in all respect for Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi.</td>
<td>Rs. 141 Lacs</td>
<td>Rs 2,82,000/-</td>
<td>05 Months (for Completion of Capital Works) 12 Months (for Defect Liability and Operation &amp; Maintenance after successful Trial Run for all works including Electrification Works) and Comprehensive Operation &amp; maintenance for further 02 years.</td>
</tr>
<tr>
<td>2</td>
<td>Supply, installation testing and commissioning of WATER TREATMENT PLANT AND SEWAGE TREATMENT PLANT Works complete in all respect for Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi.</td>
<td>Rs. 65 Lacs</td>
<td>Rs 1,30,000/-</td>
<td>05 Months (for Completion of Capital Works) 12 Months (for Defect Liability and Operation &amp; Maintenance after successful Trial Run for all works including Electrification Works) and Comprehensive Operation &amp; maintenance for further 02 years.</td>
</tr>
</tbody>
</table>

Date & Place of pre Bid meeting : 28.09.2015, 11 AM, at FDA Bhawan, Kotla Road, New Delhi-110002
Officer in-charge inviting bids : Director(GA), FSSAI, FDA Bhawan, Kotla Road, New Delhi-110002
Tele fax numbers : 011-23220994
Web site : http://www.fssai.gov.in/
Email id : Rakesh.cs@fssai.gov.in

Bids documents can be collected from the office of Director (GA) Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi, during working hours from 18.09.2015 to 05.10.2015 any working day between 10.00 AM to 3.00 PM on payment of Rs 1,000/- (Rupees One Thousand only) in Cash or Demand Draft in favour of Sr. Account Officer, FSSAI payable at New Delhi only. The tender documents can also be downloaded from website before the expiry of sale of bid documents i.e, 3 PM on 05.10.2015 and payment of tender fees in form of Demand Draft / Banker's Cheque should be made on or before the last date of sale and to be enclosed with bid in Envelope A.

Sealed bids with the name of the work and name of the bidder written on the envelope will be received by Director(GA), Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi. up to 1.00 P.M. on 12.10.2015.

Director (GA)
Food Safety and Standards Authority of India
Food Safety and Standards Authority of India

Dated, the 15th September, 2015

(List of important dates)

| Name of Work | Supply, installation testing and commissioning of WATER TREATMENT PLANT AND SEWAGE TREATMENT PLANT Works complete in all respect for Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi. |
| Completion period | 05 Months (for Completion of Capital Works) 12 Months (for Defect Liability and Operation & Maintenance after successful Trial Run for all works including Electrification Works) and Comprehensive Operation & maintenance for further 02 years |
| Date of issue of Notice Inviting Bid | 18.09.2015 |
| Last date of purchase of Bid Documents | 05.10.2015 upto 03.00 PM |
| Date of Pre-Bid conference | 28.09.2015 at 11 AM, FSSAI HQrs. 03rd / 04th Floor Conference Hall, FDA Bhawan, Kotla Road, New Delhi-110002 |
| Date of receipt of Bids. | 12.10.2015 up to 01.00 PM |
| Date of opening of EMD & Technical Bid envelopes (i.e. envelope A,B & D) | 12.10.2015 at 03:00 PM |
| Place of opening of BID | FSSAI HQrs., 3rd / 4th Floor, Conference Hall, FDA Bhawan, Kotla Road, New Delhi-110002 |
| Date & time of opening of Financial Bid (i.e. envelope C) | Shall be communicated to all bidders. |
| Officer inviting BIDS | Director (GA), Food Safety and Standards Authority of India, FDA Bhawan, Kotla Road, New Delhi-110002 |
Supply, installation testing and commissioning of WATER TREATMENT PLANT AND SEWAGE TREATMENT PLANT Works complete in all respect for Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi.

Issued to

Name of Agency: ________________________________

Food Safety and Standards Authority of India,
FDA Bhawan, Kotla Road,
New Delhi
F No.11-13/GA/2015-FSSAI
Food Safety and Standards Authority of India

Dated, the 15th September, 2015

INVITATION FOR BIDS

(IFB)
INVITATION FORBIDS (IFB)

1. Bids in the prescribed form are hereby invited on behalf of Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi for the following work.

Supply, installation testing and commissioning of WATER TREATMENT PLANT AND SEWAGE TREATMENT PLANT Works complete in all respect for Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi.

2. Bids documents can be collected from the office of Director (GA), Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi, during working hours from 18.09.2015 to 05.10.2015 any working day between 10.00 AM to 03.00 PM on payment of Rs 1,000/- (Rupees One Thousand only) in Cash or Demand Draft in favour of Sr. Account Officer, FSSAI payable at New Delhi only. The tender documents can also be downloaded from website before the expiry of sale of bid documents i.e, 03.00 PM on 05.10.2015 and payment of tender fees in form of Demand Draft / Banker's Cheque should be made on or before the last date of sale and to be enclosed with bid in Envelope A.

3. Sealed bids with the name of the work and name of the bidder written on the envelope will be received by Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi 110002 upto 01.00 P.M. on 12.10.2015.

4. The entire WTP&STP work is required to be completed within 05 months from the day of receipt of written order by the contractor or within such extended time as has been allowed under clause 7.2 (of GCC Part-1). The contract programme shall commence from the date the work order is issued and shall not be governed by the issue of any advance payment.

5. The bidder should return all the bid drawings, if any, along with the bid duly signed and stamped, otherwise the bid will be liable for rejection. The bidder can obtain clarification and examine the drawings at the office of Director (GA), Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi during working hours before 05.10.2015 at 11.00 PM.

6. The bidder shall include for the provision of all labour, materials, tools, supplies, equipment, services, facilities, supervision, administration, works contract tax, licenses, permits, insurances, bonds and any other tax as may be applicable, incidentals and all other things necessary to perform and incidental to the performance of the work in strict accordance with the contract documents to the satisfaction of the Architect/ Consultants and Owner.

7. Bidder shall include for his own unloading and hoisting of materials and equipment; own scaffolding, rigging, and access equipment; distribution of site temporary Electrical, water and other utility services from centrally located single point source; protection of adjacent trades; own clean up and trash disposal. Contractor shall make his own arrangement for Electricity/Water and other utilities at site. Cost of same is deemed to be included. Work progress should not suffer on this account. Bidder is deemed to have been allowed for alternative standby services at his own cost.
8. Where the scope of works requires engineering and/or shop drawings, the successful bidder will be required to furnish reproducible plus a given number of copies of all drawings for approval prior to fabrication. The Employer/Consultants will return these drawings with appropriate marking and/or comments. Approval will not relieve the bidder from compliance with the Contract Agreement, and/or applicable specification requirements.

9. The submission of bid will be conclusive evidence that the Bidder has fully and carefully examined the site of the work, the drawings and specifications and is satisfied as to the conditions to be encountered, as to the character, quality, quantities and performance requirements of the work to be performed and the equipment and materials and labour to be furnished, the difficulties to be encountered and the requirements of the Bid Documents, Drawings, Specifications and other Contract Documents. No allowances will be made to any bidder because of lack of such examination or knowledge. Said bid submission also warrants that Bidder is aware of conditions and rates at which materials if any, will be issued to him by the Owner.

10. Bidder is to check the numbers of the pages of all documentation & should any be found missing, or unclear, must notify the Employer/Consultants at once for clarification. No liability for errors in the bid resulting from failure to check the documentation will be accepted. Any bidder having questions regarding the true meaning of any part of the proposed contract documents or who finds discrepancies in, or omission from any part of the proposed Contract Documents may submit to the Employer or its authorized representative/Consultants a written request for interpretation thereof no later than 7 (Seven) days prior to opening of Bids.

11. The Bidder should quote in figures as well as in words the rate(s) bided by him. The amount for each item should be worked out and requisite totals given. The total amount shall be written both in figures and in words.

12. The schedule of approximate quantities for various items accompanies this bid. It shall be definitely understood that these are the estimated quantities only and are not to be taken as actual and correct quantities of the work, to be executed by the Contractor in fulfillment of his obligation under the contract. These quantities are liable to alternations by omissions, deductions or additions at the discretion of the Owner/Architect/Consultant without affecting the Terms of the Contract.

13. Each of the bid documents is required to be signed by the person or persons submitting the bid in token of his/their having acquainted himself/themselves with the Special Conditions, General conditions of contract, technical Specifications and schedule of quantities etc. as laid down. Any bid with any of the documents not so signed will be liable for rejection.

If the bid submitted by a partnership firm, it shall be signed by all the partners of the firm or by a partner who has the necessary authority on behalf of the firm to enter into the proposed contract and attach such Power of Attorney with the bid. Otherwise the bid will be liable for rejection. If the bid is made by or on behalf of Company in corporate under the Companies Act, it shall be signed by their Managing Director or one of the Directors duly authorised on its behalf.
14. All erasures and alterations made while completing the bid must be attested by initials of the Bidder. Overwriting of figures is not permitted. Failure to comply with either of these conditions after opening of the bid shall make it void. No advice of any change in rate or conditions after opening of the bid will be entertained.

15. Owner does not bind himself to accept the lowest bid and reserves to himself the authority to reject any or all bids received without assigning any reason(s). The Owner also reserves the right of accepting the whole or to reject all bids without giving any reason or any part of the bid and the Bidder shall be bound to perform the same at the rate quoted.

16. a) The bidder shall submit a programme with his bid. This programme will demonstrate the periods, sequencing and timing of the works and must show the start and finish dates for each activity.

   b) The bidder's programmer is to include all activities for which he is responsible, including the preparation of drawings, fabrication of parts, delivery to site, installation, testing commissioning etc.

17. NO ESCALATION of any kind is admissible during the stipulated period /extended period if any of completion and contractor shall keep his prices firm during this period.

18. Sales Tax, VAT, Excise Duty, Octroi, Royalty, Contract Tax, Service Tax or any other tax, duty or levy on materials in respect of this contract shall be payable by the Contractor and the Owner will not entertain any claim whatsoever in this respect.

19. The bidder shall submit a latest 'Income Tax Clearance Certificate' along with his bid.

20. The bid for works shall remain open for acceptance for a period of 90 days from the closing date for receipt of bids.

21. The Owner shall not be responsible for, nor shall the Owner reimburse any expense or loss which may be incurred by any Bidder in the preparation of the bid.

22. Performance Guarantee/Bond

For the due performance of the contract, the bidder shall furnish an undertaking within 10 days from the notice of award a bond or guarantee of an Indian Nationalized Govt. Bank to be jointly and severally bound with the bidder to the owner for the sum of 5% of the value of awarded work. The said Bank and terms of the said bond of Guarantee shall be such as approved by the employer. The obtaining of such bond or guarantee and the cost of bond or guarantee to be so entered into shall be at the expense in all respects of the bidder. Such bond or guarantee should be valid till the end of the defects liability period. Only on receipt of the Performance Guarantee, the work shall be awarded to the bidder. In case of non-receipt of Performance Guarantee within the time period stipulated, the work awarded shall be cancelled and FSSAI reserves the right to cancel the bid or award the work to any other bidder and the EMD will stand forfeited.

23. Bid Security / EMD: 2% of the estimated value of work i.e Rs. 1,30,000/-. 
24 CRITERIA FOR ELIGIBILITY

24.1 The bidder must have completed one similar work of the value equivalent to 80% of the package or Two similar works of the value equivalent to 50% of the package or Three similar works of the value equivalent to 40% of the package under a combined or individual packages during the last five years as on date of submission of bids.

24.2 The bidder should have minimum average annual financial turnover of Rs 50 Lacs during last three financial years.

24.3 The bidder should not have been black listed by any of the Govt./Semi Govt. agencies.

24.4 The bidder should have sufficient number of Technical and Administrative employees for the proper execution of the contract. The bidder should submit a list of these employees stating clearly how these would be involved in this work as described in ITB.

24.5 Evaluation of bids
   The details submitted by the bidders will be evaluated in described in Para 25 & 27 of ITB.

Food Safety and Standards Authority of India,
FDA Bhawan, Kotla Road,
New Delhi
Name of Work: Supply, installation testing and commissioning of WATER TREATMENT PLANT AND SEWAGE TREATMENT PLANT Works complete in all respect for Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi.
General Description

1 Preamble
Food Safety and standards authority of India created under the Ministry of Health & Family Welfare and presently located at FDA Bhawan Kotla Road, New Delhi - 110002. A study of the Existing Air Conditioning system in FDA Bhawan, FSSAI office Building was conducted and based on the study, the scope of work for WTP & STP works, required to be carried out was finalized.

2 Scope of Bid
2.1 The brief scope of the work, which is to be executed, is as under
a) Supply, installation testing and commissioning of WTP AND STPA Works
b) The Contractor shall furnish all labour and install all materials, appliances & equipment as per design & drawings.
a) Commissioning of entire Water Treatment and Sewage Treatment Plant.
   Operation and maintenance after successful Trial Run during Defect Liability period of 12 months and & Comprehensive Operation and Maintenance for further 2 yrs (option-I included in cost of tender) or further 5 yrs (option-II).

3.0 Project Description
3.1 The Food Safety and Standards Authority of India (FSSAI), hereinafter referred to as the Employer, invites bids for supply, installations, testing & commissioning for WTP & STP works including all contingent works thereto complete in all respects.
3.2 The successful bidder is expected to complete the works within the stipulated period of completion of the works, to be reckoned from the date mentioned in letter to proceed with the works.
3.3 Throughout these bidding documents, the terms “Bid” and “Bid” their derivatives (Bid/Bid, Bidder / Bidder, Bidding/Biding, etc.) are synonymous.

4.0 Bid Documents
Bids documents can be collected from the office of Director(GA) Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi, during working hours from 18.09.2015 to 05.10.2015 any working day between 10.00 AM to 3.00 PM on payment of Rs 1,000/- (Rupees One Thousand only) in Cash or Demand Draft in favour of Sr. Account Officer, FSSAI payable at New Delhi only. The tender documents can also be downloaded from website before the expiry of sale of bid documents i.e, 3 PM on 05.10.2015 and payment of tender fees in form of Demand Draft / Banker's Cheque should be made on or before the last date of sale and to be enclosed with bid in Envelope A.

5.0 Methodology and Period of Completion of Work
5.1 Methodology
A detailed note outlining the bidder’s proposed methodology of execution, backed with procurement of materials, quality control procedure proposed to be adopted for completed process and the completion schedule.
5.2 **Period of Completion**
The total works are to be executed within a period of 05 months including trial run from the date mentioned in the letter to proceed with the works. After the completion works, trial run will be for a period of 01 month. The 12 month Operation & Maintenance and defect liability will commence after the trial run period. The Comprehensive operation & Maintenance will be for a further period of two years for option 1 & five years for option 2. However, it shall be the employer discretion to go in for option 1 or option 2.

6.0 **Bidding**
Each bidder shall submit its bid as per bid documents complete for all items of works as per requirement of the bid documents.

7.0 **Cost of Bidding**
The bidder shall bear all costs associated with the preparation and submission of its bid, and the employer will in no case be responsible and liable for those costs regardless of the conduct of the bidding process.

7.1 **Site visit**
The bidder is advised to visit and examine the site of work and its surroundings and obtain himself at its own cost, responsibility and risks, all information that may be necessary for the preparation of the bid and for entering into a contract for the execution of the works.

7.2 **Pre Bid Conference**
A pre bid meeting shall be held on 28.09.2015 at 11 AM in the office of Food Safety and Standards Authority of India at FBA Bhawan, Kotla Road, New Delhi, to clarify issues and to answer queries on any matter pertaining to the Bid / that may be raised. The Bidder is requested to submit queries in writing so as to reach the office of the employer not later than Seven days before the scheduled date of pre-bid meeting.

The bidders are requested to carefully examine the Qualifying and Technical requirements of the Bid Documents. In case bidders choose to offer equipment with better features/specifications/design etc, same shall be discussed by the bidders in the pre-bid meeting and bidders shall also clearly spell out the advantages and superiority of taking such deviations. The documentary evidence for offering such equipment with justification shall have to be submitted to Employer during the pre-bid meeting. Based on Employer confirmation on these points, bidder will offer the equipment and will not be allowed to take any further technical deviation at the time of submission of technical offer.

Minutes of meeting, including the text of the queries raised and the responses given, together with any responses prepared after the meeting, will be transmitted without delay to all purchasers of the bidding documents. Any changes which may become
necessary as a result of pre bid meeting shall be made by the Employer exclusively through the issue of an addendum and not through the minutes of the pre bid meeting.
Nonattendance at the pre bid meeting will not be a cause for disqualification of a bidder.

8.0 Content of Bidding Documents
The bidding documents related to the Qualifying Requirements and scope should be read in conjunction with addenda, if any, issued after the pre bid meeting. The bidder is expected to examine carefully the contents of all documents related to the Qualifying Requirements, the scope of work and other terms & condition. Failure to comply with the requirements of bid submission will be at the bidder’s own risk. Bids, which are not substantially responsive to the requirements of the bidding documents, will be rejected.

9.0 Clarification of Bidding Documents
A prospective bidder requiring any clarification on bidding documents, may notify the employer in writing or by fax at the employer’s address or by e-mail as indicated in the invitation for bids. The employer will respond to any request for clarification, which he receives earlier than 3 days prior to the deadline for pre bid conference. Copies of the employer's response will be forwarded to all the bidders, including a description of the inquiry, but without identifying its source.

10.0 Amendment of Bidding Documents
10.1 At any time prior to the deadline for submission of bids, the employer may for any reason, whether at his own initiative or in response to a clarification requested by prospective bidders, modify the bidding documents by issuing addenda.
10.2 Any Addendum thus issued shall be part of the bidding documents and shall be communicated in writing to all prospective bidders who purchased the bid documents from the office of FSSAI. The other bidders who downloaded the bid document from website of FSSAI are advised to check on the website of FSSAI for any addendum issued. The prospective bidders shall acknowledge receipt of each Addendum in writing to the employer.
10.3 To give prospective bidders a reasonable time enabling them to take addenda into account, in preparing their bids, the employer may extend, if necessary, the deadline for submission of bids, in accordance with clause 19.2 of ITB

PREPARATION OF BIDS
11. Language of Bid
All documents relating to the bid shall be in English language only.
12. **Documents Comprising the Bid**

The bid to be submitted by the bidder shall comprise the following, in separate envelopes:

**Envelope “A”**—Original Earnest Money Deposit and Eligibility Requirements along with Schedule 1 to 8 & Volume -1

**Envelope “B”**- i. Technical Bid & Methodology of work

A detailed note outlining the bidder’s proposed methodology of execution, backed with his procurement of materials, quality control procedures proposed to be adopted, justifying his capability of achieving the completion of work as per milestones specified within the stipulated period of completion must accompany the bid.

ii. Conditions of Contract & Specifications (Volume –2)

iii. Any other documents required to be submitted by the bidders in accordance with these instructions.

**Envelope “C”**- Financial bid form (in the format indicated) duly signed (volume –3)

13. **Eligibility/Qualification**

13.1 Eligibility / Qualification Information

All Applicants/ bidder shall also submit the following qualification information in the prescribed schedules 1 to 8 in envelope A for detailed evaluation of their qualification.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Details about structure of organization, general experience, etc.</td>
<td>SCHEDULE 1</td>
</tr>
<tr>
<td>Report on financial capabilities, balance sheets to be attached</td>
<td>SCHEDULE 2</td>
</tr>
<tr>
<td>Information about personal and supervisory staff, etc, in the organization along with proposed site organization</td>
<td>SCHEDULE 3</td>
</tr>
<tr>
<td>Details of experience, past performance, on the basis of which qualification is sought etc.</td>
<td>SCHEDULE 4</td>
</tr>
<tr>
<td>Information about litigation history, debarring / blacklisting, abandonment etc.</td>
<td>SCHEDULE 5</td>
</tr>
<tr>
<td>Affidavit</td>
<td>SCHEDULE 6</td>
</tr>
<tr>
<td>Any other information</td>
<td>SCHEDULE 7</td>
</tr>
<tr>
<td>Check List</td>
<td>SCHEDULE 8</td>
</tr>
</tbody>
</table>

If necessary additional sheet(s) by photocopying the original schedules can be added to the schedules. If need be, attachments can be added to these schedules for giving any additional information.

While submitting the schedules, duly filled in, the applicant may enclose latest copies of brochures and technical documentation giving additional information about the applicant.
13.2 Evaluation (Eligibility Criteria)
The eligibility details submitted by the bidder in the 7 nos schedules detailed above will be evaluated in the following manner, to determine the eligibility/qualification of the bidder:

a) General Scrutiny
b) Detailed Evaluation

13.2.1 General Scrutiny
Applications, which are found deficient on general scrutiny, will be rejected. Some of the deficiencies are:

a) Application not properly signed.
b) Furnishing of incomplete or incorrect information.
c) Application not submitted in the original
d) Application received after the last date of receipt of application.

13.2.3 Detailed Evaluation
Applicant having cleared this general scrutiny, will be evaluated in detail as per information supplied with regard to.

i. Financial status i.e Annual Turnover, Net worth& Working Capital.
ii. Technical expertise i.e Manpower & Supervisory Manpower along with proposed supervisory staff for the staff.
iii. Details of experience & past performance.
iv. Litigation History & Debarring/Blacklisting
v. Methodology of work.

14.0 Bid Price
14.1 The quantities indicated in the bill of quantities are tentative and variations (Plus or minus side) can be expected as per provisions mentioned in general conditions of contract.

14.2 The bidder shall fill in the items rates and prices on item rate basis, as indicated in the financial Bid Form. Items, for which no rate or price is entered by the bidder will not be paid for by the employer, when executed, and shall be deemed to have been covered by other rates and prices in the bill of quantities. Corrections if any shall be made by crossing out, initialing and rewriting. No defacing of rates shall be permitted.

14.3 All duties, taxes and other levies payable by the contractor under the contract, or for any other clause, shall be included in the rates and the total bid price submitted by the bidder. The evaluation and comparison of bids, by the employer, shall be made accordingly.

15.0 Bid Validity
15.1 Bid shall remain valid for a period not less 90 days after the deadline for bid submission. Bid valid for shorter period may be treated by the employer as non-responsive.
15.2 In exceptional circumstances, prior to the expiry of the original time limit, the employer may request the bidders to extend the period of validity for a specified additional period. The request and the bidder's response shall be made in writing.

16.0 Bid Security
16.1 The bidder shall furnish, as part of its bid, an earnest money deposit (EMD) of the amount as shown in Invitation for BID for this particular work. This Earnest Money Deposit shall be in the form of Banker's Cheque /Demand draft in favour of Sr. Account Officer FSSAI, payable at New Delhi. Bids without proper EMD shall be summarily rejected.

16.2 The earnest money deposit of the unsuccessful bidders will be returned within 30 days from the date of finalization of the bid.

16.3 The earnest money deposit of the successful bidder will become part of security deposit.

16.4 The bid security may be forfeited:
   a) If the bidder withdraws or modifies its bid after the bid opening and during the period of bid validity.
   b) If the bidder does not accept the correction of his bid prices, pursuant to clause 26 of ITB
   c) In case of a successful bidder, if he fails within the stipulated limit to
      i) Sign the agreement; or ii) Mobilize the work; or iii) Fails to furnish required performance security in accordance with the terms of tender document within the time frame specified by the Client; or iv) Fails or refuses to honour his own quoted prices for the services or part thereof.

17.0 Format and Signing of Bid
17.1 The bidder shall submit the original documents comprising the bid as described in clause 12.0 of ITB of these instructions to bidders.

17.2 The bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the bidder. All pages of the bid where entries or amendments have been made shall be initialed by the person or persons signing the bid.

17.3 The bid shall contain no alterations or additions, except those to comply with instructions issued by the employer or as necessary to correct errors made by the bidders. The corrections shall be initialed by the persons or persons signing the bids.

17.4 All pages of Bid document shall be signed.

18.0 Sealing and Marking of Bids:
18.1 The bidder shall seal the bid in the envelopes duly marked with “Bid for WTP&STP”.
18.2 Envelope “A” The original earnest money deposit and qualifying Documents along with volume -1 including Schedule 1 to 7 in envelope “A’ (EMD + RFQ - original)
18.3 Envelope “B” The bidder shall seal the original Technical Bid and Methodology in envelope “B” (technical bid).

Conditions of Contract & Drawings (Volume -2)
Any other documents required to be submitted by the bidders in accordance with these instructions.

18.4 Envelope “C” The bidder shall seal the original financial bid documents as detailed below in envelope “C” (financial bid).
Financial bid form duly signed (Volume -3)

18.5 The envelopes A, B, C and outer envelope Shall be addressed to the employer at the following address:
And bear the following identification:
Envelope “Bid for WTP&STP”.
Director (GA)
Food Safety and Standards Authority of India,
FDA Bhawan, Kotla Road,
New Delhi-110002

18.6 DO NOT OPEN BEFORE 15:00 Hrs on 12.10.2015

18.7 The inner envelope shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared “late” pursuant to clause 20.0 of ITB or for any other reason.

18.8 If the envelope is not sealed and marked as above, the employer will assume no responsibility for the misplacement or premature opening of the bid

SUBMISSION OF BIDS

19.0 Due Date for Submission of Bid:
19.1 Bids must be received by the Employer at the office address of Food Safety and Standards Authority of India, New Delhi specified above not later than 13,00 hrs on 12.10.2015 in the event of the specified date for the submission of bids being declared a holiday, the bids will be received up to the appointed time on the next working day

19.2 The employer may extend the deadline for submission of bids by issuing an amendment in accordance with clause 10.0, of ITB in which case all rights and obligations of the employer and bidders, subjected to the previously original deadline will then be subjected to the new deadline.

20.0 Late Bids
20.1 Any bid received by the employer after the due date prescribed in clause 19.0 of ITB will be summarily rejected and returned un-opened to the bidder.

21.0 Modification and Withdrawal of Bids:
21.1 Each bidder's modification or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance to clause 17.0 and 18.0 of ITB and with the outer and inner envelopes additionally marked “MODIFICATIONS” or “WITHDRAWAL” as appropriate.

21.2 No bid may be modified after the deadline for submission of bids.

21.3 Withdrawal or modification of a bid by the bidder on his own between the deadline for submission of bids and the expiration of the original period of bid validity
specified in the form of bid may result in the forfeiture of the earnest money deposit pursuant to clause 16. of ITB. However, this shall not apply to modification carried out during negotiation.

22.0 **Bid Opening:**

22.1 The Envelope “A” containing the earnest money deposit and RFQ documents / Qualifying documents shall be opened first and evaluated as per clause 13 of ITB. Hereafter, the envelope “B” containing Technical Bid and Methodology shall be opened and evaluated in case of Agencies who fulfill the eligibility criteria. The employer will then open the Financial bids (Envelope “C”) including modifications made pursuant to clause 21.0 of ITB in the presence of the bidders or their representatives who choose to attend the bid opening. The date & time of opening of financial bid shall be communicated to the eligible bidders separately. In the event of the specified date for the opening of bids being declared as holiday, the bid will be opened at the appointed time and location on the next working day.

22.2 Envelopes marked “WITHDRAWAL” shall be opened and read out first. Bids, for which an acceptable notice of withdrawal has been submitted, pursuant to clause 21.0, of ITB shall not be opened.

22.3 The bidder’s names, the bid prices, the total amount of each bid, any discount, bid modifications and withdrawal, the presence or absence of earnest money deposit, and such other details as the employers may consider appropriate, will be announced by the employer at the time of the opening.

22.4 The employer’s representative shall prepare the minutes of the bid opening including the information disclosed to those present in accordance with sub clause 22.3 of ITB.

23.0 **Process to be Confidential:**

23.1 Information relating to the examination, clarification, evaluation and comparison of bid and recommendations for the award of contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful bidder has been announced. Any effort by bidder to influence the employer’s processing of bids or award decisions may result in the rejection of his bid.

24.0 **Clarification of Bid:**

24.1 To assist in the examination, evaluation and comparison of bids, the employer may, at his discretion, ask any bidder for clarification, including breakup of unit rates. The request for clarification and the response shall be in writing but no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by the employers at the time of evaluation of the bids in accordance with clause 26 of ITB.
25.0 **Examination of Bids and Determination of Responsiveness:**

25.1 Prior to the detailed evaluation of bids the employers will determine whether each bid:

a) Has been properly signed;

b) Meets all the requirements of the bidding documents including EMD;

c) Provides any clarifications and/or substantiations that the employers may require.

25.2 A substantially responsive bid is one, which conforms to all the terms, conditions and specifications of the bidding documents, without material deviation or reservations. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality or performance of the work (b) which limits in any substantial way, inconsistent with bidding documents, the employer’s rights or the bidder’s obligations under the contact or (c) whose rectification would affect unfairly the competitive positions of other bidders presenting substantially responsive bids.

25.3 If a bid is not substantially responsive, it will be rejected by the employer and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.

26.0 **Correction of Errors**

26.1 Bids determined to be substantially responsive will be checked by the employer for any arithmetic errors. Errors will be corrected by the employers as follows:

a) Where there is a discrepancy between the amounts in figures and in words the amount in words will govern.

b) The amount stated in the bid will be adjusted by the employer in accordance with the above procedure for the correction of errors and shall be considered as binding price of the bidder. If the bidder does not accept the corrected amount of bid, his bid will be rejected, and the bid security may be forfeited in accordance with sub clause 16.4 of ITB.

27.0 **Evaluation and Comparison of Bid:**

27.1 The employer shall evaluate and compare the bids which are determined to be substantially responsive in accordance with clause 25.0 of ITB.

27.2 In evaluating the bids, the employer shall determine for each bid, the evaluated bid price by adjusting the bid price as follows:

a) Making any correction for errors pursuant to clause 26.0 of ITB or

b) Making any appropriate adjustment for any other discount or other price modifications offered in accordance with sub clause 21.0 of ITB

c) The total cost of quoted price of shall be worked out for evaluation of lowest bidder.

27.3 The employer reserves the right to accept or reject any variation, deviation or alterative offer and other factors, which are in excess of the requirements of the bidding documents or otherwise result in unsolicited benefits for the employer shall not be taken into account in bid evaluation.
27.4 If the bid of the successful bidder is seriously unbalanced in relation to the employer’s estimate of the cost of work to be performed under the contract, the employer may order the bidder to produce details, and produce price analysis for any or all items of the bill of quantities to demonstrate the internal consistency of those prices with the construction methods and schedule proposed.

28.0 Award of Contract:
Subject to clause 29.0 of ITB, the employer will award the contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and who has offered the lowest evaluated bid price.

29.0 Employer’s right to accept any Bid or to reject any or all Bids:
Notwithstanding clause 28.0 of ITB, the employer does not bind itself to accept the lowest bid and reserves the right to accept or reject any bid or even the bidding process and reject all bids, at any time prior to the award of contract, without assigning any reason and, 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 the employer’s action.

30.0 Notification of Award and Signing of Agreement:
30.1 The bidder whose bid has been accepted will be notified of the award by the employer prior to expiration of the bid validity period and confirmed by registered letter. This letter (hereinafter and in the general condition of contract called the “letter of acceptance”) will specify the sum that the employer will pay for the completion of the works by the contractor as prescribed by the contract (hereinafter and in the contract called “contract price”)
30.2 The notification of award will constitute the information of the contract.
30.3 The final agreement will incorporate all the agreements/documents agreed between the employer and the successful bidder. It will be signed by the successful bidder in the presence of employer within 30 days of issue of acceptance letter along with the deposition of performance guarantee.
30.4 After the award of work to the successful bidder and signing of the agreement, the employer will promptly notify the other bidders that their bids have been unsuccessful and their EMD shall be returned.

31.0 The work as described shall be governed by the terms and condition as given in volume-2.
32.0 The eligibility criteria documents shall also be part of contract agreement
33.0 All additional papers submitted by the bidders should be machined numbered.
34.0 Other details can be seen in the detailed bid documents. The bidders may obtain further information if required from the office of employer.

35.0 Key Dates:
35.1 The Contractor is strictly advised to follow dates & times as indicated in the BID document.
**STRUCTURE AND ORGANIZATION**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1. Name of Company______________________________</td>
<td>Registered address______________________________</td>
</tr>
<tr>
<td></td>
<td>Telephone Number______________________________</td>
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<tr>
<td></td>
<td>Fax Number______________________________</td>
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<tr>
<td>2. Description of the company of experience as a AC Contractor</td>
<td></td>
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<tr>
<td>3. Number of years of experience as a Contractor</td>
<td></td>
</tr>
<tr>
<td>4. Number of years of experience as a Sub-Contractor</td>
<td></td>
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<tr>
<td>5. Names of members of Board of Directors / Proprietor</td>
<td></td>
</tr>
<tr>
<td>6. Attach a company organization chart</td>
<td></td>
</tr>
<tr>
<td>7. In which field of construction / Engineering construction do you claim specialization &amp; Interest</td>
<td></td>
</tr>
</tbody>
</table>

**Signature with Seal of the Company**

(Title/Designation)

Enclosures to be provided:

1) Attach copies of original document:
   a) Applicant's legal status
   b) Principal place of business
   c) The place of incorporation (for applicant who are corporation), the place of registration and nationality of the owner (for applicant who is partnership or individually owned firms).

2) Power of attorney or authority to sign.

3) Latest brochures and technical literature.
## FINANCIAL CAPABILITY

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>2012-13</th>
<th>2013-14</th>
<th>2014-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Total Asset</td>
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<td>2.</td>
<td>Current Asset</td>
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<td>3.</td>
<td>Total Liability</td>
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<td>4.</td>
<td>Current Liability</td>
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<tr>
<td>5.</td>
<td>Net Worth (1-3)</td>
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<tr>
<td>6.</td>
<td>Working Capital</td>
<td></td>
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<tr>
<td>7.</td>
<td>Annual Turnover</td>
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<tr>
<td>8.</td>
<td>Construction Services related turnover</td>
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<tr>
<td>9.</td>
<td>Profit before Taxes</td>
<td></td>
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<tr>
<td>10.</td>
<td>Profit after Taxes</td>
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</tbody>
</table>

A Enclosures to be provided:

1. Attach copies of audited financial statement of the last three financial years.
2. Details of construction services related turnover

Signature with Seal of the Company
(Name of the Authorized Signatory)
Title/Designation

Firms owned by individuals, partnership, may submit their balance sheets certified by the registered Chartered Accountant, and supported by the copies of tax return, if audits are not required by the laws of their countries of origin.

**Note**: *(The following information is mandatory)*

i. The average annual financial turnover during the last 3 years ending 31st March of previous financial year should clearly be indicated.

ii. Audited Annual Report including profit and Loss account for last three financial years.
### PERSONNEL CAPABILITIES / PROFESSIONAL STAFF WITH THE ORGANIZATION

<table>
<thead>
<tr>
<th>Name &amp; Designation</th>
<th>Age</th>
<th>Years with Firm</th>
<th>Qualification and Date Attained</th>
<th>Affiliation with Professional Bodies / Date Attained</th>
<th>Years of Experience</th>
<th>Total Experience</th>
<th>Experience Relevant to this Project</th>
</tr>
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<tbody>
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</tbody>
</table>

Signature with Seal of the Company  
(Name of the Authorized Signatory)  
Title/Designation
## WORK EXPERIENCE

LIST OF RELEVANT PROJECTS (ON THE BASIS OF WHICH ELIGIBILITY IS SOUGHT).

<table>
<thead>
<tr>
<th>Name of Employer /Client</th>
<th>Name, Location, Nature &amp; Discipline of Work</th>
<th>Contract Price in Indian Rs.</th>
<th>Percentage of Participation of the Company</th>
<th>Contractual Date of Commencement of Construction</th>
<th>Contractual Date of completion of Work</th>
<th>Actual Date of Start of Work</th>
<th>Actual Date of Completion of Work</th>
<th>Reason for Delay in Completion, if any</th>
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<tbody>
<tr>
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Signature with Seal of the Company  
(Name of the Authorized Signatory)  
Title/Designation

**Note:**
1. Certificates from the employers are to be attached in respect of the information furnished.
## SCHEDULE 4A

LIST OF RELEVANT COMPLETED PROJECTS OF SIMILAR NATURE IN LAST 5 YRS. (30 point scale)

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Works Involved</th>
<th>Name of Client</th>
<th>Contract Value</th>
<th>Date of Commencement of Works</th>
<th>Due Date for Completion</th>
<th>Actual Date of Completion</th>
<th>Percentage-wise Completion upto due date</th>
<th>Expected Date of Completion</th>
</tr>
</thead>
<tbody>
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</table>

Signature with Seal of the Company
(Name of the Authorized Signatory)
Title/Designation
SCHEDULE 5

INFORMATION REGARDING CURRENT LITIGATION OF APPLICANT OR ABANDONMENT OF WORK BY APPLICANT

1. a) Is the applicant currently involved in any arbitration /litigation to the contract works
   b) If yes, give detail

2. a) Has the applicant or any of its constituent partners failed to complete any contract work in India during the last 5 years due to any reason
   b) If yes, give detail

Note: If any information in this schedule is found to be concealed, participant of applicant will be summarily rejected at any time,

The applicant is supposed to fill-up the correct details of arbitration / litigation during last five years with their outcome.

<table>
<thead>
<tr>
<th>Details of Dispute</th>
<th>Year</th>
<th>Award for or Against Applicant</th>
<th>Name of Client, Cause of Litigation and matter of dispute</th>
<th>Current Value of Disputed Amount</th>
<th>Actual Awarded Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Signature with Seal of the Company
(Name of the Authorized Signatory)
Title/Designation
SCHEDULE 6

AFFIDAVIT (NJSP Rs. 3/-)

1. I, the undersigned, duly authorized on behalf of Company / firm hereby certify that all the statement made in the required attachments are true and correct to the best of my knowledge.

2. The undersigned hereby authorize(s) and request(s) any bank, person, firm or corporation to furnish pertinent information deemed necessary and requested by the Employer to verify this statement or regarding my (our) competence and general reputation.

3. The undersigned agrees to furnish any information / clarification that may be asked for by the employer.

4. The undersigned hereby certify that the Co/firm has never been black listed or debarred by any Government, Semi Government or any other agency

Signature with Seal of the Company
(Name of the Authorized Signatory)
Title/Designation

Note: Enclose requisite Power of Attorney of Authorized Signatory
SCHEDULE 7

ADDITIONAL INFORMATION

Following additional information may be supplied along with your

c) Registration of company, partnership deed, Article of association, Registration under labour law, Registration under sales tax act.

2. EPF No., PAN No and Service Tax No. etc.

3. Details of available site testing equipments.

d) Details of possession of Electrical License from Chief Electrical Inspector of the state for execution of High Tension line Network.

Please add any further information, which you consider to be relevant to the evaluation of your application. If you wish to attach other document please list below, otherwise state “not applicable”

Signature with Seal of the Company
(Name of the Authorized Signatory)
**CHECKLIST ON PREPARATION OF BIDS**

<table>
<thead>
<tr>
<th>No.</th>
<th>Details</th>
<th>Yes / No</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Enclose DD for Rs. 1,000/- in favour of Sr. Account Officer, FSSAI for the cost of Tender Documents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02.</td>
<td>DD for Rs. 130,000/- in favour of Sr. Account Officer, FSSAI towards EMD.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03.</td>
<td>Enclosed Schedule – 1: Structure and Organization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.</td>
<td>Enclosed Schedule – 2: Financial Capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05.</td>
<td>Enclosed Schedule – 3: Personnel Capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>06.</td>
<td>Enclosed Schedule – 4: Work Experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.</td>
<td>Enclosed Schedule – 5: List of relevant Completed Projects of similar nature in last 05 years</td>
<td></td>
<td></td>
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<tr>
<td>08.</td>
<td>Enclosed Schedule – 6: Affidavit</td>
<td></td>
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<tr>
<td>09.</td>
<td>Enclosed Schedule – 7: Additional information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Have you filled in and signed the Bid Form in the letterhead?</td>
<td></td>
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</tr>
<tr>
<td>11.</td>
<td>Have you read and understood all the terms and conditions of the tender document / contract and shall abide by the?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Have you enclosed the EMD of Rs.130,000/- in the Technical Bid?</td>
<td></td>
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<tr>
<td>13.</td>
<td>Have you attached proof of having met the following minimum eligibility criteria?</td>
<td></td>
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<tr>
<td>14.</td>
<td>Legal Valid Entity: Have you attached attested Certificate?</td>
<td></td>
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<tr>
<td>15.</td>
<td>Financial Capacity: Have you attached Audited Balance Sheets showing minimum turnover in the similar business?</td>
<td></td>
<td></td>
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<tr>
<td>16.</td>
<td>Registration with Government Bodies like PAN, Service Tax: Have you attached a Registration copy of each of the certificate?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Experience: Have you attached the attested experience certificates issued by the Government Departments of the last five years?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Have you attached the proof of authorization to sign on behalf of the bidder in the Technical Bid?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Have your Technical Bid been packed as per the requirements of the Tender?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FINANCIAL BID**

| 20.  | Have your financial Bid proposal is duly filled, sealed and signed on all pages? |          |         |
| 21.  | Have you quoted prices against each of the category?                      |          |         |
| 22.  | Have your financial bid been packed as per Tender?                         |          |         |

I / We hereby declare that the information furnished above is true and correct.

Signature with Seal of the Company

(Name of the Authorized Signatory)
CONDITIONS OF CONTRACT

Supply, installation testing and commissioning of WATER TREATMENT PLANT AND SEWAGE TREATMENT PLANT Works complete in all respect for Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi.
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Section No.</th>
<th>Description</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Section -1</td>
<td>PART – I: GENERAL CONDITIONS OF CONTRACT:</td>
<td>33</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>APPENDIX -I : SUMMARY OF SALIENT ASPECTS</td>
<td>61</td>
</tr>
<tr>
<td>3</td>
<td>Section – 1</td>
<td>PART – II: GENERAL CONDITIONS OF CONTRACT:</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Section – 1</td>
<td>PART – III: SPECIAL CONDITIONS FOR SUBMISSION OF BIDS</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>Section – 2</td>
<td>FORMS SECURITIES &amp; RATE ANALYSIS</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>APPENDIX –A: BID SECURITY FORM (BANK GURANTEE)</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>APPENDIX -B : PERFORMANCE SECURITY FORM</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>APPENDIX -C : ADVANCE PAYMENT SECUTIRY FORM</td>
<td>77</td>
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<td>Section – 3</td>
<td>TECHNICAL SPECIFICATIONS</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>Section – 3.1</td>
<td>WATER TREATMENT PLANT WORKS</td>
<td>79</td>
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<td></td>
<td>Section – 3.2</td>
<td>SEWAGE TREATMENT PLANT WORKS</td>
<td>113</td>
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<tr>
<td></td>
<td>Section- 4</td>
<td>SCHEDULE OF WORKS</td>
<td>124</td>
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<tr>
<td></td>
<td>Section- 5</td>
<td>WORK PROGRAMME</td>
<td>139</td>
</tr>
</tbody>
</table>
SECTION - I

GENERAL CONDITIONS

OF

CONTRACT (GCC)

PART - I
GENERAL CONDITIONS OF CONTRACT: PART - I

1. DEFINITIONS

The following terms shall have the meaning hereby assigned, to them except where the context otherwise requires:

a) Employer/Owner, means Food Safety and Standards Authority of India or his Authorized Representatives.

b) Architect/Consultant, shall be the person duly appointed by the Employer to act as "Architect/Consultant" for the purpose of the contract.

b1) Consultants shall be the person to act as Consultant for the purpose of the contract.

c) Contractor shall mean the successful tenderer to whom the contract, has been awarded.

d) Sub-contractor shall mean the person named in the contract for any part of the work or any person to whom part of the Contract has been sublet with the consent in writing by the Architect/Employer and the legal representative/s, successor/s and assignee/s of such person.

e) Contract shall mean and include the following:
   i) General Conditions of Contract
   ii) Technical Specifications
   iii) Bill of Quantities
   iv) Tender Drawings

f) Site, shall mean the actual place in, over or under which work is to be done, allotted by the Architect/Employer for Contractor's use.

g) Work
   The term "Work" means the work which is undertaken by the Contractor pursuant to the Contract. Work includes but is not necessarily limited to the furnishing of all materials, labour, equipment, supplies, plant tools, scaffolding, transportation, superintendence, temporary construction of every nature, taxes, work contract tax, excise, octroi, insurance, water, electricity and all other services and facilities necessary for the full performance and completion of the requirements of the contract.

h) Contract Price, shall mean the sums preferred to in the formal agreement, if any or the work order.

i) Employer’s designated representative
   The term "Employer’s designated representative" and or Employer’s Representative means Architect/ Employer's designated representative engaged at site of work who may, for the time being be the executive in-charge of executing the work or of any portion of such work.
j) Act of Insolvency
The terms "Act of Insolvency" means any act of insolvency as defined by the Presidency Towns Insolvency Act or the Provincial Insolvency Act or any amending statute.

k) Market Rate:
   i) Materials: Rates as decided by Employer's designated representative which include taxes, octroi, transport and any other handling charges.
   ii) Labour: As per Local Administration labour rates notified and fixed from time to time.

l) Day: A "Day" shall mean a day of 24 hours from midnight to midnight irrespective of the number of hours worked in that day.

m) Week: A "Week" shall mean seven days without regard to the number of hours worked in any day in the week.

n) Month: A "Month" shall mean a month of 30 days without reference to the number of days worked during this period.

o) Temporary Works: "Temporary Works" shall mean all temporary works of every kind required in or about the execution, completion or maintenance of tendered works.

p) Urgent Works: "Urgent Works" shall mean any urgent measures which in the opinion of the Employer's designated representative, become necessary during the progress of the works to obviate any risk of accident or failure or which become necessary for security for completing the overall project within the stipulated time.


r) Singular or Plural / Typographic Errors: Where the context so requires, words implying the singular only also includes the plural and vice versa. Words implying persons include persons and corporations. Typographic or spelling errors shall not be cause to vitiate the contract.

2.0 ASSIGNMENT AND SUB-LETTING

2.1 Assignment:
The Contractor shall not assign the contract or any part thereof or any benefit therein or thereunder without the written permission of the Architect/Consultants/Employer.
2.2 Sub-letting

The Contractor shall not sub-let the whole of the contract. The Contractor shall not sublet any part of the works without the written consent of the Architect/Consultants and the Employer and such consent if given, shall not relieve the Contractor from any liability or obligation under the contract and the Contractor shall be responsible for the acts, defaults and neglects of the Sub-contractor, his agents, employees or workmen as fully as if they were the acts defaults or neglects or the Contractor or his agents, servants, or workmen.

2.3 Changes in Contractors Constitution

Where the Contractor is a partnership, prior approval in writing shall be obtained from the Employer before any change is made in the CONSTITUTION of the partnership.

Where the Contractor is an individual or a Hindu undivided family business, such written approval from Employer shall likewise be obtained before Contractor enters into any partnership agreement in which the partnership would have the right to carry out the work previously to be undertaken by the Contractor.

If such written prior approval is not obtained by the Contractor, the contract shall be deemed to have been assigned in contravention of article 2. Paragraph 1 of these general conditions of contract, and the same action taken and consequences ensue, as provided for under article 8 paragraph 1 of said general conditions of contract.

3.0 DRAWINGS

3.1 Issue of Drawings

Two copies of drawings and specifications duly approved for construction will be issued free of charge to the Contractor progressively during the contract period and the Contractor shall arrange for the execution of the works and the procurement of materials accordingly. The Contractor shall give adequate notice in writing to the Architect/Consultants or his Representative of any further drawings or specifications that may be required for the execution of the works or otherwise under the contract.

3.2 Copies of Drawings for Site

One copy of the drawings furnished to the Contractor as aforesaid shall be kept at the site and the same shall at all reasonable times be available for inspection and use by the Architect/Consultants/Employer or his Representative and by any other person authorized by the Architect/Consultants in writing. The Contractor may request for additional copies the cost of which shall be to his account.

3.3 Issue of Further Drawings and Instructions

The Architect/Consultants/Employer shall have full power and authority to supply to the Contractor from time to time through his representative, during the progress of the works such further drawings and instructions as shall be necessary for the purpose of proper and adequate execution and maintenance of the works and the Contractor shall carry out and be bound by the same.
3.4 Ownership of Drawings

All drawings supplied to the Contractor are deemed to be the property of the Architect/Consultants. The Contractor agrees both on behalf of himself and his employees, and sub-contractors, whether during or after completion of the contract not to divulge or use, except for the purpose of this contract, any information contained in the drawings.

3.5 Execution as per Drawings

The Contractor must not vary or deviate from the drawings in any respect while executing the work or executing any extra work of any kind whatsoever unless advised by the Architect/Consultants/Employer.

3.5.1 Shop Drawings / Product Data / Samples

Contractor shall submit to Architect/Consultants through Employer’s designated representative any/all shop drawings required to be produced by him as described in the contract documents or as may be necessary for the furtherance of his work.

All submittals shall show design, dimensions, connections, and all other details consistent with the requirements of the contract documents, and shall show adjoining works in sufficient detail as to ensure proper co-ordination therewith and connection there to.

Upon receipt of shop drawings, product data and/or samples Architect/Consultants shall review and approve or otherwise, but only for conformance with the design concept of the work and the information given in the contract documents.

Architects/Consultants approval of the specific item shall not be construed as approval of an assembly of which it may be a component. Contractor is deemed to have included for the cost of all shop drawings/product data sheets/samples, in his tender. - See also article 9 of Notice Inviting Tenders.

3.5.2 As Built Drawings

Contractors shall maintain adequate records of all changes to the works as shall from time to time be required by the Architect/Consultants and/or Employer. Contractor shall prepare accurate and complete as built drawings of the work as constructed. Such drawings shall include all concealed construction, field changes, and other details not indicated in initial Contract Drawings.

Contractor shall supply one (1) reproducible and four (4) blue prints of each as built drawing, through the Employer’s designated representative, to the Architect/Consultants.

Final payment to Contractor shall depend in part upon receipt and approval of all necessary as built drawings.

Contractor is deemed to have included for the cost of production of as built drawings in his tender.
4.0 GENERAL OBLIGATIONS

4.1 Site and Local Conditions
By executing the contract, the Contractor represents that he has visited the site of the proposed work, fully acquainted and familiarized himself with the conditions as they exist and the character of the operations to be carried out under the proposed Contract and made such investigations as he may deem fit so that he shall fully understand the facilities, physical conditions and restrictions attending the work under the Contract. The Contractor also agrees that he has carefully examined the drawings, specifications and associated documents and the site, and that from his own investigation he has satisfied himself as to the nature and location of the work, the general and local conditions, and all matters which may in any way affect the work or its performance, and that as a result of such examination and investigation he has fully understood the intent and purpose of the contract documents. Claims for additional compensation or extension of time because of Contractor’s failure to follow the foregoing procedure and to familiarize himself with the Contract Documents and all conditions which might affect the work shall not be allowed.

4.2 Sufficiency of Tender
The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the rates and prices stated in the priced bill of quantities and the schedule of rates and prices, if any. The tender rates and prices shall cover all his obligations under the Contract and all matters and things necessary, for the proper completion and maintenance of the work.

4.3 Clarification Before Submitting Tenders
Should the Contractor notice any discrepancy or error in the statement made, or quantities or units shown against items, he shall immediately bring same to the notice of the authorities and obtain clarification before submitting the tender. The tender shall be based on such clarifications received and shall be recorded as such in the covering letter to the tenderer, failing which the Employer shall have the right to ask the Contractor to execute the work according to the statement made or quantities or units shown in the tender, without any compensation.

4.4 Rates Quoted for Finished Work
The rates quoted in the tender by the Contractor must be for the finished work as per the Contract Documents.

4.5 Location of Work
Unless specifically mentioned in the items, the work described therein may be at any location or elevation.
4.6 **Programme of Work**

Within Seven (7) days of the award of contract, the Contractor shall submit to the Employer’s designated representative for his approval a program to accord with the planned completion of the whole job showing the order of procedure and method in which he proposes to carry out the works and shall whenever required by the Employer’s designated representative furnish further detailed programs and particulars in writing of the Contractor’s arrangements for carrying out the works and of the construction, plant and temporary works which the Contractor intends to supply, use or construct as the case may be. The submission to, and approval, if any, by the Employer’s designated representative of such programs or particulars shall not relieve the Contractor of any of his duties or responsibilities under the contract.

4.7 **Contractors Employees**

The Contractor shall provide and employ at site in connection with the execution and maintenance works;

a) A full time Sr. Engineer assisted with a team of Competent Engineers, Quantity Surveyor etc.

b) Only such technical assistants as are skilled and experienced in their respective callings and such subagents, foreman and leading hands as are competent to give proper supervision to the work they are required to supervise and,

d) The Contractor shall employ labour in sufficient number and skill, either directly, or where permitted and approved in advance, through Sub-contractors, to meet the required rate of progress and quality, and to the satisfaction of the Employers Representative.

4.8 **Removal of Workmen**

The Architect/Consultants/Employer’s designated representative shall be at liberty to object to and require the Contractor to remove forth with from the works any person employed by the Contractor in or about the execution or maintenance of the works who in the opinion of the Architect/Consultants/Construction Manager misconducts himself or is incompetent or negligent in the proper performance of his duties or whose employment is otherwise considered by the Architect/Consultants/Construction Manager to be undesirable and such person shall not be again employed upon the works without the written permission of the Architect/Consultants/Construction Manager. Any person so removed from the works shall be replaced by the Contractor without delay by a competent substitute approved by the Architect/Consultants/Employer’s designated representative.

4.9 **Communication to be in Writing**

All references, communications, correspondence made by the Architect/Consultants and Employer representative or the Contractor concerning the works, shall be in writing and no reference, communication, or complaint which is not in writing, shall be recognized. All such communications shall be directed in the first instance through the Employer’s designated representative at the Project Office.
4.10 Occupation and use of land

No land, building belonging to, or in the possession of, the Employer shall be occupied by the Contractor. The Contractor shall not use, or allow to be used, the site for any purpose other than that for executing the works.

4.11 Contractors Site Office/Stores

Any Site Office or shed, proposed to be temporarily constructed by the Client for his office work, storage of materials etc. shall conform to the standard sketch, or to the plan approved by the Architect/Consultants. Permission for the Construction of such office or shed shall be obtained in writing, as its location on Site.

4.12 Materials Tools and Plant

All materials required for the execution of the works shall be supplied by the Contractor. All direct/indirect costs associated therewith are deemed included in Contractors tender. Materials so supplied shall have the approval of the Architect/Consultants before incorporation within the works, and shall be in entire conformity with all relevant specifications.

Rejected materials shall be removed at once from the Site of work at Contractors Cost.

Contractor shall supply all Tools, Tackle and equipments required for the safe and effective execution of the works.

No claims for delay or additional costs shall be allowed arising out of Contractor’s failure to supply or obtain timely approval for his materials, or for their insufficiency or unavailability.

4.13 Tollages etc.

The Contractor shall pay all tollages and other royalties, rent and other payments or compensations, if any, arising out of obtaining materials required for the works.

4.14a Setting Out

The Contractor shall be responsible for the true and proper setting of the works and for correctness of the position, levels, dimensions, and alignment of all parts of the works and for the provisions of all necessary instruments, appliances, and labour in connection there with. If at any time during the progress of the works any error shall appear or arise in the position, level, dimensions or alignment of any part of the works, the Contractor on being required so to do by the Architect/Consultants or his representative, shall at his own cost rectify such error to the satisfaction of the Architect/Consultants or his representative. The checking of any setting out or of any line or level by the Architect/Consultants or his representative shall not in any way relieve the Contractor of his responsibility for the correctness thereof. The Contractor shall provide all necessary instruments, appliances, and labour required by the Architect/Consultants or his Representative for checking, if any, of the setting out. The Contractor shall carefully protect and preserve all bench marks, site levels, pegs and other things used in setting out of the works. The rates quoted for the work shall also include the cost of all reference and level pillars and their dismantling when no longer required.
4.14b Field Dimensions

Before ordering any materials or doing any work, the Contractor shall verify the pertinent field dimensions for the project and shall be responsible for the correctness of same. No extra charge or compensation will be allowed on account of differences existing between actual dimensions and dimensions indicated on the Drawings. Any differences which may be found shall be submitted to the Consultant for consideration before proceeding with the work.

4.15 Damage to Persons and Property

The Contractor shall indemnify and keep indemnified the Employer against all losses and claims for injuries or damages to any person or property whatsoever which may arise out of or in consequence of the construction and maintenance of works and against all claims, demands, proceedings, damages, costs, charges, expenses whatsoever in respect thereof in relation thereto.

4.16 Co-ordination /Co-operation with other Contractors

The Contractor shall co-operate with the work of other agencies or contractors that may be employed or engaged by the Employer in so far as it relates to the Contractor's work. The sequence of work shall be so arranged that the works of other agencies are enabled to progress simultaneously and in a coordinated manner.

In the event of confliction, the decision of the Employer's designated representative shall be final and binding.

4.17 WATCHING AND GUARDING

The Contractor shall provide and maintain at his own expense, all lighting, guards, fencing, warning notices, and watching wherever and whenever necessary to ensure the safe and effective prosecution of the works, or as required by the Employer's designated representative, and to ensure the safety of all persons employed on the work in whatever capacity, all visitors to the works, and members of the General Public within or adjacent to the works. Any instruction /requirement of the Construction Manager with regard to safety shall not relieve Contractor of his absolute responsibility under this or any other relevant contract condition.

4.18 PROTECTION OF UNDERGROUND SERVICES

The Contractor must make himself aware of the location of and take all precautionary measures to protect existing and new underground and other service lines, (viz. cables, water and sewer lines etc.) and carry out any specific instructions which may be given in this regard by the Architect/Consultants. Should Contractor damage such existing service/s, he shall rectify said damage in a manner to be agreed with the respective Consultant /Statutory Authority and at no cost to the Owner. The contractor shall submit plans for existing and re-routed services.
4.19 **DE-WATERING TRENCHES AND PITS**

The tendered rate shall be deemed to have taken into account the cost of removal of silt and materials that may slip into the trench and/or pit and de-watering the trenches or pits of water accumulated or collected through seepage or subsoil water or rain water. The Contractor shall in no case be entitled to claim any extra amount for the above work. The Contractor shall remain prepared with necessary pumps and equipment for de-watering the trenches or pits so as to avoid unnecessary delay and possible damage to property etc. Any removal / replacement / re-compaction of soils is deemed to have been included in the tender price.

4.20 **WORK IN OR AROUND OPERATING PLANT OR OFFICES ETC.**

Where the work is being carried out in or around an operating plant where the plant must run uninterrupted, the Contractor shall work only at specified places and times as mutually arranged between the Contractor and Architect/Consultants. Similar arrangements must be made while executing works inside the offices, buildings etc., so as not to cause disturbance to the office work. Due to this, work may be required to be done during off-hours and Sundays. No extra will be allowed beyond the rates quoted for doing work in the manner described above.

4.21 **WORK IN SHIFTS AND OFF-DAYS**

The Contractor shall work in one or more shifts as well as Sundays and holidays to complete the work in time, if so required by the Architect/Consultants for which the Employer shall not be liable to pay any extra.

4.22 **SITE ORDER BOOK**

A site order book must be maintained and always be available at site to record the instructions of the Architect/Consultants or his Representative. The Contractor must see that the instructions noted therein are properly carried out.

4.23 **CONTRACT SIGNING**

After acceptance of the tender, the tenderer shall sign the necessary contract papers within 10 days of the intimation. Expenses for the agreement including cost of stamp papers etc. shall be borne by the Contractor.

4.24 **SITE TO BE KEPT CLEAR**

Contractor shall be entirely responsible for prompt removal from site of all surplus excavated material, spoil, and debris / deleterious materials of whatever nature. This removal shall be carried out on a repetitive basis, and subject if necessary to the instructions of the Employer’s Representative. Said instructions shall be binding upon Contractor, but shall not relieve him of any of his obligations under the Contract. Contractor shall be responsible for selection of the place of disposal which shall be legally authorized for that purpose. Contractor shall defend, indemnify, and hold harmless the Employer from any and all loss, damages, expenses, fines, etc that Contractor may incur if in violation of such requirement. Contractor is deemed to have allowed for all associated costs in his tender.
4.25 CONFLICT IN MEANING BETWEEN SCHEDULES OF RATES AND SPECIFICATIONS

The Schedule of Rates shall be read in conjunction with the Specifications, and in the event of conflict in meaning between the two, the corresponding item in the Schedule shall always have precedence over the Specifications.

4.26 CONFLICT IN MEANING BETWEEN GENERAL CONDITIONS OF CONTRACT AND THE SPECIAL CONDITIONS

In case of any inconsistency between the General Conditions of Contract and the Special Conditions, the Special Conditions of Contract shall have precedence over the General Conditions.

4.27 CONTRACT DOCUMENTS COMPLIMENTARY

The Contract documents are complementary and are intended to include or imply all items required for the proper execution and completion of the work. That required by any one shall be as binding as if required by all. In the event there are any discrepancies between individual documents / article/s, then whichever is the more stringent shall prevail. Any errors in description, quantity, or rate shall not vitiate the Contract or release the Contractor from the execution of the whole or any part of the work comprised therein, or any of his obligations under the Contract.

4.28 ADMINISTRATION – ARCHITECT/CONSULTANTS AND EMPLOYERS REPRESENTATIVE

The Employer’s Representative will provide administration of the Contract as hereinafter described;

The Architect/Consultants will be the Employers Representatives during construction and until the final completion of the project. They will advise and consult with the Employer. All instructions to the Contractor shall be forwarded by the EMPLOYER’S DESIGNATED REPRESENTATIVE. The Architect/Consultants each will have the authority to reject the Contractor’s work which does not conform to the Contract documents and to call for any necessary inspection and testing. The Employer's designated representative will determine in general whether the work of the Contractor is being performed in accordance with the Contract documents. The Architect/Consultants, the Employer's designated representative and the Employer shall at all reasonable times have free access to the work and/or to the workshops, factories or other places wherever work is in preparation or progress and also to any place where materials are located or from which they are being obtained, and the Contractor shall afford every facility to them and any of their representatives that may be necessary for inspection, examination and testing of the materials and workmanship. If the work is to be done at a place other than the site, the Contractor shall obtain the written permission of the Employer’s designated representative and the Architect/Consultants for doing so. With the exception of representatives of the Public Authorities, persons not concerned with Project and any other unauthorized person shall not be allowed on the project at any time without the written permission of the Employer's designated representative.

The Architect/Consultants will visit the site at regular intervals during construction and as warranted by the construction schedule to familiarize himself with the quality of the work and to determine in general if the work is proceeding...
in accordance with the drawings and the specifications. However, the Architect/Consultants will not make exhaustive or continuous onsite inspections to check the quality or quantity of the work, replacement of work.

Neither the Architect/Consultants nor the Construction Manager will be responsible for the acts, omissions or performance of any Contractor, it being expressly understood that neither the presence nor the absence of the Architect/Consultants or the Construction Manager on the job, shall relieve the Contractor from responsibility for compliance with Contract Documents, nor from responsibility for removal and replacement of work not in accordance therewith.

The Employer's designated representative will schedule and coordinate the work of all the Contractors on the project including their use of the site.

The Employer's designated representative will jointly record the measurement of works carried out by the Contractor in proper measurement books. The Contractors shall submit four copies of all their bills, including final bills, to the Employer's designated representative. After checking and verification, the Employer's designated representative will then make recommendations to the Architect/Consultants / Employer along with the amount due to the Contractor and will issue a Certificate of Payment incorporating such amount.

4.29 PATENT RIGHTS

The Contractor shall indemnify the Owner against all claims in respect of patent rights and shall defend all actions arising from such claims unless he has informed the Construction Manager before of any such infringement and received his permission to proceed, and shall himself pay all royalties, license fees, damages, costs and charges that may be legally incurred in respect thereof.

4.30 ARCHAEOLOGICAL ARTE FACTS / COINS / FOSSILS AND THE LIKE

Materials of any kind obtained from excavation on the site shall remain the property of Owner and shall be disposed of by the Contractor as the Employer's designated representative may direct. All fossils, coins articles or things of geological or Archaeological interest discovered on the site shall be the absolute property of the Owner. The Contractor shall take reasonable precautions to prevent his workmen or any other person from removing or damaging any such article or thing and shall immediately upon discovery thereof and before removal inform the Employer's designated representative of such discovery and carry out his directions as to the disposal of the same.

5.0 LABOUR

5.1 Labour Rules

The Contractor will make his own arrangement of keeping labour as it will not be possible for the Client to allow it to live at site. In respect of all labour directly or indirectly employed on the works by the Contractor, the Contractor shall comply with the provisions of the Contract Labour (Regulation and Abolition) Act 1970, Minimum Wages Act 1948, Payment of Wages Act 1936 and any amendments
thereof and all legislations and rules of the State and / or Central Government or other local authority, framed from time to time, governing the protection of health, sanitary arrangements, wages, welfare and safety for labour employed on building and construction works and for P.F., bonus, maternity benefits, retirement benefits including gratuity retrenchment/lay off compensation, and all other matters involving liabilities of Employers to Employees. The rules and the other statutory obligations with regard to fair wages, welfare and safety measures, maintenance of register etc. will be deemed to be part of the Contractors obligation under the contract. The Contractor shall indemnify the Employer against any payments to be made under the observance of the above regulations without prejudice to his right to claim indemnity from his Sub contractors.

The E.S.I (Employees State Insurance) charges shall be borne by the Contractor.

5.2 Accident Reporting

The Contractor shall be responsible for the safety of all employees and/or workers employed or engaged by him on and in connection with the works and shall forthwith report all cases of accidents to any of them, however caused and whenever occurring to the authorities concerned as required by law and to the Architect/Consultants / Employer’s designated representative and shall make every arrangement to render all possible assistance and aid to the victim of the accident.

5.3 Provision of Workmen’s Compensation Act.

The Contractor shall at all times indemnify and keep indemnified the Employer against all claims for compensation under the provisions of the workmen’s compensation act 1923, Apprentices Act 1961, Industrial Disputes Act 1947 and Miscellaneous Provisions Act 1952 or any other law for the time being and any Act and enactment relating thereto and rules framed under each of the above Acts from time to time and also meet all expenses, if any, required for the said compliance in force by or in respect of any workmen employed by the Contractor in carrying out the Contract and against all costs and expenses or penalties incurred by the Employer in connection there with. In every case in which, by virtue of the provisions of the said Act, the Employer is obliged to pay compensation to a workman employed by the Contractor in executing the works, the Employer shall recover from the Contractor the amount of the compensation so paid, and without prejudice to the rights of the Employer under the said Act. The Employer shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any monies due by the Employer to the Contractor, whether under this contract or otherwise without prejudice to any other remedy that may be available to the Employer in law. The Employer shall not be bound to contest any claim made against it under the said Act, except on the written request of the Contractor and upon his giving to the Employer full security for all costs for which the Employer might become liable in consequence of contesting such claim.

5.4 Accident or Injury to Workmen

The Employer shall not be liable for or in respect of any damages or compensation payable by law in respect of, or in consequence of any accident or injury to any workmen or other person in the employment of the Contractor or his Sub-contractor, and the Contractor shall indemnify and keep indemnified the Employer
against all such damages and compensation, and against all claims, demands, proceedings costs, charges and expenses whatsoever in respect thereof or in relation thereto.

5.5 **Provision of Mines Act**

The Contractor shall observe and perform all the provisions of the Mines Act 1952 where applicable, or any statutory modifications thereof and shall indemnify and keep indemnified the Employer from and against any and all claims, under the said Act.

5.6 **Preservation of Peace**

The Contractor shall take requisite precautions to prevent any riotous or unlawful behaviour by or amongst his workmen and / or others employed on the works by him, for the preservation of peace and protection of the inhabitants and security of property in the neighbourhood of the works.

5.7 **Age limits of Labour**

The age limit of employment of labour shall be in strict accordance with the existing labour regulations.

5.8 **Return of Labour Employed**

The Contractor, if required by the Construction Manager shall submit returns in such form and at such intervals as the Construction Manager may prescribe showing the number of different classes of labour employed on the works from time to time by the Contractor.

5.9 **Observance by Sub-contractors**

The Contractors shall be responsible for the observance of the provisions of aforesaid clauses by the Sub-contractors employed by him in the execution of the contract.

6.0 **MATERIAL TESTS AND WORKMANSHIP**

6.1 **Quality of Materials, Workmanship and Tests**

All materials and workmanship shall be of the respective kinds described in the contract and in accordance with the Architect’s/ Consultants or Employer’s designated representative instructions and shall be subjected from time to time to such tests as the Architect/ Consultants or Employer’s designated representative may direct at the recognized and approved testing laboratory, or on the site. The Contractor shall provide such assistance, instruments, machines, labour and materials, as are normally required for examining, measuring, and testing any work and the quality, weight or quantity of any material used, and shall supply samples of materials before incorporation in the works for approval as may be required by the Architect/ Consultants or Construction Manager.
6.2 **Construction of Prototypes or Samples of Work**

The Contractor shall construct prototypes or samples of work as laid down in the Contract, or as instructed by the Architect/Consultants. Such prototypes or samples of work, after approval by the Architect/Consultants/Employer shall serve as the standards to be achieved in the final construction.

6.3 **Cost of Samples**

All samples shall be supplied by the Contractor at his own cost.

6.4 **Cost of Tests**

i) The costs of all testing mandated by the Specifications shall be borne by the Contractor and are deemed to be included in his tender.

ii) Contractor shall take samples - where applicable - for said tests, from locations determined by the Employer’s designated representative and / or Architect/Consultants.

iii) At all times, Employer’s designated representative and / or Architect/Consultants shall be afforded the facility to witness such sample taking and testing.

iv) Results of tests shall be presented in written form, in duplicate, to the Employer’s designated representative.

6.5 **Inspection of Operation**

The Architect/Consultants/ Employer’s designated representative or any person authorized by them, shall at all times have access to the works and to the site and to all workshops and places where work is being prepared or where materials, manufactured articles or machinery are being obtained for the works; and the Contractor shall afford every facility for, and every assistance in obtaining such access.

6.6 **Examination of Work before Covering Up**

No work shall be covered up or put out of view without the approval of the Architect/Consultants / Employer’s designated representative and the Contractor shall afford full opportunity to them 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 Architects/Consultants/Employer’s designated representative wherever any such work or foundations is or are ready or about to be ready for examination and the Architects/Employer’s designated representative shall without unreasonable delay- unless he considers it unnecessary and advises the Contractor accordingly - attend for the purpose of examining and measuring such work or of examining such foundations.

6.7 **Uncovering and Making Openings**

The Contractor shall uncover any part or parts of the works or make openings in or through the same as the Architect/Consultants may from time to time direct and
shall reinstate and make good such part or parts to the satisfaction of the Architect/Consultants. If any such part or parts have been covered up or put out of view after compliance with the requirements of clause 6.6 hereof 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 such expenses shall be borne by the Contractor and shall be recoverable from him by the Employer and deducted by the Employer from any moneys due or which may become due to the Contractor, without prejudice to any other remedy that may be available to the Employer in law.

6.8 Removal of Improper Work and Materials

The Architect/Consultants/Employer’s designated representative 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 times as may be specified in the order, of any materials which in the opinion of the Architect/Consultants/Employer’s designated representative are not in accordance with the Contract.

b) The substitution of proper and suitable materials.

c) The removal and proper re-execution (not withstanding a previous test thereof or interim payment thereof) of work which in respect of materials or workmanship is not in the opinion of the Architect/Consultants/Employer’s designated representative in accordance with the Contract.

6.9 Suspension of Work

The Contractor shall, on the written order of the Employer/Employer’s designated representative suspend the progress of the works or any part thereof for such time or times and in such manner as the Employer/Employer’s designated representative may consider necessary and shall, during such suspension, cause contractor, properly protect and secure the work, so far as is necessary in the opinion of the Employer/Employer’s designated representative. Specifically provide that the Contractor shall not have the right to suspend Work and shall not be entitled to any compensation or expenses (including without limitation towards idle labour charges) during the period of suspension.

7.0 TIME OF COMPLETION, AND TAKING OVER:

7.1 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 will be available to him and subject to any requirement in the contract as to the order in which the work shall be executed, the Architect/Consultants/Employer’s designated representative shall 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 construction of the works in accordance with such reasonable proposals of the Contractor as he will make in writing to the Architect/Consultants/Construction Manager and shall, from time to time as the work proceeds, give the Contractor possession of such further portions of the site as may be required to enable the Contractor to proceed with construction of the works.
in accordance with the said program or proposal.

7.2 Time of Completion

The whole of the works i.e. Supply, installation, testing & commissioning and handing over of WTP AND STP works shall be completed within 5 (Five) months from the day of receipt of written order by the contractor or within such extended time as has been allowed under clause 7.3

7.3 Extension of Time (Liquidated Damages)

a) If the Contractor fails to complete the works and clear the site on or before the time of completion or extended period for such completion, he shall without prejudice to any other right or remedy of the Employer on account of such breach, pay to the Employer compensation to the extent stipulated as Liquidated damages a sum @ 0.5% of the total contract value per week of delay up to a maximum of 10% of the total contract value of the work. The liquidated damages contained herein are reasonable and a genuine pre-estimate mutually agreed to by the parties and is not by way of a penalty”.

b) If Contract is delayed in the execution of the Work by unusually severe weather conditions, strikes, acts of God, or other causes beyond the control of the Contractor, such delay may entitle Contractor to an equivalent extension of time, provided that Contractor has taken reasonable precautions to foresee, prevent, and to mitigate delays due to such causes, and provided Contractor has given written notice as required by paragraph 7.3.d. Under no circumstances shall delays attributable to such causes defined in this paragraph 7.3.b. result in the entitlement of Contractor to any additional compensation or damages for delays and Contractor hereby expressly waives the right to claim any such additional compensation or damages.

c) Should the amount of extra or additional work of any kind, or changes in scope of work or other special circumstances of any kind whatsoever which may occur, be such as fairly to justify the contractors’ request for extension of time for the completion of the works, the Architect/Consultants / Employer’s designated representative shall determine the amount of such extension and shall intimate this to the Contractor in writing.

d) In the event that Contractor is delayed in the execution of the Work by causes defined in paragraphs 7.3b and 7.3c. Contractor shall give Employer with a copy to Employer’s designated representative, written notice of the occurrence of the cause within five (5) business days after the commencement thereof and keep Employer and Employer’s designated representative currently informed in writing with respect thereto until the delay has terminated. If Contractor fails to give such notice within the time specified, Contractor shall be deemed conclusively to have waived its right to an extension of time for performance of the Work.
7.4 Practical and Virtual Completion

i) As soon as the Contractor considers work is practically completed he shall give notice of such completion through the Employer’s designated representative to the Architect/Consultants. Within fifteen (15) days of the receipt of such notice, the Architect/Consultants shall inspect the works, or those portions thereof notified by the Contractor as practically complete. After such inspection, the Architect/Consultants shall within ten (10) days issue a list of defects and/or deficiencies for correction by the Contractor and— at his entire discretion— confirm, or otherwise, that the work is practically complete.

The Contractor shall rectify all defects/make up all deficiencies in so far as is practicable not later than thirty (30) calendar days after receipt of the list of defects/deficiencies from the Architect/Consultants. Upon completion by the Contractor of all defects/deficiencies— in so far as it is practicable,— Contractor shall inform the Architect/Consultants through the Employer’s designated representative. The Architect/Consultants shall within ten (10) days re-inspect the works and at his entire discretion certify the works as complete and issue a Virtual Completion Certificate. The date of issue of the virtual Completion Certificate shall constitute the date at which the Defects liability/Maintenance Period starts.

ii) The work shall not be treated as Virtually Completed until:

The site is clear from all materials, site shed etc. and the Employer’s designated representative/Architect/Consultants/Employer is satisfied with the job done by the Contractor.

The Contractor has submitted the reconciliation statement regarding the stores received from the Employer, and all the surplus and salvaged materials are returned to the Employers’ stores, and the Employer has agreed to the same. All equipment, tools, plants etc. taken from the Employer has been returned by the Contractor.

Any other material, taken on loan/transfer from any other agency have been returned by the Contractor.

All power and water supply connections taken for the execution of the works have been disconnected by the Contractor, and left in a safe condition to the satisfaction of the Employer’s Representative.

Rectification of any damage done by the Contractor to the Work executed has been satisfactory made good by the Contractor.

Submission of As Built Drawings as per clause 3.5.2

7.5 Occupation of all or Part of the Works for Employers Convenience

The Employer shall have the right to use or occupy all, or any portion of, the work before the work is accepted as finally completed, excepting only that Architect/Consultants shall inspect those parts of the works to be occupied by the
Employer, and issue to Contractor a List of Defects/Deficiencies outstanding, prior to occupation by Employer. With this sole exception, such occupation shall not relieve Contractor of any of its obligations under the Contract.

### 7.6 Defect Liability Period inclusive of Operation & Maintenance

The Defect Liability Period inclusive of operation and maintenance shall commence as of the date of issue of the Virtual Completion Certificate, and shall be for a period of 365 days. The Contractors' liability shall be to operate, maintain and replace the defective parts, rectify/reconstruct the defective work that may develop of his own construction or those of his Sub-contractors approved by the Employer (under Clause 2.1 and 2.2) arising from faulty material or workmanship or for any other reason.

If it is necessary for the Contractor to rectify/reconstruct any defective portions of the work under the contract, the provision of this condition shall apply to the portions of work so replaced or renewed until the expiration of three months from the date of such replacement or renewal or until the end of the above mentioned period of one year, whichever may be later. If any defects are not remedied within a reasonable time the Employer may proceed to do the work at Contractor’s risk and expense, but without prejudice to any other rights which the Employer may have against the Contractor in respect of such defects.

The Contractor shall bear the cost of such repairs/rectifications carried out on his behalf at site. Immediately upon expiry of the maintenance period the Employer shall issue a final certificate indicating that the Contractor has completed his obligations under the contract.

### 8.0 TERMINATION OF CONTRACT

#### 8.1 Failure of Performance - Cures and remedies

If Contractor at any time refuses or neglects to supply enough properly skilled workers and proper materials, or fails properly and diligently to execute the works, or fails to make prompt payment to its workers, Sub-Contractors, or Suppliers or becomes delinquent with respect to contributions or payments legally required to be made to any Statutory Authority or otherwise is guilty of a material breach of a provision of this Contract, and fails within Forty Eight (48) hours after receipt of written notice from Employer to commence and continue satisfactory correction of such default with due diligence, then Employer without prejudice to any other rights or remedies shall have the right to any or all of the following remedies:

a) Employer may terminate Contractors right to perform under this Contract and Employer may use any materials, implements equipment, appliances or Tools procured by, furnished by, or belonging to Contractor to complete the work, without further compensation to Contractor for such use.

b) Obtain such number of workers and quantity of materials, equipment and other facilities as Employers deems necessary for the completion of the work or that part thereof which Contractor has failed to complete and perform, and charge all cost thereof plus a mark up of Twenty (20%) percent.
c) Contract with one or more alternative Contractors to perform the work as Employer shall determine will provide the most expeditious completion of the total work, and charge the cost thereof plus a mark up of Twenty (20%) percent.

d) Withhold payment of any compensation due or to become due to Contractor pending corrective action to the extent required by, and to the satisfaction of, the Employer.

e) Make payments directly to Contractors Sub-Contractors or Suppliers or to others who may have Bond rights, and to charge the amount/s thereof to the Contractor. In the event of an emergency effecting the safety of persons or property the Employer may proceed as above without notice.

8.2 **Grounds for Withholding Payments**

Employer may withhold the whole or part of any compensation due to Contractor to the extent necessary to protect Employer from loss on account of any breach of Contractors obligations under the Contract. When the cause for withholding is rectified, such amounts as then due and owing shall be paid or credited to the Contractor.

8.3 **Bankruptcy or Insolvency**

a) **Termination**

If a Receiver for Contractor is appointed, or if Contractor makes an assignment for the benefit of its creditors, or if Contractor become insolvent, Employer may terminate the Contract by giving Forty-Eight (48) hours written notice to Contractor and its Surety - if any. If any order for relief -if relevant - is entered with respect to Contractor, Employer may terminate the contract by giving Forty -Eight (48) hours written notice to Contractor, its Trustee, and its Surety - if any; unless Contractor, the Surety, or the Trustee. a) Promptly cures all defaults; b) provides adequate assurance of future performance; c) compensates Employer for financial loss resulting from such defaults; d) Assumes the obligations of Contractor within the statutory time limit.

b) **Interim Remedies**

If Contractor is not performing in accordance with the program of work when any order for relief is entered, or at any subsequent time, Employer, while awaiting the decision of Contractor or its Trustee and its Surety - if any, to reject or accept the Contract, and provide adequate assurance of its ability to perform there under, may avail itself of such remedies under this paragraph 8 as are reasonably necessary to maintain the schedule of work. Employer shall have the right to offset against any payment/s due or to become due Contractor, all costs incurred in pursuing any of such remedies. Contractor shall be liable for the payment of any amount by which such costs may exceed the unpaid balance of the money payable to Contractor.
8.4 Termination of Contract by Contractor

The Contractor may terminate the Contract by giving notice in writing to the Owner if:

a) Payment of the amount due to the Contractor under approved interim certificates of payment remains unpaid by Employer for Ninety (90) days after the Contractor’s notice in writing requiring payment.

b) The work under the Contract is stopped for Five (5) months or more under the order of the Employer, or by any injunction or any other order of a court of law having jurisdiction, provided only that such injunction or order was not caused by any unlawful act of the Contractor.

Then in these specific instances the Contractor shall be entitled to recover from the Employer payment for all work executed by him, and for any loss he may sustain in respect of plant or materials supplied, purchased, adapted, or prepared for the specific use of the works under this contract. In computing the amount of any such payment, the net rates contained in final contract documentation shall be used, or where these may be inapplicable, valuation shall be made under the relevant section/s of article 9 of these General Conditions of Contract.

8.5 Cancellation of Contract Due to Death

Where the Contractor is an individual or proprietary entity and the individual or proprietor dies, or if the Contractor is a partnership and one of the partners dies, then unless the Employer is satisfied that the legal representative/s of the individual Contractor or the proprietor or the proprietary entity or the surviving partner/s of the Partnership, is/are capable of carrying out and completing the Contract satisfactorily and in time, the Employer shall be entitled to cancel the incomplete works under this Contract, whether partially or entirely, without liability for payment of any compensation to the estate of the deceased and/or surviving partner/s, or proprietor/s, due to said cancellation.

The decision of the Employer that the legal representative/s or surviving partner/s or proprietor/s of the Contractor cannot carry out and complete the Contract satisfactorily and in time shall be final and binding on the parties. In the event of such cancellation the Employer shall not hold the estate of the deceased Contractor, or surviving partner/s, or surviving proprietor/s, liable for damages for not completing the works under the contract.

9.0 ALTERATIONS, ADDITIONS AND OMISSIONS:

9.1 Variation
The Architect/Consultants /Employer shall be entitled to make any variation of the 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, 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 completion of the works, and no such variation shall in any way vitiate or invalidate the Contract but the value, if any, of all such variations shall be taken into account in ascertaining the amount of the Contract Price.

9.2 **Order for Variations to be in Writing**

No Variation shall be made by the Contractor without an order in writing by the Architect/Consultants/Employers Representative, provided that no order in writing shall be required for increases or decreases in the quantity of any item of work where such increase or decrease is the result of the actual quantities exceeding or being less than those stated in the Bills of Quantities which are estimates. In such cases, the Contractor shall be paid only for the actual quantity of work done as certified by the Architect/Consultants at the accepted unit item rates and no further compensation shall be allowed.

Provided also that if for any reason the Architect/Consultants shall consider it desirable to give any such order verbally, the Contractor shall comply with such order which must be followed by confirmation in writing by the Architect/Consultants. Said verbal order shall then be deemed to be an order in writing within the meaning of this clause.

9.3 **Extra Items**

If the Contractor is required to execute any such item/work in the course of construction for which tender rates have not been quoted by him, he must undertake such work. The rate for such additional work shall be determined by the Architect/Consultants/Employer per the following:

i) The rate to be derived from one of the quoted rates for similar items of work in the tender.

ii) Rates based on actual observation and/or analysis of labour and materials involved in such work. For this purpose the Contractor shall submit to the Architect/Consultants detailed analysis of the rate proposed by the Contractor supported by relevant vouchers along with the estimated quantity of work item involved. While fixing rates for extra items an all inclusive allowance of 20% of the cost will be provided for Contractors overheads, profit and establishment charges.

iii) In case any Extra Item is executed through specialized agency co-ordination charges to main contractor shall be 10% only.

9.4 **REBATE / EXTRA OVER ORIGINAL ITEM**

If there is a deviation in the specification for particular item/s of the tender, the rebate/extra over the quoted rate shall generally be ascertained as follows:- For items not covered in the schedule, the rebate/extra shall be derived based on observation/analysis of labour and materials involved in such items.
9.5 CLAIMS

The Contractor shall send to the Architect's/Consultants / Employer's designated representative an account, giving full and detailed particulars with proper analysis, of all claims for any additional expense to which the Contractor may consider himself entitled and of all extra items of work ordered by the Architect/Consultants, which he has executed, within one month of execution of such work, and no claim for payment for any such work will be considered which has not been included in such particulars. Provided always that the Architect/Consultants / Employer's designated representative shall be entitled to authorize payment to be made for any such work notwithstanding the Contractor's failure to comply with this condition, if the Contractor has at the earliest particular opportunity notified the Architect/Consultants / Employer's designated representative in writing, that he intends to make a claim for such work.

10.0 VALUATIONS AND PAYMENTS

10.1 Works to be measured

The Employer's designated representative shall, except as otherwise stated, ascertain and determine by measurement the value in terms of 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 Construction Manager or his 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 such agent, then the measurement made by the Employer's designated representative or approved by him, shall be taken to be the correct measurement of the work. If the contractor does not so attend to examine and agree such records and drawings they shall be taken to be correct. If after examination of such records and drawings, the Contractor does not agree to the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor shall, within fourteen (14) days of such examination, lodge with the Construction Manager for decision by the Employer's designated representative, notice in writing of the respects in which such records and drawings are claimed by him to be incorrect.

10.2 Method of Measurement

The works shall be measured in accordance with IS:1200 (All parts) notwithstanding any general or local custom, except where otherwise specifically described or prescribed in the contract.

10.3 Provisional Sums

"Provisional Sum" means a sum included in the contract and so designated in the Bills of Quantities for execution of works or the supply of goods, material or services or for contingencies, which sum may be used, in whole, or in part or not at all, at the direction or discretion of the Architect/Consultants. The Contract Price shall include only such amounts in respect of the work, supply or services to which Provisional Sums relate as the Architect/Consultants shall approve or determine.
The Contractor shall when required by the Architect/Consultants, produce all quotations, invoices, vouchers, and accounts or receipts in connection with expenditure in respect of Provisional Sums.

10.4 Security Deposit / Retention Money

i) Security Deposit / Retention Money to the amount specified in the Appendix to these General Conditions of Contract shall be deducted from all payments approved and due to the Contractor during the course of the contract.

ii) The Retention Money shall become due to the Contractor upon the issue of the Certificate of Virtual Completion of entire work.

10.5 Secured Advance Against Materials

No secured advance will be payable on supply of part materials. The payment terms to be followed for progressive payments.

10.6 Interim Accounts

i) The Contractor shall prepare and submit interim bills to the Employer's designated representative once a month throughout the Construction period, provided the amount of said billing exceeds the minimum value stipulated in the Appendix to these General Conditions of Contract.

ii) Interim bills shall be presented in a format to be agreed in advance of the fact, with the Employer's designated representative and shall be supported by detailed measurements item by item.

iii) Interim billings may include for materials on site presently unincorporated within the permanent works, subject to the stipulations thereon specified in clause 10.5 of these General Conditions of Contract.

iv) Retention Money shall be applied to interim billings in accordance with clause 10.4 of these general conditions of contract.

v) Cost of materials if any issued by the Owner shall be recovered at rates specified in the Bills of Quantities.

vi) Within Fifteen (15) days of receipt of the Contractors interim applications for payment, the Employer's designated representative shall check and assess same, certify the amount due to the Contractor and recommend payment of that amount by the Employer to the Contractor.

vii) Within Fifteen (15) days of receipt by the Employer of the Employer's designated representative’s certification of the amount due to the Contractor, the Employer shall make payment to the Contractor.

viii) Any interim Certificate of Payment given by the Employer's designated representative relating to the work done or the materials delivered may be modified or corrected by any subsequent interim Certificate or the Final
Certificate of payment. No certification by the Construction Manager supporting an interim payment shall itself be conclusive evidence that any work or materials to which it relates is/are in accordance with the Contract.

10.7 Final Account

i) The Contractor shall submit his final billing to the Employer's designated representative within three (3) months of the virtual completion of the works as certified by the Architect/Consultants. No further claims shall be made by the Contractor or allowed by the Employer after submission of his final billing.

ii) The final billing shall be accompanied by all substantiating documentation as required for interim billings with the addition of the following items that shall be supplied by the Contractor:

   a) All written guarantees and warranties required by the Contract documents.
   b) Operation and Maintenance manuals and instructions for equipment and apparatus.
   c) One (1) reproducible and two (2) blue lines of all requisite As Built drawings.
   d) General arrangement (Schematic Diagram) & layout drawings for WTP AND STP works.
   e) Test reports of all equipments.
   f) History sheets.
   g) Log books wherever required.
   h) List of spares with parts nos.
   i) List of Tools & Tackles.

iii) The Employer's designated representative shall check and assess the final billing submitted by the Contractor and within Sixty (60) days of its receipt by him, shall certify the final amount due and recommended payment of that amount by the Employer to the Contractor.

iv) Within Thirty (30) days of receipt by Employer of the Employer's designated representative's certification of the amount due the Contractor, the Employer shall effect payment to the Contractor.

v) Within Thirty (30) days of receipt by Employer of the Employer's designated representative's certification of the amount due the Contractor, the Employer shall effect payment to the Contractor.

vi) No payment shall be effected until full satisfaction of clause 10.7 paragraph 2 above is made by the Contractor.

vii) The relevant sections of clause 10.4 - Retention Money, shall apply to the final billing.

viii) All approvals from appropriate authorities required as per contract.
11.0 SETTLEMENT OF DISPUTES:

11.1 Matter to be settled by Employer
All disputes and differences of any kind whatsoever arising out of or in connection with the Contract whether during the progress of the works or after their completion shall be referred by the Contractor to the Employer and the Employer shall within a reasonable time after their presentation make and notify decisions thereon in writing.

The decisions, directions, clarifications, measurements, drawings and certificates with respect to any matter the decision for which is specially provided for by these or other special conditions to be given and made by the Employer or by the Architect/Consultants on behalf of the Employer are matters which are referred to hereinafter as Excepted Matters and shall be final and binding upon the Contractor and shall not be set aside on account of non-observance of any formality, any omission delay or error in proceeding in or about the same or on any other grounds or for any reason and shall be without appeal and not subject matter of arbitration.

11.2 Arbitration:
In the event of any dispute or difference between the parties hereto as to the construction or operation of this contract, or the respective rights and liabilities of the parties on any matter in question, dispute or difference on any account or as to the withholding by the Employer of any certificate to which the Contractor may claim to be entitled, or if the Employer fails to make a decision within reasonable time, then and in any such case, but except in any of the Excepted Matters referred to in the above clause, the Contractor after 90 days of his presenting his final claim on the disputed matters, may demand in writing that the dispute or difference be referred to arbitration. Such demand for arbitration shall specify the matters which are in question, dispute or difference, and only such dispute or difference other than Excepted Matters of which the demand has been made and no other dispute or difference shall be referred to the arbitration of an officer of the Employer to be nominated by the CEO of the Employer for the time being and the provisions of the Arbitration and Conciliation Act 1996, for the time being in force or of any other Act of the Legislature passed in substitution thereof or modification thereof and for the time being in force, shall apply to such arbitration.

The Contractor shall not, except with the consent in writing of the Employer, or the Architect/Consultants, in any way delay the carrying out of the work by reason of any such matter, question or dispute being referred to arbitration but shall proceed with the work with all due diligence and shall, until the decision of the arbitration is given, abide by the decision of the Architect/Consultants / owner and no award of the arbitrator shall relieve the Contractor of his obligation to adhere strictly to the Architects/Consultants instructions with regard to the actual carrying out of the work except as specifically affected by such award.

11.3 All disputes to be settled in New Delhi.
12.0 NOTICES

12.1 Service of Notice on Contractor

All notices to be given by the Employer or by the Architect/Consultants to the Contractor under the terms of the Contract shall be served by sending by Registered Post or delivering the same to the Contractor’s place of business or such other address as the Contractor shall nominate for this purpose.

12.2 Service of notice on Employer

All notices 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 Employers' address.

13.0 LOCAL BODIES

The Contractor shall comply with and give all notices required under any Government Authorities, instrument, rule of order made under any Act of Parliament, State Laws, or any regulation or bye-laws of any Local Authority related to the work. The Contractor shall pay and indemnify the Employer against any liability in respect of the above, without any additional cost.

14.0 APPLICABLE LAW

The Contract shall be governed by, construed and enforced in accordance with, the Laws of India.

15.0 ESCALATION

No escalation on this work shall be applicable till the completion of this project.

16.0 Fraud and Corruption

It is the Employer’s policy that requires the Bidders, suppliers and contractors and their subcontractors under the contracts to observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Employer:

(a) defines, for the purpose of this provision, the terms set forth below as follows:

(i) “corrupt practice” is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

(ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
(iii) “collusive practice” is an arrangement between two or more parties
designed to achieve an improper purpose, including to influence
improperly the actions of another party;
(iv) “coercive practice” is impairing or harming, or threatening to impair or
harm, directly or indirectly, any party or the property of the party to
influence improperly the actions of a party;
(v) “obstructive practice” is
(aa) deliberately destroying, falsifying, altering or concealing of
evidence material to the investigation or making false statements
to investigators in order to materially impede a Employer’s
investigation into allegations of a corrupt, fraudulent, coercive or
collusive practice; and/or threatening, harassing or intimidating
any party to prevent it from disclosing its knowledge of matters
relevant to the investigation or from pursuing the investigation;
or
(bb) acts intended to materially impede the exercise of the Employer’s
inspection and audit rights.
(b) will reject a proposal for award if it determines that the bidder
recommended for award has, directly or through an agent, engaged in
corrupt, fraudulent, collusive, coercive or obstructive practices in competing
for the contract in question;
(d) will sanction a firm or individual, including declaring ineligible, either
indefinitely or for a stated period of time, to be awarded a contract if it at
any time determines that the firm has, directly or through an agent, engaged
in corrupt, fraudulent, collusive, coercive or obstructive practices in
competing for, or in executing, a contract; and
(e) will have the right to require that the provision be included in Bidding
Documents and in contracts, requiring Bidders, suppliers, and contractors
and their sub-contractors to permit the Employer to inspect their accounts
and records and other documents relating to bid submission and contract
performance and to have them audited by auditors appointed by the
Employer.

Note: In case any contractual condition left out or specified then CPWD Works Manual
shall be followed.
## APPENDIX – I
### SUMMARY OF SALIENT ASPECTS

**TENDER DETAILS FOR WTP AND STP WORKS**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Date of collection Tenders</td>
<td>18.09.2015 to 05.10.2015 from 10 AM to 3 PM.</td>
</tr>
<tr>
<td>2.</td>
<td>Time and Date to receipt of Sealed Tenders</td>
<td>Up to 13:00 hrs. on 12.10.2015 in office of Director(GA), Food Safety and Standards Authority of India, FDA Bhawan, Kotla Road, New Delhi-110002</td>
</tr>
<tr>
<td>3.</td>
<td>Validity of Offer</td>
<td>90 days from the date of opening of tender</td>
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<td>4.</td>
<td>Trial Run</td>
<td>one month at the cost of contractor</td>
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<tr>
<td>5.</td>
<td>Defects Liability Period</td>
<td>12 months from the date of virtual completion</td>
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<tr>
<td>6.</td>
<td>Comprehensive Operation &amp; Maintenance</td>
<td>24 months from the date of completion of defect liability period</td>
</tr>
<tr>
<td>7.</td>
<td>Date of Commencement</td>
<td>From the date of Letter of Intent</td>
</tr>
<tr>
<td>8.</td>
<td>Minimum Value of Work Interim Billing</td>
<td>Maximum of one bill per month</td>
</tr>
<tr>
<td>9.</td>
<td>Security Deposit/Retention Money</td>
<td>5% of Gross Value of each interim bill subject to contract price.</td>
</tr>
<tr>
<td>10.</td>
<td>Rate of Interest for Delayed Payment</td>
<td>Rate of interest on delayed payment by Owner/Employer will be NIL</td>
</tr>
<tr>
<td>11.</td>
<td>Submission of Final Bill</td>
<td>Within one month from the date of virtual completion. Payment 3 months after receipt of Contractors Final Billing.</td>
</tr>
<tr>
<td>12.</td>
<td>Period of Completion</td>
<td>5 months</td>
</tr>
<tr>
<td>13.</td>
<td>Penalty for Liquidated Damages</td>
<td>0.5% per week of delay subject to a maximum of 10% of contract value.</td>
</tr>
<tr>
<td>14.</td>
<td>Terms of Payments for Capital Works</td>
<td>10% mobilization advance against Bank Guarantee valid for One (1) Year recoverable with interest of 9% p.a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60% against material at site (advance will be adjusted in material at site bill).</td>
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<td>20% against erection.</td>
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<td></td>
<td></td>
<td>10% after commissioning and handing over against the Bank Guarantee of 5% valid for defect liability period. (This bank guarantee shall be separate from the bank guarantee against advance).</td>
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<tr>
<td></td>
<td></td>
<td>10% during defect liability period quarterly.</td>
</tr>
<tr>
<td>15.</td>
<td>Terms of Payments for Comprehensive Maintenance Period of 2 years</td>
<td>Quarterly Payment</td>
</tr>
<tr>
<td>16.</td>
<td>EMD (Earnest Money Deposit)</td>
<td>Rs. 1,30,000/- (Rupees One Lakh Thirty Thousand only).</td>
</tr>
</tbody>
</table>
SECTION - 1

PART - 2

GENERAL CONDITIONS

OF

CONTRACT (GCC)
1. GENERAL CONDITION OF CONTRACT PART – I AND PART – II ARE COMPLEMENTARY

These General Conditions of Contract Part – II are complementary to General Conditions of Contract Part – I and shall be read in conjunction to them.

a) The work shall conform to the Schedule of Quantities, Technical Specifications and drawings in the tender documents in the Tender Documents as given.

b) Where items are not covered under Technical Specifications then the work shall be performed as per the current C.P.W.D. Specifications relevant to that work.

c) Where items are not covered under paragraphs a. or b. then the work shall be performed as stipulated by the Architect/Consultant/Employer’s designated representative whose decision shall be final and binding.

2. SITE CONDITIONS

All equipment shall be suitable for satisfactory operation at the following site conditions.
Maximum 45° Celsius, 90% relative humidity.
Minimum 4° Celsius, 90% relative humidity

3. SCOPE OF WORK

The work to be carried out under this contract comprises the Supply, installation testing and commissioning of WTP AND STP Works including Operation & Maintenance after successful Trial Run during Defect Liability period of 12 months & Comprehensive Operation and Maintenance for further 2 yrs (option-I included in cost of tender) or further 5 yrs (option-II) for Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi. The Contractor shall carry out and complete the said work under this contract in every respect in conformity with the current rules and regulations of the Indian Standard Institution and to the satisfaction of the Architect/Consultant/Employer’s designated representative. The Contractor shall furnish all labour and install all materials, appliances, equipment (except those items which will be supplied by Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi to the Contractor at site) necessary for the complete provision and testing of the Installation as specified herein and shown on the drawings. This also includes any material, appliances, equipment not specifically mentioned herein or noted on the drawings as being furnished or installed but which are necessary and customary to make complete installation properly connected and in working condition. The work shall include all incidental jobs/minor civil works connected with WTP AND STP works installation such as excavation in trenches and back filling, cutting/drilling and grouting etc.
4. **PRICES**

The Tenderer shall quote his offer for Supply, Installation Testing and Commissioning of the complete works at site. The entire work covered by this document shall be treated as works contract. The prices quoted shall include all packing, crating, insurance, freight, handling and all other charges for delivering the equipment at the above site, including Sales Tax, Excise Duty, Works Contract Tax and Octroi. The price quoted shall be firm till the completion of the job and handing over.

5. **MOBILIZATION ADVANCE**

Employer may consider payment of 10% of the capital contract value i.e, excluding Comprehensive Maintenance Cost towards mobilization advance, against prescribed bank guarantee. This amount will be recovered on pro-rata basis from each running account bill amount payable to the Contractor, such that full advance is recovered by the time 70% work is completed. The mobilization advance shall also be recovered with interest of 9% per annum for the period of utilization. The bank guarantee shall be kept valid till entire amount stands recovered. The advance shall be used exclusively for the purpose of this contract. In the event of the contract being terminated for any reasons, the outstanding mobilization advance will be returned by the Contractor along with interest @ 21% P.A. alternatively, the same shall be recovered with interest @ 21% P.A. from any sum due to contractor.

6. **TECHNICAL DATA**

The Tenderer shall furnish along with his offer a “Schedule of Technical Data” showing in detail all the characteristics and all technical information about the equipment offered by him. In addition, he shall also supply a specification together with illustrations and drawings necessary to fully describe his offer.

7. **LIABILITY**

The Contractor shall not be liable for any loss, damage or delay caused by acts of governments, strikes, lockouts, fire explosion, theft, floods, riot, civil commotion, war, malicious mischief, act of God or cause beyond his reasonable control and in no event shall be liable for consequential damages.

8.0 **TAXES - GENERAL**

The contractor is deemed to have included for all taxes associated with his work. This shall include, but not necessary be limited, to works contract tax.

9.0 **INCOME TAX**

Owner shall deduct Money as “Tax Deducted at Source” (TDS) as per the prevailing income tax laws and regulations from all payments to the contractor that are so subject.

10.0 **INSURANCE**

The Contractor shall at all times indemnify and keep indemnified the Owner and its officers, servants, agents and any other person moving in the premises, from and against all third party claims whatsoever which may arise out of or in consequence of
the construction and maintenance of works, (including but not limited to property loss and damage, personal accident, injury or death of / to servants or agents of the contractor, any sub-contractor(s) and/or the Owner) and the Contractor shall at his own cost and initiative at all times up to the successful conclusion of the defect liability period, maintain all insurable liabilities under this Clause, including but not limited to third party insurance and liabilities under the Motor Vehicles Act, Workmen’s Compensation Act, Fatal Accidents Act, Personal Injuries Insurance Act, Employees State Insurance (ESI), Emergency Risk Insurance Act and / or other Industrial Legislation from time to time in force in India with insurance company(ies) approved by Architect/Employer and such policy (ies) shall be of not lesser limit than the limits hereunder specified with reference to the matters hereunder specified, namely;

a) Workmen’s Compensation Insurance - to the limit to which compensation may be payable under the laws of the Republic of India.

b) Third Party Insurance - bodily injury and property damage to the limit of not less than Rs.1, 00,000/- (Rupees One Lac Only) in each accident at site and to a limit of not less than Rs.5, 00,000/- (Rupees Five Lacs Only) for all accidents at site.

c) Marine Cum Erection Insurance Policy: Comprehensive marine cum erection Policy shall be provided, under which the entire material and equipment needed for the installation are insured for the amount equivalent to the cost of material/equipment from the date of consignment leaves the factory to the date the material/equipment is duly erected are handed over to the Owner subject to terms and condition, warranties and exclusion of the policy.

Provided that the limits specified above shall operate only as a specification of minimum limits for insurance purposes, but shall not in any way limit the Contractor’s liability in terms of this clause to the limit(s) specified.

Should the Contractor fails to take out/or keep current, insurance as provided for in the foregoing Sub-clause, The Owner shall be entitled (but without obligation to do so) to take out and/or keep current such insurance at the cost and expense of the Contractor, and without prejudice to any other rights or remedies of Owner in this behalf, to deduct the sum(s) incurred, from the dues of the Contractor.

Period of Policies: All insurance covers mentioned above shall be kept alive during the completion period of contract till completion of the project.

The said Insurance Policies shall be lodged with the Employers authorized representative prior to Contractor’s start work on site.

11.0 LIMITATIONS OF SPACE AND FACILITIES TO BE APPROVED
Due to the constricted nature of the project, the following limitations are imposed:-

a) No labour camp shall be permitted on the project site. Contractor shall make suitable arrangement for accommodating the labour at nearest possible location. Basic amenities like drinking water, toilets and also crèche for children of labour to be provided by Contractor at his cost.
b) Contractor shall be deemed to have allowed all costs and time associated with the manufacture fabrication of hollow blocks pre-cast concrete/structural steel at an offsite location, its transportation to site and placement at final location. Only erection shall be done at site.

c) Prior to locating his site offices, storage facilities, temporary roads, plant location, Stone cutting/forming areas, bulk materials storage locations on site, Contractor shall obtain prior approval of the Employer’s designated representative for the location and extent of such facilities. Such approval shall not relieve Contractor of any of his obligations under the contract.

d) Under no circumstances shall stacking/storage of construction materials, plant equipment, surplus materials or rubbish be permitted within the immediate surroundings of the Owner’s premises. If/when in violation, the Contractor shall be held solely responsible for each and ever cost associated with such violation, and shall act immediately upon the direction of the Construction by the Employer’s designated representative shall not relieve Contractor from entire responsibility for said remedial action.

e) Contractor is advised that onsite parking – other than legitimate construction traffic for loading/unloading purposes in the designate areas – shall be limited, and must have prior Employer’s designated representative approval as to location, if any.

Contractor shall immediately remove any illegally parked on Site Company or private vehicles when required by Employer's designated representative.

f) First Aid Services:

The Contractor shall at his own expanses, provide adequate first aid services on the site including trained first aid staff during all working hours. The Contractor shall make necessary arrangements with a local hospital and with local doctors so that his sick or injured persons may receive prompt medical treatment with minimum delay at any hour of the day or night. Contractor is advised to make an arrangement with a physician for biweekly visit to the labourers/workmen as a preventive measure and control of diseases.

12.0 PROGRESS REPORTING

The Contractor shall provide the Employer's designated representative with written reports on a bimonthly basis. Such reports shall include but not necessarily be limited to, progress in relation to the program and any anticipated problems that may cause delays or disruption. A format for these reports shall be approved by the Employer's designated representative prior to issuance.

13.0 SECURITY

Contractor shall be held entirely responsible for the security and the protection of their works at all times inclusive of non-working hours. They shall be deemed to have
included for all costs associated therewith. This clause shall enhance and complement clause (4.17) of General Conditions of Contract Part – I.

14.0 TEMPORARY POWER AND WATER

Temporary water and electricity shall be arranged by the Contractor at his own cost and they shall be responsible for all connections, pumps, pipes, storage facilities and all other things necessary to distribute and use services from these distribution points and, as may be required for his work. Employer does not warrant continuous supply of these services. However if these services are provided by the Main Civil Contractor, the charges for the same shall be mutually agreed between the main Contractor and the Services Contractor.

15.0 TRESPASS

Contractor shall ensure that none of the workforce or their dependents trespasses on surrounding areas owned by "others".

16.0 SAFETY

Contractor shall install and maintain any and all temporary lighting, access ways, and / or safety precautions (such as guard rails, temporary coverings for holes in floors etc.), that are deemed necessary for the efficient and safe prosecution of the works. In the event of disagreement as to the type or extent of such temporary lighting, access way, and/or safety precautions, the Employer’s designated representative’s decision shall be final and binding. Lack of any direction or instruction by the Employer’s designated representative shall not release Contractor from his responsibilities and obligations under this clause. This clause shall enhance and complement Clause 23 of General Conditions of Contract Part – II

17.0 HOISTING, TRANSPORTATION ETC.

Contractor shall include for his own unloading and hoisting of materials and equipment; own scaffolding, rigging and access equipment, clean up and rubbish disposal.

18.0 MULTIPLE VISITS

Contractor shall be deemed to have allowed for multiple visits to complete the work described.

19.0 PROTECTION / PRESERVATION OF TREES

Contractor shall take all measures necessary to ensure the protection and preservation of existing trees within the boundary of the site.

20.0 USE OF CONTRACTORS FACILITIES BY OTHERS

Contractor shall allow the use of his access ways, scaffolding, temporary staging, and sources of temporary power and water, by other contractors, where necessary for their legitimate work, without let or hindrance, but in a coordinated manner. Should there be conflict, then the reasonable direction of the Employer’s designated representative shall be final, and all parties shall be bound by it.
21.0 EXISTING SERVICES
Contractor shall be deemed to have allowed for all costs involved in the strict coordination of his work, such as no interruption of permanent of existing permanent services crossing the site shall occur.
The Contractor shall at all times conform to the directions of the Employer's designated representative with regard to integration of adequate protection of and uninterrupted use of these facilities during the execution of his works.

22.0 MAINTENANCE OF ROADS ACCESS WAYS, TRAFFIC CONTROL
Contractor shall be entirely responsible for maintaining public roads adjacent to the site free from any materials of whatever nature being delivered to or removed from the site; and in a generally clean and safe condition. With this in mind, Contractor shall ensure adequate traffic control at the entrance and exit points of the site – both temporary and permanent – and ensure no parking on public roads, pavements or lands adjacent.

23.0 BARRICADING/SAFETY PRECAUTIONS:
Contractor shall provide of whatsoever nature, temporary barricades and/or fencing including warning signs, signals, notice and lights as appropriate to the particular situation and of a sufficiency and strength suitable for said situation. Same shall be maintained continuously until the particular hazard is ended.

In like manner same shall be maintained at, but not necessary be limited to, such works as demolition, dismantling, structural erection and sheeting.

Any direction/instruction deemed necessary and issued by the Employers representative in this regard shall be immediately executed by the Contractor.

Such directions/instructions shall not relieve the Contractor of his entire responsibility under this or any other relevant clause of the Contract.

Contractor is deemed to have allowed for all direct or associated costs arising there from, when tendering for the work.
SECTION - 1

PART – 3

SPECIAL CONDITIONS

FOR

SUBMISSION OF BIDS
SPECIAL CONDITIONS FOR SUBMISSION OF TENDER : PART - III

Subject: Proposed Centralized WTP AND STP for Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi.

It is proposed to supply, installation, testing and commissioning of WTP AND STP system as per Bill of Quantities at the above premises.

1.0 SHOP DRAWINGS:

On the award of the work, the Contractor shall immediately proceed with the preparation of detailed working drawings showing the detail of the equipment that are to be installed and the ancillary works that are to be carried out.

Three sets of all such working drawings duly signed by the head of the planning & design department shall be submitted to the Owner / Consultant / Architect for approval to ensure that the works will be carried out in accordance with the specifications and drawings, including such changes as may have been mutually agreed upon. All the drawings shall be received by the Owner / Consultant / Architect for approval within 04 (Four) weeks of the award of work. The approval of the drawings by the Owner / Consultant / Architect shall in no way relieve the Contractor from his obligations to provide a complete and satisfactory plant installation, testing and commissioning as per intent and purpose as laid down in the specifications.

2.0 INSTRUCTION / MAINTENANCE / OPERATION MANUAL:

The Contractor shall prepare and produce instruction, operation and maintenance manuals in English for use, operation and the maintenance of the supplied equipment and installations, and submit to the Owner (03) three copies at the time of handing over. The manual shall generally consist of the following:

a) Description of the Project.
b) Operating instructions.
c) Maintenance instructions including procedures for preventive maintenance.
d) Manufacturers catalogues.
e) Spare parts list.
f) Trouble shooting charts.
g) Drawings.
h) Type and routine test certificates of major items.
i) One (1) set of reproducible ‘as built’ drawings.

3.0 GUARANTEE:

The contractor shall guarantee the complete WTP AND STP system for a period of 18 months from the date of handing over the plant after successful initial testing.
4.0 REPAIRS / REPLACEMENT OF PARTS DURING GUARANTEE:

Any defects or other faults which may appear within defect liability / guarantee period of 18 months from the date of handing over the system in a satisfactory working conditions to the Client (except for normal wear and tear) arising in the system from material or workmanship not in accordance with the contract specification will be rectified by the contractors free of cost and nothing shall be paid extra on any account.

5.0 TESTING:

All testing instruments, velocity meter, digital thermometer, pyschrometer, measuring steel tapes, tools, scaffolding and ladders etc. that may be required for taking measurements shall be arranged by contractor at his own cost.

All types of routine and other tests shall be carried out at the works of the Contractor or the manufacturers of the components. The Client shall be free to witness any or all tests, if they so desired. The Contractor has to inform to the Client before dispatch of any material / equipment.

On the completion of the installation, the Contractor shall arrange to carry out various initial tests as detailed below, in the presence of Owner / Consultant / Architect/Employer’s designated representative and to the entire satisfaction of the Owner / Consultant / Architect/ Employer’s designated representative. Any defect or short-coming found during the tests shall be speedily rectified or made good by the Contractor at his own expenses. During Fire Ventilation Test by the Fire Department, the WTP AND STP contractor shall arrange and stand to carry various in initial Test such as Normal operation & In case of Fire.

It is clarified that guarantee period shall start after successful completion of one major test i.e. either summer or monsoon for all equipment and inside temperature in the working area if any.

After commissioning of Plant the testing will be done by the CPCB / any other agency regularly to ascertain that the required parameters are being achieved. The cost of testing charges shall be borne by the bidder.

6.0 OPERATION OF PLANT:

The tenderer shall arrange to operate the plant for a period of ONE MONTH from the date of commissioning of plant and successful completion of initial test free of cost.

7.0 TRAINING OF PERSONNEL:

The contractor shall impart training to the minimum three technical staffs appointed by the Client free of cost during erection and commissioning of the plant.

8.0 WEEKLY PROGRESS REPORT:

A weekly progress report of site shall be submitted in writing to the Owner / Consultant / Architect.
9.0 STORAGE OF MATERIALS / EQUIPMENTS
If any storage of materials / equipment brought to site by the contractors, watch and ward of the same shall be the contractor's responsibility. In case the plant room space is not readily available, it shall be contractor's responsibility to make his own temporary structure at site with approved location from the client at his own cost.

10.0 INSURANCE:
The contractor shall be responsible for the storage and safe custody of all equipment / materials brought to site from time to time till the system is taken over by the department. The contractor may provide adequate and comprehensive insurance coverage for storage and execution.

The contractor shall be responsible for all the injury or damage to persons, buildings, structures, property etc., which may arise from any act of omission on part of the contractor or his servants or sub contractors or his employee etc. The contractor shall indemnify and keep indemnified the owner and hold him harmless in all respects of and any expenditure liability, loss, claims or proceeding arising from any such injury or damage to persons or property as aforesaid.

The contractor may undertake all risk policy including earthquake risk with an insurance company approved by the owner in the joint names of owner and contractor at his own expense.

11.0 COMPREHENSIVE ANNUAL MAINTENANCE:
The Contractor shall quote for Comprehensive Annual Maintenance service contract for the system offered by him for a period of 2 years after completion of Defect Liability period. Any parts/Components consumable whatsoever needs replacement during the above mentioned period shall be supplied and installed by the vendor without extra cost.

Periodical checking for all parameters for machines operation and diagnosis, routine checking and cleaning operations, annual preventive maintenance / overhauling as required for smooth and trouble free operation of the package shall be carried out by the contractor. The contractor shall furnish detailed facilities available with him for executing such contract and also furnish annual charges for the same in the priced part of the Bid. Rates shall be quoted in the Price Bid only.

12.0 PENALTY CLAUSE:
If the effluent from the Sewage Treatment Plant is not as per the desired parameters then the bidder shall be responsible for all consequences arises there upon inclusive legal matters and penalty of amount of Rs. 25,000/- shall be imposed.

13.0 All technical data to be filled by the bidders in section - 21 of Technical specs. shall be accepted in metric system only. Any bidder submitting the technical data in any other unit would render his bid liable for rejection. The technical data should be typed in capitals only.

Note- Price bid shall be evaluated considering the price loading on account of power consumption, guarantee and two years AMC charges.
SECTION – 2

FORMS SECURITIES & RATE ANALYSIS
FORMS OF SECURITIES AND RATE ANALYSIS

Samples of acceptable forms of Bid, performance and advance payment securities are annexed. Contractors should not complete the performance and advance security forms at this time. Only the successful Contractor will be required to provide performance and advance payment securities in accordance with one of the samples or in a similar form acceptable to the Client.

Appendix A:       Bid Security Form (Bank Guarantee)
Appendix B:       Performance Security Form
Appendix C:       Advance Payment Security Form
APPENDIX A: SAMPLE FORM

BID SECURITY FORM (BANK GUARANTEE)

To
__________________________.

_____________________________

WHEREAS, ________________ [name of Contractor] (hereinafter called "the Contractor") has submitted his Bid-dated ________________ [date] for the ________________ for M/s. ________________.

_____________________________

KNOW ALL MEN by these presents that We ________________ [name of bank] of ________________ [name of country] having our registered office at ________________ are bound unto ________________ [name of Client] (hereinafter called "the Client") in the sum of $______________ for which payment well and truly to be made to the said Client, the Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _______ day of ________ 2015.

THE CONDITIONS of this obligation are:

(1) If the Contractor withdraws his Bid during the period of Bid validity specified in the Form of Bid; OR

(2) If the Contractor having been notified of the acceptance of his Bid by the Client during the period of Bid validity:

(a) Fails or refuses to execute the Form of Agreement in accordance with the Notice and Instructions to Tenderers, if required; or

(b) Fails or refuses to furnish the Performance Security, in accordance with the Notice and Instruction to Tenderers,

(c) Does not accept the correction of the Bid Price.

We undertake to pay the Client up to the above amount, according to, and upon receipt of, its first written demand, without the Client having to substantiate its demand, provided that in its demand the Client will note that the amount claimed by it is due to it owing to the occurrence of one or both of the above-stated Condition or Conditions.

THIS GUARANTEE will remain in force up to and including fifteen (15) days after period of Bid validity, and any demand in respect thereof should reach the Bank not later than such date.

______________________________

(Name of Bank)

By (Authorized Representative)

______________________________

(Signature of Witness)

Name of Witness:

Address of Witness:
APPENDIX B: SAMPLE FORM

PERFORMANCE SECURITY FORM

To

______________________________.
______________________________.

WHEREAS ________________ [name and address of Contractor] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated ________________ to execute _______________________________ for M/s. ………………………………………….. …………………..

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____________ [amount of Guarantee] 2 ______________ [in words], such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____________ [amount of Guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until 2 years from the issue of the Certificate of Completion.

SIGNATURE AND SEAL OF THE GUARANTOR ______________________
NAME OF BANK__________________________________________________
ADDRESS________________________________________________________
DATE____________________________________________________________

______________________________
APPENDIX C: SAMPLE FORM

ADVANCE PAYMENT SECURITY FORM

To
M/s. ________________________-
__________________________________

Gentlemen:

In accordance with the provisions of the Special Conditions of Contract, Clause 39 or 40 ("Advance Payment") of the construction contract of ________________________ 
_______________________________, __________________________ 
_________ [name and Address of Contractor] (hereinafter called “the Contractor”) shall deposit with 
……………………………………………………… a bank guarantee to guarantee his proper and faithful 
performance under the said Clause of the Contract in an amount of ________________________ 
amount of Guarantee
__________________________ ________________________________________ 
in words.

We, the ____________________ [bank or financial institution], as instructed by the Contractor, agree 
unconditionally and irrevocably to guarantee as primary obligor and not as Surety merely, the 
payment to ………………………………………  on his first demand without whatsoever right of objection on 
our part and without his first claim to the Contractor, in the amount not exceeding ____________________ 
(amount of Guarantee)2 ________________________________________ [in words] or to the amount remaining 
unpaid or unadjusted & shall remain in force until _______________________ the end of Defects Liability 
Period.

We further agree that no change or addition to or other modification of the terms of the Contract or of 
Works to be performed thereunder or of any of the Contract documents which may be made between 
………………………………………  and the Contractor, shall in any way release us from any liability under this 
guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment under the 
Contract until ……………………………………… [name of Client] receives full repayment of the same amount 
from the Contractor.

Yours truly,  ________________
Signature and Seal: ______________________________

Name of Bank/Financial Institution: ______________
Address: _______________________________________
Date: __________________________________________

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1This form is applicable for both Mobilization Advance and Advance against Material in accordance with clause 39 and 40 respectively of special Conditions of Contract.
SECTION – 3

TECHNICAL SPECIFICATIONS
SECTION – 3.1 WATER TREATMENT PLANT WORKS

A) SPECIFICATION FOR FILTER FEED AND WATER TRANSFER PUMPS:

1.0 SCOPE OF WORK:

The general character and the scope of work to be carried out under this contract is illustrated in the drawings, specifications and schedule of quantities. The Contractor shall carry out and completes the said work under this contract in every respect in conformity with the rules and regulations of the Local Authority. The contractor shall furnish all labour, supply and install all new materials, appliances, equipment necessary for the complete provision and testing of the complete installation as specified herein and in accordance with relevant BIS codes and as shown on the drawings. This also includes any material, appliance, equipment not specifically mentioned herein or noted on the drawings as being furnished or installed but which are necessary and customary to make a complete installation. In general the work to be performed under this contract shall comprise of the following:

Without restricting to the generality of the foregoing, the Water Treatment Plant Installations shall include the following:-

WATER TREATMENT PLANT/WATER SUPPLY DRAINAGE PUMPS:

→ Filter Feed and water transfer Pumps
→ Water Treatment Equipments
→ Associated Electrical Work

a) All incidental jobs connected with Water Treatment Plant services installation such as cutting chases in concrete and brick and making good, cutting/ drilling holes through walls, floors and grouting for fixing of fixtures, equipment foundation, Structural supports & other supports as required at site shall be part of Water Treatment Plant works.

b) Contractor shall submit the samples/catalogues of each material/equipment giving technical data. Only after written approval of samples/catalogues, the Contractor shall place the order.

c) Preparation of shop drawings - Contractor shall submit the detailed shop drawings after coordinating with structural, architectural and other services drawings. All structural openings & pipe sleeves shall be identified. Shop drawings shall be furnished within four weeks after the award of the contract.

d) Contractor shall furnish and install a complete working Water Treatment Plant installation as per approved shop drawings and as described in this specification and as per the latest BIS codes. If any item (S) of work (S) which are explicitly/implicitly not specified in B.O.Q. but are necessary either as per specifications/BIS Codes or as per mandatory / local authority requirements; these shall be identified by the contractor with cost implication at the time of submission of tender (as an annexure) failing which no claims to this respect shall be permitted during execution of the contract.
Before starting the work at site the contractor shall examine all services drawings and report to Architect/Consultant for discrepancies and obtain clarifications. Any work done without regard or consultation with other trades, shall be removed by the contractor without additional cost to the owner.

e) Cleaning of all equipment and piping including flushing of all pipe work to remove any foreign matter shall be carried out in sections as the work progresses.

f) Contractor shall temporarily cover & protect all equipments & open pipe ends etc. It is the responsibility of the Contractor to protect all the installed fittings and all equipments until the time of testing, commissioning & handing over to the owners.

g) Painting of all concealed and exposed pipes, equipment as specified including weather proof treatment on exposed/buried pipe work shall be part of this contract, even if it is implicitly/explicitly not specified in B.O.Q.

h) Testing & commissioning of all systems including submission of test reports.

i) Contractor shall submit as installed drawings, operation and maintenance manual for all equipments/operations etc. Framed operating & maintenance instructions shall be provided in plant room.

j) Contractor shall quote for the first make of materials from the list of approved makes. In case of deviations from the same alternate makes with subsequent price reduction to the client shall be quoted by the contractor.

k) Contractor shall submit the list of various manufacturers/suppliers/dealers including their detailed addresses & telephone numbers from whom the various materials/equipment shall be purchased.

l) Quoted rates shall be firm during the execution of the contract.

m) Work under this section shall consists of furnishing all labour, materials, equipment and appliances necessary and required to supply install and commission the water supply and drainage pumps as described hereinafter and given in the Bill of Quantities and/or shown on the drawings.

2.0 GENERAL REQUIREMENTS:

2.1 All materials shall be new of the best quality conforming to specifications and subject to the approval of Project Manager.

2.2 All equipment shall be of the best available make manufactured by reputed firms.

2.3 All equipment shall be installed on suitable foundations, true to level and in a neat workmanlike manner.
2.4 Equipment shall be so installed as to provide sufficient clearance between the end walls and between equipment to equipment.

2.5 Piping within the pump house shall be so done as to prevent any obstruction in the movement within the pump house.

2.6 Each pumping set shall be provided with a Ball Valve / butterfly valve on the suction and delivery side and a dual plate type return valve on the delivery side.

2.7 All delivery headers/hanging pipes within the pump house shall be floor supported.

SPECIFICATION FOR PUMPS:

3.0 PUMPING SETS FOR FILTER FEED/TRANSFER PUMPS:

3.1 Water supply pumps shall be suitable for clean filtered water. Pumps shall be single/multi stage, monobloc vertical/horizontal, centrifugal pumps with C.I body and CI/bronze impeller, stainless steel shaft carbon, mechanical seal and coupled to a TEFC electric motor. Each pump should be operated to a curve required by the operating conditions.

3.2 All parts in contact with water shall be corrosion resistant stainless steel DIN-Nr.1.4401.

3.3 Each pump shall be provided with a totally enclosed fan cooled induction motor of suitable H.P. The motors shall be suitable for 415 volts, 3 phase, 50 cycles A.C. power supply and shall conform to IS 325 operating at 2900 RPM nominal speed.

3.4 Each pumping set shall be provided with 100-mm dia 150 mm dia gunmetal "Borden" type pressure gauge with gunmetal ball valve and connected piping.

3.5 Pump or the whole set shall be stable on rubber vibration eliminating pads appropriate for each pump as recommended by the manufacturer and accepted by the Project Managers.

4.0 LEVEL CONTROLLERS:

4.1 Level controllers shall be electronic low voltage type using required number of stainless steel type probes, shrouded in PVC sheath or encapsulated in a stainless steel pipe.

5.0 PIPE & FITTINGS (FOR HEADERS AND CONNECTIONS):

5.1 Pump suction and delivery headers shall be galvanized iron pipes heavy class with matching fittings. The pipe joints shall be threaded as per manufacturer’s instructions.

5.2 Vibration Eliminators:
Provide on all suction and delivery lines as shown on the drawings double flanged reinforced neoprene flexible pipe connectors. Connectors should be suitable for a working pressure of each pump and tested to the test pressure given in the relevant head. Length of the connectors shall be as per site requirements in accordance with manufacturer details.

5.3 Valves:

5.3.1 Butterfly Valves:
All valves 65 mm dia and above shall be C.I. slim seal butterfly valves or sluice valve. Butterfly valves shall be of best quality conforming to I.S. 13095 of class specified.
5.4 **Non-Return Valves (Check Valves):**

Non-return valves shall be cast iron dual plate type with cast iron body and gunmetal internal parts conforming to IS: 5312.

6.0 **PAINTING AND CLEANUP:**

a) On completion of the installation contractor shall scrub clean all pumps, piping, filters and equipment and apply one coat of primer as required.

b) Apply two or more coats of synthetic enamel paint of approved make and shade on steel pipes.

c) Provide painted identification legend and direction arrows on all equipment and piping as directed by Project Manager.

d) On final completion of the work, contractor shall cleanup the site Pump room of all surplus materials rubbish and leaves the place in a broom-cleaned condition.

7.0 **MEASUREMENT:**

7.1 **General:**

7.1.1 All items must include all accessories fittings as described in the specifications. BOQ and shown on the drawings.

7.2 **Filter Feed/ Water Transfer Pumps:**

Pumps shall be measured by numbers and shall include all items as given in the specifications and Bill of Quantities to provide a complete working system.

7.3 **Level Controllers and Alarms:**

Level controllers for each set of pumps shall be measured by number and inclusive of probes, cabling unto surface box near the pump and shall include all items as given in the specifications and Bill of Quantities to provide a complete working system.

7.4 **Piping Work:**

7.4.1 Suction and delivery headers for each pumping system shall be measured per linear meter of finished length and shall include all items as given in the Bill of Quantities. Painting shall be measured per linear meter.

7.4.2 PVC/G.I. pipes between various equipment’s shall be measured per linear meter of the finished length and shall include all fittings, flanges, jointing, clamps for fixing to walls or hangers and testing. Flanges shall include 3 mm thick insertion rubber gasket, nuts, bolts and testing.

7.4.3 Vibration eliminators, “Y” strainers, butterfly valves, slim non return valves shall be measured by numbers and shall include all items as given in the Bill of Quantities and specifications.
B) WATER TREATMENT EQUIPMENT:

1.0 GENERAL REQUIREMENTS:

1.1 All materials shall be new of the best quality conforming to specifications and subject to the approval of Project Manager.

1.2 All equipment shall be of the best available make manufactured by reputed firms.

1.3 All equipment shall be installed on suitable foundations, true to level and in a neat workman like manner.

1.4 Equipment shall be so installed as to provide sufficient clearance between the end walls and between equipment to equipment.

1.5 Piping within the pump house shall be so done as to prevent any obstruction in the movement within the pump house.

2.0 Multigrade Filter (Dual Media)/ Activated Carbon Filter:

2.1 Water filter shall be sand/gravel pressure filters downward or upward flow type suitable for a flow rate of filtration given in the schedule of quantities.

2.2 Filters shall be vertical type of required diameter. The shell and dished ends shall be fabricated from bobbin wound polyester fiberglass multi layer tank suitable to with stand a working pressure given in schedule of quantities. The vessel shall have a minimum thickness suitable for pressure as given in the schedule of quantities as per manufactures recommendations.

2.3 Each filter shall have at least one pressure tight manhole cover, and one side hole with cover for inspection and repairs.

2.4 Each filter shall be provided with screwed or flanged frontal piping comprising of inlet, outlet back wash and rinse with valves efficient under drain system and raw water distributor, 100mm dia dial bourdon type gun metal pressure gauges with gun metal isolation cock and connecting piping on inlet, outlet, sampling cock on raw water inlet and filtered water outlet.

2.5 Face piping shall be of non corrosive uPVC of 10kg/sqcm with injection moulded fittings and solvent weld joints.

2.6 Filter media Graded aggregate, selected coarse and fine sand as per latest water treatment practice. Aggregate to be acid washed and having purity of 99.9%.

2.7 Depth of filter Depth of filter media shall be 750-900 mm deep or as per manufacturer's design.

2.8 Back washing as specified in the manufacturer manual.
3.0 CHEMICAL DOSING PUMP:

3.1 Chemical dosing system comprising of metering pump, 100 lts. Capacity FRP / HDPE solution tank with level gauge and lid on top.

3.2 Motor driven metering pump with mechanically activated diaphragm with oil lubricated gear mechanism. The output of the plug should be adjustable operation from 10-100%. Pump construction shall be corrosion resistant polypropylene or similar material dosing pump shall be used for:

3.3 Each pump shall be provided with an injector assembly with suction and delivery piping complete in all respects.

4.0 WATER SOFTENER:

4.1 Softeners shall be vertical up flow type, designed to give required hardness. Softener shall be provided with suitable grade of Cation exchange resins in quantity to be indicated by the contractor at the time of tendering.

4.2 Softener vessel shall be bobbin wound polyester fiberglass multi-layer vessel with dished ends and self supporting arrangement. The vessel shall have a minimum thickness suitable for pressure as given in the schedule of quantities as per manufactures recommendations.

4.3 The vessel shall have minimum two pressure type manhole covers, efficient under drain system comprising of sufficient numbers of PP strainers, raw water distributor at the top and one number (PVC) regenerate distributor at required level. The strainer plate shall be accessible as per manufacturer’s design.

4.4 Softener shall have a set of face piping of non corrosive uPVC of 10kg/sqcm with injection moulded fittings and solvent weld joints comprising of inlet, outlet and backwash regeneration and rise complete with valves and piping, 100 mm dial bourden type gunmetal pressure gauges with gunmetal isolation cock and connecting piping on inlet and outlet, sampling cock on raw water inlet and softened water outlet, drain connection with valve.

4.5 One set of regeneration assembly comprising of power valve, ejector, brine suction valve and all necessary piping.

4.6 One orifice board for indicating wash and rinse rate to be filtered in drain sump.

4.7 One charge of supporting gravel, sand and "Cation" resin in requisite quantity.

4.8 One water testing kit with instructions for testing water samples.

5.0 PIPE AND FITTINGS (FOR HEADERS AND CONNECTIONS):

5.1 Pump suction and delivery headers shall be of approved corrosion resistant material with matching fittings. The pipe joints shall be threaded or as manufacturer’s instructions.
5.2 **Valves**: 
- Valves 65 mm dia and above shall be C.I. Slim Seal butterfly valves (PN 1.6).
- Valves up to 50 mm dia shall be ball valve.
- Non return valve shall be CI dual plate type non return (PN1.6).

C) **COMMISSIONING AND GUARANTEES:**

1.0 **SCOPE OF WORK:**

Work under this section shall consist of pre commissioning, commissioning, testing and providing guarantees for all equipment, appliances and accessories supplied and installed by the contractor under this contract.

2.0 **GENERAL REQUIREMENTS:**

2.1 The rates quoted in this tender shall be inclusive of the works given in this section.

2.2 Contractor shall provide all tools equipment, metering and testing devices required for the purpose.

2.3 On award of work, contractor shall submit a detailed proposal giving methods of testing and gauging the performance of the equipment to be supplied and installed under this contract.

3.0 **PRECOMMISSIONING:**

3.1 On completion of the installation of all pumps, piping, valves, pipe connections, and water level controlling devices the contractor shall proceed as follows:

A. **Pipe work**:

i) Check all clamps, supports and hangers provided for the pipes.

ii) Fill up pipes with water and apply hydrostatic pressure to the system as given in the relevant section of the specifications. If any leakage is found, rectify the same and retest the pipes.

4.0 **COMMISSIONING & TESTING:**

A. **Handing over**:

i) All commissioning and testing shall be done by the contractor to the complete satisfaction of the Project Manager, and the job handed over to the Project Manager, or his authorized representative.

ii) Contractor shall also handover, to the Project Manager, all maintenance & operation manuals and all other items as per the terms of the contract.
B. Guarantees:
   i) The contractor shall submit a warranty for all equipment, materials and accessories supplied by him against manufacturing defects, malfunctioning or under capacity functioning.
   
   ii) The form of warranty shall be as approved by the Project Manager.

C. Operation and Maintenance manuals

   i) Operation and Maintenance manuals. The manuals shall contain basis of design, detailed technical data and drawings for each equipment as installed, the erection, testing, operation and maintenance procedures. The contractor shall also submit the Preventive Maintenance schedule for the equipment supplied.

   ii) List of recommended spares and consumables

D) ELECTRICAL INSTALLATIONS:

1.0 GENERAL:

This section covers the general requirements for electrical work to be installed under this specification.

The Contractor shall supply and install all electric wiring, switchgear etc., necessary for the complete, safe and satisfactory operation of the plant covered by the Specification. All electrical wiring and cables shall be properly tagged to the satisfaction of the Architect.

All equipment provided shall be ‘tropicalized’, i.e. designed for use in conditions up to 50°C ambient air temperature and 100% relative humidity.

All equipment, materials, workmanship and fittings shall comply with the appropriate Indian Standard or Code of Practice as listed in the relevant paragraphs of this Section, or any approved equivalent international standards.

2.0 ELECTRICAL SUPPLY:

The electricity supply shall be 415/240 Volts, 50 Hz, 3 phase, 4 wire. All equipment shall be designed to operated with a ± 10% voltage tolerance without a loss of rated output.

All equipment shall be connected to ensure that the phases are balanced, to the requirements of the local supply authority.

3.0 SWITCHBOARDS AND SWITCHBOARD EQUIPMENT:

   a) Motor Control Panel:

   Control panels shall be self-contained suitable for the location indicated and an operating environment of 50 degree C, built up of enclosed compartments
conforming to form 3B as per BS 5486 Part-I : 1990 and IEC 439-1 to preclude fault transference between sections of the switchboard.

Control panels shall be arranged for the maximum safety of personnel. All power wiring and busbars shall be fully enclosed with isolating and insulating barriers and interlocks provided to ensure maximum safeguards. All switches shall be lockable in both of the ‘OFF’ or ‘ON’ positions.

Control panel shall be of the floor standing, type tested modular design, totally enclosed “dead front” type, consisting of dished front panels and doors built up on an approved substantial mild steel angle or channel frame with no cross-struts, and shall be fitted with removable rear and end panels held in position with six fixing points.

All panels and doors shall be constructed of best quality, dead-flat CRCA MS sheet not less than 2 mm thick. Neat cutouts shall be provided in dished panels to allow the exposure of circuit breaker escutcheons and toggles, and switch operating handles and indicators only. The edges of all outlets and drilled holes shall be burr free.

Doors shall be stiffened and provided with metal based neoprene gaskets and concealed non-ferrous door hinges. Door handles shall be chrome plated and incorporate a barrel type locking mechanism and shaft adjustment for increasing sealing pressure.

All switches/MCCB shall be provided with mechanical interlocks to prevent any positive access to any equipment inside the cubicle when the switch is in the ‘ON’ position.

Dished panels shall be stiffened and held in place with chrome plated castle head nuts attached to fixed studs of not less than 10mm nominal diameter. All fixing hardware shall be cadmium plated.

The removable rear panels shall be provided with a pair of handles for easy fixing/removal of the panels.

Provision shall be made for lifting cubicle switchboards. Eye bolts shall not be used when subjected to shear stresses.

Adequate provision and space shall be provided for bending and connecting cables, which shall be separated from switchboard busbars.

All internal small wiring shall be PVC insulated, neatly, bunched and run on supporting cleats or in trunking, colour coded and labeled or sleeved for identification. All switch-board small wiring is to terminate on labeled terminal boards or strips to which external connections are made.

Insulators, including busbar supports, shall be non-hygroscopic and non-deteriorating. The use of fibrous materials, linseed oil, varnish, “Presspalin”, etc is prohibited.
Low voltage switchboards shall be constructed to withstand a system fault level of 35/50 KA at 415 volts for 1 second. Low voltage switchboards shall be designed to comply with IS : 13947-1993.

Type test certificates, issued by a reputable and independent testing authority such as CPRI certifying the circuit breaker, busbar and its enclosure shall be submitted for review.

Ventilating water-proof louvers are to be provided on the sides and back and are to be of approved design with internal dust baffles.

Where ventilating fans are installed, a low level, filtered air intake shall be provided. The filter shall be removable from outside the switchboard.

Current transformers shall be mounted without reduction of busbars or connections and arranged for ease of removal.

b) Wall Mounted Panel:

Wall mounted panels with an appropriate rating and number of circuits shall be provided to supply power to plant located throughout the building.

Panel enclosures are to be fabricated from CRCA sheet metal of minimum 2 mm thickness and finished in enamel of a colour to the approval of the Architect. Inside the enclosure door, a circuit chart indicating the number of ways, location of equipment, loading and protection rating shall be fixed.

All wiring terminations, busbars, and live parts within the panel board shall be adequately shrouded and an insulating front shield of minimum 1.6mm thickness shall be provided to completely screen the unit's interior. Only the operating dolly and insulated surround shall project through the shield.

The units are to be provided with sufficient wiring ways for outgoing circuits at both the top and bottom of the board. Space for future ways shall be provided.

c) Busbars:

All busbars shall be made of hard drawn high conductivity aluminum. Conductor conforming to grade 91E of IS 5082-1981, making and arrangement of the busbars, connections and auxiliary wiring shall be to relevant Indian Standard. Busbars shall be insulated with heat shrunk PVC sleaving of 1.1 KV grade and Bus bar joints shall be provided with clip on shrouds.

Busbars shall be adequately rated and supported by porcelain or moulded insulators spaced at suitable intervals, the complete assembly being capable of withstanding the maximum mechanical stress to which it may be subjected under fault conditions. Full size neutral bars shall be provided.
Busbars shall be so arranged that all conductors can be brought onto the bars without undue bending.

Conductors between the busbars and MCCBs or isolators are to be high conductivity aluminium bar having a current rating of not less than that of the switches to which they are connected. The conductors are to be insulated with PVC sheathing and colour coded for phase identification.

Removable bolted links shall be provided for the accommodation of current transformers for metering and protection facilities without affecting the mechanical and electrical properties of the busbars as a whole.

d) **Moulded Case Circuit Breakers (MCCBs):**

All moulded case circuit breakers shall conform to IS : 13947-1993, and be of one approved manufacture throughout the project.

The body and base of the units are to be moulded and the units are to be sealed after assembly.

The load handling contacts are to be silver/tungsten and the contacts and operating mechanism so designed as to give a wiping action both at make and break.

The breaker operating mechanism is to be of the trip-free type so designed to prevent the load handling contacts from closing on a fault.

The toggle handle shall open and close all poles of a multipole circuit breaker simultaneously. A fault on one pole shall open all poles.

The MCCBs shall have the fault level rated as per schedule of quantities.

Circuit protection against overload and fault conditions is to be provided by means of a thermal-magnetic device designed to give thermal operation on overload and magnetic operation under fault conditions.

The position of the breaker operating dolly is to be clearly indicated for ‘ON’ and ‘OFF’.

MCCBs shall be suitable for use at temperatures of 50°C Ambient.

e) **Miniature Circuit Breaker:**

Single pole or triple pole miniature circuit breakers (MCB) are to be used for sub-circuit protection.

All MCBs shall conform to IS : 8828-1996. The body and base of the units are to be moulded bakelite or similar material and the units are to be sealed after assembly.
The load handling contacts are to be silver/tungsten, and the contacts and operating mechanism shall be so designed as to give a wiping action both at make and break.

The breaker operating mechanism is to be the trip free type. A thermal-magnetic time tripping mechanism is to be included for circuit protection against overload and short circuit. Short circuit level of MCBs shall not be less than 10 KA.

Tripping characteristics of MCBs shall be able to discriminate with up stream breakers.

f) **Isolators**:

All isolators whether mounted in a cubicle type switchboard or separately mounted shall be heavy duty type conforming to the requirements of IS : 13947-1993. All contacts are to be fully shrouded and are to have a breaking capacity on manual operation as required by British Standards.

Operation of switches shall be independent of the operator's control, with a quick make/quick break action.

The links for switch are to be high rupturing capacity.

The category of duty of the main switchboard, submain switches and cable tee-offs shall be as indicated in the schedules.

Switches and isolators mounted in cubicle type switch-boards are to be enclosed in separate sheet metal compartments, and mechanical interlocks are to be provided between the cubicle doors and the switch operating mechanisms, so arranged that the cubicle door may not be opened with the switch in the ‘ON’ position. Similarly it shall not be possible to close the switch with the cubicle door open, except that provision shall be made within the cubicle for authorized persons to defeat the mechanical interlock for test purposes, and close the switch with the door in the open position.

The ‘ON’ and ‘OFF’ positions of all switches and isolators shall be clearly indicated by a mechanical flag indicator or similar device.

In TPN switch units, bolted neutral links are to be fitted. For single pole and neutral switches and isolating switches, the neutral conductor is to be taken through a bolted link.

g) **Contactors**:

Contactors or control relays are to be single or triple pole, conforming to IS : 13947-1993 (part IV Section 3). The rating shall be as noted on the drawing but in any case, shall not be less than 10A or the rating of the circuit, whichever is the greater. All ratings shall be “continuous” and all contacts shall be silver plated. Contactor coils shall operate from the supply provided.
h) **Measuring Instruments and Protection Relays:**

All ammeters and voltmeters for use in conjunction with switch-gear are to be of the moving iron pattern to comply with relevant Indian Standard.

Unless otherwise specified, all meters are to be 96mm dial square flush pattern with quadrant scales.

Ammeters with scale deflections greater than 100A installed in the Switch Board shall indicate all phase and neutral currents.

All ammeters shall have a continuous overload capability of 120% of the upper limit of the scale for two hours. Each ammeter shall be provided with an adjustable red index pointer to indicate the normal full load current.

Ammeters shall be provided for motors of 5.5KW or larger and they shall be capable of starting current and shall have a compressed overload scale for this purpose. Motor current reading shall be provided on one phase only.

Voltmeters shall be of accuracy Class 2 and have expanded scales.

Voltmeters shall be connected to the incoming side of the power supply through 6 ampere MCB’s. Mechanical zero adjustment shall be provided for voltmeters and ammeters by means of a screw slot at the face of the meters.

Energy and maximum demand meters shall be installed as specified. Energy meters shall provide a direct, single, digital reading, without the need to apply multiplication factors.

Earth fault and overcurrent protection relays shall be as specified in the drawings.

Current transformers for measurement and protection shall be of ring pattern, clamped on readily removable, bolted copper links with accessible terminals.

Selector switches of the rotary type shall be provided to enable all phase currents and all phase and phase to neutral voltages to be read.

Instrument MCB shall be mounted on the panel adjacent to their associated instruments.

All instrument and indicating lamp wiring behind hinged front panels shall be protected by clear acrylic sheets.

The arrangement, scale deflections and ratios of all instruments and relays shall be approved prior to assembly of the associated switchboard.
i) **Labelling:**

All items of equipment on the switchboard shall be labeled to indicate function with black Traffolyte labels and white engraved lettering securely fixed with chrome plated screws. Lettering shall be at least 10mm high. Labels to all switches, isolators and the like shall indicate the supply and cable details. All labels shall be approved prior to engraving.

The use of adhesive labels will not be permitted. All electrical equipment not mounted on the switchboard shall also be labeled as specified above.

j) **Time Delays.**

Time delays shall be provided to prevent the simultaneous starting of any two motors above 3.5 kW and to prevent short cycling of automatically controlled motors.

k) **Control Switches.**

All control switches shall be of the rotary type of approved manufacturer.

Each control switch shall be panel mounted and engraved to clearly indicate the equipment controlled or function of the switch.

l) **Indicating Lamps:**

Indicating lamps shall be individual flush mounted units. Lamps shall have chromium plated and polished solid brass body and ring with metallic threaded section and shall be circular in shape of approximately 22 mm diameter.

Indicating lamps shall be of 240/110 V and rated to withstand not less than 20% continuous over voltage.

Lamps shall be well ventilated and the design shall permit removal of lamp glasses and bulbs from the front of the unit without the need of any special tool.

A push button lamp test facility shall be provided for all switchboards.

Indicating lamps shall be colour coded as follows:

- **Green** - Motor stopped, circuit breaker OFF.
- **Amber** - Supply available.
- **White** - Valve open, circuit breaker auto trip.
- **Red** - Motor running, circuit breaker ON.
- **Blue** - Valve closed.

Control circuit shall be of 240V supply.
m) Push Button Switches:

Push button switches shall comply with and be tested and certified to relevant Indian standard. Electrical rating shall be 500V AC or 250 V DC as appropriate. Push buttons for alarm duty shall be minimum of 2 amp rated. Push buttons for control duty shall be 10 amp rated.

Push buttons shall be individual flush mounted units with metallic chromium plated and polished solid brass body and ring, circular in shape and approximately 20mm diameter.

Unless specified otherwise, push buttons shall be colour coded as follows:

- Green - Start motor
- White - Open valve
- Red - Stop motor
- Blue - Closed valve.
- Black - Reset protection/alarm, lamp test
- Yellow - Accept alarm

n) Earth System:

All metal work associated with the switchboard installation not forming part of a phase or neutral circuit shall be bonded together and shall be solidly and effectively earthed through the system provided by the Main Electrical Contractor. Continuous earth bus suitable to withstand prospective short circuit current shall be provided. Hinged doors shall be connected to earth through adequately sized flexible braids. It shall be the responsibility of this Contractor to ensure that adequate means of earthing are provided.

o) Cabling:

A cabling zone clear of busbars, switch and circuit breaker chambers shall be provided in such a manner to give minimum difficulty in connecting sub-main cables entering the switchboard for connection to switch units or circuit breakers. The cabling zone shall be fully isolated from any live metal part so that future cabling and alterations can be carried out in complete safety without the necessity of shutting down the complete switchboard.

p) Terminal Blocks:

Terminal blocks for control wiring shall be rated not less than 20 amp and shall clamp the wire securely between two plates secured by a captive screw.

Terminal blocks shall have easily removable copper links to short circuit adjacent terminals or shall be fitted with suitable holders where required. Pinch screw type terminal blocks will not be acceptable.

Cables having the same number shall be terminated at adjacent terminals and connected by means of cable links at the terminal block. The incoming cable cores shall be terminated at the lower or outer side of the block, and the outgoing cable cores at the upper or inner side of the terminal block, and cable links on any free side.
Terminal blocks at different voltage, shall be segregated into groups, distinctively labeled and provided with permanent rigid barriers. Terminals in groups shall have separate non-combustible transparent plastic covers.

100% spare terminals shall be provided on each terminal block.

q) **Wiring Diagrams:**

Prepare construction layouts and functional wiring diagrams of all switchboards, which shall be reviewed prior to commencement of any work thereon.

The wiring diagrams shall show control circuits separate from main circuits and shall indicate the size of each conductor and the colour, number and/or terminal connection designation of each control conductor.

Switchboard drawings shall include a schedule of all equipment mounted therein, including make, model, and where applicable, fuse rating and set point of all variable adjustors.

Circuit diagrams shall be mounted near the switchboard in an approved location and shall be covered with either glass or clear Perspex sheet not less than 3mm thick.

r) **General Requirements:**

The Contractor shall ensure that the switchboards ordered can be accommodated (together with the control cubicles) in the space provided.

A rubber insulating mat shall be placed in front of the switchboard for its entire length.

4.0 **PVC INSULATED ARMOURED COPPER CABLE:**

Cables of this type are to be 1100 volt grade complying to IS-1554-1998 with each conductor of the same cross sectional area.

PVC insulated and colour coded cores shall be sheathed with PVC which shall serve as a bedding for galvanized strip armouring. The armouring shall be covered with an outer PVC sheath.

Cables shall be terminated in a gland fitted with an armour clamp. The gland body shall be provided with an internal conical seating to receive the armour wires ensuring that the armour wires are tightly clamped between the armour cone and conical armour seating.

The minimum bending radius for power cables shall be twelve times the overall cable diameter.

When cables are run on a wall they shall be cleated at distances not exceeding 1 metre.
5.0 PVC INSULATED ALUMINIUM CABLES:

PVC insulated aluminium cables shall comply with IS:1554-1988 (Part I). Cables are to be 1100 volt grade depending on size.

6.0 WIRING:

The current carrying capacity is to be in accordance with IEE Wiring Regulations and is to be limited by the allowable voltage drop.

All wiring shall be carried out on the loop-in system. For conduit wiring systems, wiring shall be drawn into the conduits after the whole of the conduit installation has been completed. No joints or connectors will be allowed in any such cables, except that connectors may be used in accessible positions within lighting fittings or device outlet boxes.

All cables shall be colour coded consistently over their entire length. Red, yellow and blue shall be used for phase conductor and black and green for neutral and earth respectively.

The maximum number of cables that may be accommodated in a given size of conduit, cable tray, trunking is not to exceed the number given in the Indian Standard.

Where wiring penetrates fire walls, then these shall be sealed using fire retardant pillows packed tightly on both sides of the penetration. Internal fire barriers within trunking shall also be provided. All fire retardant materials used shall be to the approval of the Architect and local authorities.

Floor penetrations for cable risers shall be made weatherproof progressively during construction to minimize damage due to the weather.

Where wiring penetrates vapour barriers, adequate air tight seals shall be provided. Wiring shall enter the low temperature area via conduit and the conduit itself shall be sealed internally to provide an airtight barrier within the conduit.

All wiring associated with equipment necessary for fire and smoke control shall be provided.

7.0 CONDUIT:

All conduits shall be heavy gauge galvanized/black enameled ERW steel complying with relevant Indian Standard. No conduits shall be less than 25 mm nominal diameter.

Conduit shall be concealed in concrete as construction proceeds, and so arranged as to drain naturally to outlet boxes. Prior to laying, this Contractor shall check with the Contractor responsible for the building work that conduits of the sizes proposed will not affect the structural integrity of the concrete. Sealing caps shall be placed on all conduits before concrete pouring commences to ensure no water enters the conduit. Expansion couplings shall be fitted at all building expansion joints.
Surface conduits shall in no circumstances be fixed to floor slabs.

All conduit systems are to be installed fully in accordance with the requirements of the IEE Regulations.

All conduits shall be swabbed through to clean out all dirt, burrs and moisture.

All sets and bends in conduit runs are to be formed on site with bending machines. Distortion of conduits due to bending is not acceptable.

Runs between draw-in boxes are not to have more than two right angle bends or their equivalent and the length of such runs shall be limited to 12 m to permit easy drawing-in of cables.

Flexible conduit shall be used for final connections to equipment subject to vibration.

The conduit shall be watertight with the provision of separate earth wire enclosed for earth continuity. All flexible steel conduits shall be PVC sheathed.

The contractor shall make good any damage to the finish of all conduits including threads cut at site, by painting damaged areas with two coats of aluminium primer paint.

Supply for review prior to installation conduit layout drawings for the entire installation. The approved set shall be kept up to date on site and on completion, three sets of record drawings shall be provided for record purposes.

8.0 CONDUIT BOXES:

All conduit junction boxes are to be malleable iron (surface mounted) or mild steel (concealed) and of standard pattern. Standard pattern boxes are to be used with conduits up to and including 25 mm diameter. Rectangular pattern boxes are to be used for conduits of 25 mm diameter and larger. For the drawing-in of cables, standard pattern through boxes are to be used. All conduit boxes are to be galvanized finish.

Adaptor boxes are to be of galvanized zinc passivated mild steel not less than 3 mm thick. Boxes are to be not less than 5 mm deep and of such dimensions as will enable the largest size cable for which the conduit run is suitable to be drawn in without excessive bending of the cables. Covers of approved material with fixing screws are to be provided. All boxes are to be drilled for holes according to the conduit entries required.

All conduit entries to adaptor boxes, outlet boxes and switchgears are to be made with couplings and hexagonal male bushes.

The protective coating of the boxes shall be heavy both inside and outside.
9.0  CABLE TRUNKING:

Metal trunking shall comply with BS 4678 and shall be manufactured in minimum lengths of 2 m from 2 mm thick zinc sprayed sheet steel finished with rust resisting primer and sprayed overall grey enamel. Covers are to be held in place by screws. Trunking shall be terminated with end flanges bolted directly to switch or distribution boards. Connecting pieces are to be used and bolted with cadmium plated mushroom head steel screws, nuts and shake-proof washers. Each joint is to have a copper link to ensure electrical continuity.

Conduit entries to trunking shall be made with couplings and brass make bushes. Knockouts will not be required and trunkings may be drilled on site.

Trunkings shall not contain more cable than allowed by the space factors described in the IEE Regulations.

Each joint shall have a copper bond bolted to each adjacent trunking to ensure electrical continuity. All frayed and sharp edges shall be removed from trunking before installation.

Conduit entry to trunking shall be by coupling and male bush. Knock-outs shall not be provided, and trunking shall be drilled on site.

Where trunking crosses expansion joints, a trunking system which will allow for expansion and maintain earth continuity shall be used. The system used shall be reviewed by the Architect prior to manufacture.

Where the trunking passes through floors or fire compartments, fire resisting barriers shall be provided.

All supports and hangers shall be of hot-dipped galvanized mild steel construction with min. coating thickness of 85 micron and 210 micron for indoor and outdoor installation respectively. All bolts and nuts shall be electroplated with zinc or cadmium with min. plating thickness of 25 micron.

10.0  CABLE TRAYS:

Cable trays are to be of a perforated pattern 1.6mm minimum mild steel with returned edges galvanized overall.

Trays shall be supported from the soffit of structural slabs and beams by mild steel rods not less than 6mm diameter and underslung mild steel angles, or alternatively, supported on steel angle brackets secured to walls. The former method shall be preferred where practicable. All supports and hangers shall be hot-dipped galvanized with bolts and nuts electroplated.
11.0 MOTORS:

All motors shall be of a type constructed to relevant Indian Standard.

Motors shall be selected to obtain the most suitable drive for the specified equipment, as recommended by the equipment manufacturers. Squirrel cage indication motors are preferred. Motors shall generally be three phase. Motors 1 KW or less may be single phase.

Ratings shall be based on continuous duty in the prescribed environment or an ambient temperature of 43 degree C whichever is the more demanding.

Motors in all cases shall be entirely suitable for the duty. A margin of not less than 10% shall be provided between the continuous rating of the motors (without overloading) and the maximum power absorbed by the item of equipment (as installed) under its most arduous operating condition, taking account of the characteristics of the driving machine. All motors up to 30 KW shall have full load efficiency of not less than 85% and power factor of not less than 85. Motors of rating greater than 30 KW shall have full load efficiency of not less than 90% and power factor of not less than 0.85.

Winding insulation and general construction of the motor casing, terminal block etc. shall be to Class F, allowing 80 degree C temperature rise above ambient, unless otherwise specified.

All motors shall have an isolating switch adjacent to and within sight of the motor. The switch shall be such that all conductors to the motor are isolated in one operation.

Motors up to and including 3.7 KW shall be fitted with ball bearings at both ends. Larger motors shall be fitted with roller or deep groove ball bearings. Motors operating with vertical shafts shall be equipped with bearings designed to counter unbalanced end thrust. Except where noted, motors shall have a synchronous speed not exceeding 1500 rpm.

All motors rated at 22 KW or more shall be fitted with thermistors or other sealed, temperature sensitive devices embedded in the windings and suitable for connection to motor protection control circuits.

Terminal blocks enclosed in cast iron or aluminium boxes shall be provided for all wiring connections to motors. The blocks shall be arranged to enable easy access for maintenance.

Motors shall be mounted on a common bed plate with the driven machine wherever possible. The whole assembly shall be supported on vibration isolating material or springs to eliminate the transmission of noise and vibration into the structure. All holding down bolts required shall be supplied and fixed by this Contractor.
Motors rated in excess of 5.5KW shall be supplied with anti-condensation heaters, controlled such that the heater is only ‘ON’ when the motor is ‘OFF’.

The drive selected for any machine shall be the type recommended by the manufacturer of the driven machine and subject to approval. All drives shall be fitted with safety guards.

For multi-winding motors there shall be no way that the motor isolating switch can be operated whereby any winding may be energized whilst another winding is isolated.

Terminal boxes shall be of such dimensions as will ensure access to the terminals and allow room for the supply leads.

Each box shall be fitted with normal bottom or top cable entry. With exception of motors with ratings less than 1 KW, all boxes shall be capable of being turned to a further 3 positions, 90 degrees apart without affecting the terminal base or terminals. Standardize frame sizes for all applications so that the minimum practical number of motors need be carried as spares. Ensure that motors of different frame sizes spared by a single motor be provided with adaptor plates, oversize couplings, oversize terminal boxes, standard keyways etc to facilitate replacement.

Motors of a particular type or application shall be of the same manufacturer.

Motors above 7.5 KW shall be provided with suitably sized tinned brass cable sockets. The type of cable terminations shall be as shown on the drawings. Three phase motors shall be fitted with separate earthing terminals.

On all motors over 25 kg in weight, lifting eyes or lugs shall be supplied.

Unless specified otherwise, enclosures for motors shall be as follows:

- Hazardous areas: Flame proof
- External: TEFC – Tropical
- In forced air flow: TE non-fan cooled or TEFC
- Areas subject to hosing: Hoseproof
- All other areas: TEFC

All motors shall be provided with name plates. Motors shall have a maximum SPL of 85db(A) at 1 metre.

Overloads and thermistor protection shall not be provided for smoke exhaust fan motors or stair pressurization fan motors which operate only under a fire alarm condition and are essential for fire and smoke control.

Motors for fans having a dual function, e.g. smoke/return air fans, which are essential for fire and smoke control, shall be protected as specified above. However, such protection shall be overridden in a fire alarm condition.

Protection for supply air fan motors shall be provided as indicated above and shall remain in circuit at all times.
12.0 STARTERS:

Contractors used in starters shall be of Class AC3 type provided with silver alloy contacts. Auxiliary contacts shall be provided to facilitate the connection of interlocks, status indication and auxiliary controls. Unless explicitly described, a minimum of one normally open and one normally closed contact shall be provided.

Each starter shall be completed with protection incorporating the following features:

- Overload protection in each supply phase adjustable from 80 to 120% of full rated load.
- Manual reset
- Phase failure protection
- Ambient temperature compensation
- An auxiliary contact to signal an overload condition.

Contactors or complete starters not mounted in switchboards shall be contained in metal or approved plastic enclosures with conduit entries, shrouded "stop" and "start" push buttons and a manual "reset" button, which may be combined with the "stop" button.

Generally, reduced voltage starters of the following type shall be selected:

- Motors from 9.3 kW to 150 kW
- Star delta
- Motors in excess of 29 kW

Each starter of the open transition “Star-Delta” (OT.SD) type shall include the following:

- One (1) main-line contactor suitably rated for the motor.
- Star and Delta configuration contactors suitably rated for the motor, mechanically and electrically interlocked to prevent simultaneous operation.
- One (1) triple pole overload relay meeting the requirements as specified previously in this clause under ‘Generally’.
- One (1) approved time delay relay, with at least 0-30 second adjustable time delay period, to control the star to delta switching contactors.

Closed transition reduced voltage starters shall be approved type and manufacture and shall be capable of starting the motor from stopped to full load speed without interruption and in such a manner that the torque developed by the motor increases as uniformly as practicable during the whole starting sequence.

Closed Transition “Star-Delta” Starters (CT. SD)
Each starter of this type shall include the following equipment:

- The equipment as specified in Clause “Open Transition Star-Delta Starters (OT.SD)”.

- A suitably rated transition resistance bank such as to allow approximately full load supply current when in circuit prior to opening of the star point. The short time rating of the resistors shall also be considered in relation to the length of their “in circuit” requirements.

- A transition contactor suitably rated to facilitate connection of the resistance bank during the transition period.

- Any additional auxiliary contacts, timers, etc required for the transition sequencing operation.

13.0 EARTHING:

All metal work associated with the electrical installation but not forming part of a phase of neutral circuit shall be bonded together and solidly and effectively earthed.

Metal conduit, ducts and cable armour shall be earthed at the switch-board at which they originate by means of locknuts, screwed connection or cable gland.

The electrical resistance of metallic enclosures or framework to earth shall be low enough to permit the passage of current necessary to operate the device protecting the associated circuit.

The size of all earth continuity and bonding conductors shall be in accordance with the Local Regulations.

All earth conductors fixed or run outside the building shall be protected against corrosion and mechanical damage.

14.0 SPARES:

The Contractor shall supply the following items as spares:

a) 20% indicating lamps of all colours and sizes.

b) Any other spares as indicated in the Schedules.

15.0 MOTOR CONTROL CIRCUITS:

For each motor provide the following:

a) On-off-auto test switch

b) Blue power on light

c) Green pilot light

d) Red fault light

e) Auxiliary contacts for remote stop-start.

f) Auxiliary contacts for remote status indication.

(Items e and f to be connected to a labeled terminal strip in the switchboard).
16.0 RADIO INTERFERENCE:

All equipment and systems shall be properly designed to ensure that there is no interference caused to any transmitters, receivers or other electronic equipment in the near vicinity. Should interference be detected, the Contractor shall provide free of charge devices capable of eliminating such interference.

17.0 ISOLATING SWITCHES:

All items of equipment shall be provided with isolating switches adjacent to the item of equipment in an accessible position.

Isolators shall be capable of being padlocked in either the on, auto or off positions.

Isolators for motors and equipment which are essential for fire and smoke control shall be labelled as specified elsewhere and in addition a second label with white lettering on a red background reading:

WARNING – ESSENTIAL FOR LIFE SAFETY

Do not switch off except in absolute emergency shall be provided.

18.0 DDC/BAS INTERFACING:

For installations incorporating a DDC/BM system, a separate terminal strip shall be provided in each switchboard for connection of DDC/BM interface cabling for monitoring and for control. Terminals shall be segregated from other terminals in the same panel and shall be of a different colour.

Contacts for monitoring of status and alarm conditions shall be potential free and arranged to close when the item of plant runs or when an alarm condition occurs. Contacts shall incorporate a wiping action to provide a consistently very low contact resistance and eliminate “open circuit” (high resistance) conditions due to oxide build up on contact surfaces. Contacts shall provide positive indication, compatible with the extra low voltage monitoring supply from the DDC/BM.

This Contractor shall co-ordinate with the DDC/BM Contractor to determine the control output voltage from the DDC/BM. Interface relays shall be mounted within each panel and controlled direct from the DDC/BM at this voltage. Relay coil current and relay characteristic shall be completely compatible with the DDC/BM system.

Status and alarm contacts and relay interface connections shall be individually connected to terminals (that is, two connections per item). Any looping required for common connections shall be made at the terminal strip as required.

All DDC/BM point numbers shall be shown on the wiring diagrams consistent with the DDC/BASM numbering system.
E) TECHNICAL DATA SHEET:

Please furnish complete technical data & detail on the format as mentioned below:

Contractor furnish the curves, dimension detail, installation detail and pump & motor detail catalogue while submitting the tender.

1.0 FILTER FEED PUMPS:

Location : As per client

Description:

**Pump:**
- Quantity :
- Make :
- Model :
- No. of Stages :
- Power Requirement :
- Efficiency :
- Pump Type :
- Capacity/ Discharge in l.p.s. :
- Total Head :
- Suction end I.D. :
- Delivery end I.D. :

**Material:**
- a) Body :
- b) Impeller :
- c) Shaft :
- Type of impeller :
- Is it suitable for direct coupling. :

**Motor:**
- Make :
- Model :
- R.P.M :
- Rating :
- Over Load Capacity :
- Class of Insulation :
- Details of Additional protection in winding :
- Motor Efficiency :
- Is it suitable for direct coupling to pump ? :
- Type of rotary movement :
- Size and type of cable for connections :
2.0 DUAL MEDIA FILTER (Domestic):

**Location: As per Client**

Contractor shall fill in the following technical data.

- **Quantity**: 
- **Material of construction**: 
- **Model**: 
- **Diameter**: 
- **Height on straight**: 
- **Max. flow rate (Lts/Sec)**: 
- **Min. flow rate (Lts/Sec)**: 
- **Working pressure**: 
- **Backwash duration (Minutes)**: 
- **Backwash flow rate**: 
- **Pressure drop across the filter Kg/Sqcm**: 
- **Max. inlet turbidity (NTU)**: 
- **Turbidity in filtered water**: 
- **Velocity of water flowing through filter**: 
- **Details of filtering media**: 
- **Source of backwash water**: 

3.0 WATER SOFTENER:

**Location: Plant Room**

- **Quantity**: 
- **Item No.**: 
- **Tag No.**: 
- **Description**: 
- **Quantity**: 
- **Make**: 
- **Model No.**: 
- **Rated Capacity**: 
- **Flow Rate (cum/hr)**: 
- **Input Water Hardness (PPM)**: 
- **Output Water Hardness (PPM)**: 
- **Quantity of Resin (Ltrs)**: 
- **Salt Required per Generation (Kg)**: 
- **Working Pressure (Kg/Sq.cm)**: 
- **Test Pressure (Kg/Sq.cm)**: 
- **Regeneration Cycle**: 
- **Inlet Max Head (Kg/Sq.cm)**: 
- **Regeneration**: 

**Material of Construction**

- **Pressure Vessel**: 
- **Pipes**: 
- **Valves**: 

104
MOC of Brine Tank : 
Capacity of Brine Tank (Ltrs) : 
Dimension of Brine Tank : 
Inlet Valve Size (mm) : 
Outlet Valve Size (mm) : 
Drain Valve Size (mm) : 
Working Height (Kg) : 
## ANNEXURE-A

### APPLICABLE CODES, STANDARDS AND PUBLICATIONS

1.0 All equipment, supply, erection, testing and commissioning shall comply with the requirements of Indian Standards and code of practices. All equipment and material being supplied by the Contractor shall meet the requirements of IS., Tariff advisory committee’s regulation (fire insurance), electrical inspectorate and Indian Electricity rules and other Codes/Publications as given below.

#### A) General:

<table>
<thead>
<tr>
<th>IS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>Pig lead</td>
</tr>
<tr>
<td>325</td>
<td>Dimensions for pipe threads where pressure tight joints are required on the threads.</td>
</tr>
<tr>
<td>554</td>
<td>PVC insulated cables for working voltages up to and including 1100 V.</td>
</tr>
<tr>
<td>779</td>
<td>Specification for water meters (domestic type)</td>
</tr>
<tr>
<td>782</td>
<td>Specification for caulking lead</td>
</tr>
<tr>
<td>800</td>
<td>Code of Practice for general construction in steel</td>
</tr>
<tr>
<td>1068</td>
<td>Electroplated coatings of nickel plus chromium and copper plus nickel plus chromium</td>
</tr>
<tr>
<td>1172</td>
<td>Code of basic requirements for water supply drainage and sanitation</td>
</tr>
<tr>
<td>1367 (Part-1)</td>
<td>Technical supply conditions for threaded steel fasteners : Part 1 introduction and general information.</td>
</tr>
<tr>
<td>1367 (Part-2)</td>
<td>Technical supply conditions for threaded steel fasteners : Part 2 product grades and tolerances.</td>
</tr>
<tr>
<td>1554 (Part-1)</td>
<td>PVC insulated (heavy duty) electric cables : Part 1 for working voltages up to and including 1100V.</td>
</tr>
<tr>
<td>1554 (Part-2)</td>
<td>PVC insulated (heavy duty) electric cables : Part 2 for working voltages from 3.3 kV up to and including 11 kV.</td>
</tr>
<tr>
<td>1726</td>
<td>Specification for cast iron manhole covers and frames</td>
</tr>
<tr>
<td>1742</td>
<td>Code of practice for building drainage.</td>
</tr>
<tr>
<td>2064</td>
<td>Selection, installation and maintenance of sanitary appliances - Code of practice.</td>
</tr>
<tr>
<td>2065</td>
<td>Code of practice for water supply in buildings.</td>
</tr>
<tr>
<td>2104</td>
<td>Specification for water meter boxes (domestic type)</td>
</tr>
<tr>
<td>2373</td>
<td>Specification for water meters (bulk type)</td>
</tr>
<tr>
<td>2379</td>
<td>Colour code for identification of pipe lines</td>
</tr>
<tr>
<td>7098 (P-1)</td>
<td>Code of practice for fixing rainwater gutters and down pipes for roof drainage.</td>
</tr>
<tr>
<td>2629</td>
<td>Recommended practice for hot dip galvanizing on iron and steel</td>
</tr>
<tr>
<td>3114</td>
<td>Code of practice for laying of cast iron pipes</td>
</tr>
<tr>
<td>4127</td>
<td>Code of practice for laying glazed stoneware pipes.</td>
</tr>
<tr>
<td>4853</td>
<td>Recommended practice for radiographic inspection of fusion welded butt joints in steel pipes</td>
</tr>
<tr>
<td>5329</td>
<td>Code of practice for sanitary pipe work above ground for buildings.</td>
</tr>
<tr>
<td>5455</td>
<td>Cast iron steps for manholes.</td>
</tr>
<tr>
<td>6159</td>
<td>Recommended practice for design and fabrication of material prior to</td>
</tr>
<tr>
<td>Reference</td>
<td>Title</td>
</tr>
<tr>
<td>-----------</td>
<td>-------</td>
</tr>
<tr>
<td>IS : 7558</td>
<td>Code of practice for domestic hot water installations</td>
</tr>
<tr>
<td>IS : 8321</td>
<td>Glossary of terms applicable to plumbing work</td>
</tr>
<tr>
<td>IS : 9668</td>
<td>Code of practice for provision and maintenance of water supplies and fire fighting.</td>
</tr>
<tr>
<td>IS : 9842</td>
<td>Preformed fibrous pipe insulation</td>
</tr>
<tr>
<td>IS : 9912</td>
<td>Coal tar based coating materials and suitable primers for protecting iron and steel pipe lines.</td>
</tr>
<tr>
<td>IS : 10221</td>
<td>Code of practice for coating and wrapping of underground mild steel pipelines</td>
</tr>
<tr>
<td>IS : 10234</td>
<td>Recommendations for general pipeline welding.</td>
</tr>
<tr>
<td>IS : 10446</td>
<td>Glossary of terms relating to water supply and sanitation.</td>
</tr>
<tr>
<td>IS : 11149</td>
<td>Rubber Gaskets</td>
</tr>
<tr>
<td>IS : 12251</td>
<td>Code of practice for drainage of building basements</td>
</tr>
<tr>
<td>IS : 5572</td>
<td>Code of practice for sanitary pipe work</td>
</tr>
<tr>
<td>IS : 6700</td>
<td>Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their cartilages.</td>
</tr>
<tr>
<td>IS : 8301</td>
<td>Code of practice for building drainage</td>
</tr>
<tr>
<td>BSEN : 274</td>
<td>Sanitary tap ware, waste fittings for basins, bidets and baths. General technical specifications.</td>
</tr>
</tbody>
</table>

**B) PIPES AND FITTINGS:**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS : 458</td>
<td>Specification for precast concrete pipes (with and without reinforcement)</td>
</tr>
<tr>
<td>IS : 651</td>
<td>Salt glazed stone-ware pipes and fittings</td>
</tr>
<tr>
<td>IS : 1239 (Part 1)</td>
<td>Mild steel tubes, tubular and other wrought steel fittings Part 1 Mild Steel tubes</td>
</tr>
<tr>
<td>IS : 1239 (Part 2)</td>
<td>Mild steel tubes, tubular and other wrought steel fittings : Part 2 Mild steel tubular and other wrought steel pipe fittings.</td>
</tr>
<tr>
<td>IS : 1536</td>
<td>Centrifugally cast (spun) iron pressure pipes for water, gas and sewage</td>
</tr>
<tr>
<td>IS : 1537</td>
<td>Vertically cast iron pressure pipes for water, gas and sewage.</td>
</tr>
<tr>
<td>IS : 1538</td>
<td>Cast iron fittings for pressure pipes for water, gas and sewage</td>
</tr>
<tr>
<td>IS : 1729</td>
<td>Sand cast iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.</td>
</tr>
<tr>
<td>IS : 1879</td>
<td>Malleable cast iron pipe fittings</td>
</tr>
<tr>
<td>IS : 1978</td>
<td>Line pipe</td>
</tr>
<tr>
<td>IS : 1979</td>
<td>High test line pipe</td>
</tr>
<tr>
<td>IS : 2501</td>
<td>Copper tubes for general engineering purposes</td>
</tr>
<tr>
<td>IS : 2643 (Part 1)</td>
<td>Dimensions for pipe threads for fastening purposes : Part 1 Basic profile and dimensions.</td>
</tr>
<tr>
<td>IS : 2643 (Part 2)</td>
<td>Dimensions for pipe threads for fastening purposes : Part 2 Tolerances</td>
</tr>
<tr>
<td>IS : 2643 (Part 3)</td>
<td>Dimensions for pipe threads for fastening purposes : Part 3 Limits of sizes.</td>
</tr>
<tr>
<td>IS : 3468</td>
<td>Pipe nuts</td>
</tr>
<tr>
<td>IS : 3589</td>
<td>Seamless or electrically welded steel pipes for water, gas and sewage (168.3 mm to 2032 mm outside diameter)</td>
</tr>
<tr>
<td>IS : 3989</td>
<td>Centrifugally cast (spun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.</td>
</tr>
<tr>
<td>IS : 4346</td>
<td>Specifications for washers for use with fittings for water services.</td>
</tr>
<tr>
<td>IS : 4711</td>
<td>Methods for sampling steel pipes, tubes and fittings</td>
</tr>
<tr>
<td>IS : 6392</td>
<td>Steel pipe flanges</td>
</tr>
<tr>
<td>IS : 6418</td>
<td>Cast iron and malleable cast iron flanges for general engineering purposes.</td>
</tr>
<tr>
<td>IS : 7181</td>
<td>Specification for horizontally cast iron double flanged pipe for water, gas and sewage.</td>
</tr>
</tbody>
</table>

C) **VALVES:**

| IS : 778 | Specification for copper alloy gate, globe and check valves for water works purposes |
| IS : 780 | Specification for sluice valves for water works purposes (50 mm to 300 mm size) |
| IS : 1703 | Specification copper alloy float valves (horizontal plunger type) for water supply fittings |
| IS : 2906 | Specification for sluice valves for water works purposes (350 mm to 1200 mm size) |
| IS : 3950 | Specification for surface boxes for sluice valves |
| IS : 5312 (Part 1) | Specification for swing check type reflux (non return) valves : Part 1 Single door pattern |
| IS : 5312 (Part 2) | Specification for swing check type reflux (non return) valves : Part 2 Multi door pattern |
| IS : 12992 (Part 1) | Safety relief valves, spring loaded : Part 1 - Design |
| IS : 13095 | Butterfly valves for general purposes. |

D) **WATER QUALITY TOLERANCE:**

| IS : 3025 (Part 1 to 44) | Method of sampling and test (physical and chemical) for water and waste water |
| IS : 4764 | Tolerance limits for sewage effluents discharged into inland surface waters |
| IS : 10500 | Drinking water |

E) **PUMPS AND VESSELS:**

| IS : 1520 | Specification for horizontal centrifugal pumps for clear cold fresh water |
| IS : 2002 | Steel plates for pressure vessels for intermediate and high temperature service including boilers |
| IS : 2825 | Code for unfired pressure vessels |
| IS : 5600 | Specification for sewage and drainage pumps |
| IS : 8034 | Specification for submersible pump sets for clear, cold, fresh water |
| IS : 8418 | Specification for horizontal centrifugal self priming pumps |
**F) QUALITY ASSURANCE AND QUALITY CONTROL :**

1.0 The work shall conform to high standards of design and workmanship, shall be structurally sound and aesthetically pleasing quality standards prescribed shall form the backbone for the quality assurance and quality control system.

2.0 At the site level the Contractor shall arrange the materials, their stacking/storage in appropriate manner to ensure the quality. Contractor shall provide equipment and manpower to test continuously the quality of materials, assemblies etc. as directed by the Employer’s designated representative. The test shall be conducted continuously and the result of tests maintained. In addition the Contractor shall keep appropriate tools and equipment for checking alignments, levels, slopes and evenness of surface.

3.0 The Engineer-in-Charge shall be free to carry out tests as may be considered necessary by him at his sole discretion, from time to time, in addition to those specified in this document. The Contractor shall provide the samples and labour for collecting the samples nothing extra shall be payable to the Contractor for samples or for the collection of the samples.

4.0 The test shall be conducted at the site laboratory that may be established by Employer's designated representative or at any other standard Laboratory selected by Engineer-in-Charge.

5.0 The contractor shall transport the samples to the laboratory for which nothing extra shall be payable. In the event of Contractor failing to arrange transportation of the samples in proper time Employer’s designated representative shall have them transported and recover two times the actual cost from the Contractor’s bills.

6.0 **The costs of all testing mandated by the Specifications shall be borne by the Contractor and are deemed to be included in his tender.**

7.0 Testing may be witnessed by the Contractor or his authorized representative. Whether witnessed by the Contractor or not, the test results shall be binding on the Contractor.
### WATER ANALYSIS REPORT

(As per IS: 10500-1991, Reaff. 1993, Ed. 2.2)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Tests</th>
<th>Test Value</th>
<th>Requirement Desirable Limits</th>
<th>Conformity</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Physico-chemical characteristics)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Colour, Hazen Unit</td>
<td>&lt;5</td>
<td>5 Max.</td>
<td>Yes</td>
<td>IS:3025 Pt-4-2002</td>
</tr>
<tr>
<td>2.</td>
<td>Odour</td>
<td>Unobjectionable</td>
<td>Unobjectionable</td>
<td>Yes</td>
<td>IS:3025 Pt-5-2002</td>
</tr>
<tr>
<td>3.</td>
<td>Turbidity, NTU</td>
<td>7</td>
<td>5 Max (10)</td>
<td>Yes</td>
<td>IS:3025 Pt-10-2002</td>
</tr>
<tr>
<td>4.</td>
<td>pH value</td>
<td>7.8</td>
<td>6.5 to 8.5</td>
<td>Yes</td>
<td>IS:3025 Pt-11-2002</td>
</tr>
<tr>
<td>5.</td>
<td>Total Hardness (as CaCO₃), mg/l</td>
<td>66</td>
<td>300 Max</td>
<td>Yes</td>
<td>IS:3025 Pt-21-2002</td>
</tr>
<tr>
<td>6.</td>
<td>Iron (as Fe), mg/l</td>
<td>0.1</td>
<td>0.3 Max</td>
<td>Yes</td>
<td>APHA 21st Ed., 3111</td>
</tr>
<tr>
<td>7.</td>
<td>Chlorides (as Cl), mg/l</td>
<td>19</td>
<td>250 Max</td>
<td>Yes</td>
<td>IS:3025 Pt-32-2003</td>
</tr>
<tr>
<td>8.</td>
<td>Fluoride (as F), mg/l</td>
<td>1.3</td>
<td>1.0 Max (1.5)</td>
<td>Yes</td>
<td>APHA 21st Ed., 4500-F</td>
</tr>
<tr>
<td>10.</td>
<td>Magnesium (as Mg), mg/l</td>
<td>8</td>
<td>30 Max</td>
<td>Yes</td>
<td>IS:3025 Pt-46-2003</td>
</tr>
<tr>
<td>11.</td>
<td>Calcium (as Ca), mg/l</td>
<td>13</td>
<td>75 Max</td>
<td>Yes</td>
<td>IS:3025 Pt-40-2003</td>
</tr>
<tr>
<td>12.</td>
<td>Copper (as Cu), mg/l</td>
<td>0.01</td>
<td>0.05 Max</td>
<td>Yes</td>
<td>APHA 21st Ed., 3111</td>
</tr>
<tr>
<td>13.</td>
<td>Manganese (as Mn), mg/l</td>
<td>&lt;0.01</td>
<td>0.1 Max</td>
<td>Yes</td>
<td>APHA 21st Ed., 3111</td>
</tr>
<tr>
<td>14.</td>
<td>Sulphate (as SO₄), mg/l</td>
<td>8</td>
<td>200 Max</td>
<td>Yes</td>
<td>IS:3025 Pt-24-2003</td>
</tr>
<tr>
<td>15.</td>
<td>Nitrate (as NO₃), mg/l</td>
<td>7</td>
<td>45 Max</td>
<td>Yes</td>
<td>IS:3025 Pt-34-2003</td>
</tr>
<tr>
<td>16.</td>
<td>Phenolic compounds (as C₆H₅OH), mg/l</td>
<td>&lt;0.001</td>
<td>0.001 Max</td>
<td>Yes</td>
<td>IS:3025 Pt-43-2003</td>
</tr>
<tr>
<td>17.</td>
<td>Mercury (as Hg), mg/l</td>
<td>&lt;0.001</td>
<td>0.001 Max</td>
<td>Yes</td>
<td>APHA 21st Ed., 3112</td>
</tr>
<tr>
<td>No.</td>
<td>Parameter (as Name), mg/l</td>
<td>Limit (mg/l)</td>
<td>Max Limit (mg/l)</td>
<td>Result</td>
<td>Reference</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------</td>
<td>--------------</td>
<td>-----------------</td>
<td>--------</td>
<td>-----------</td>
</tr>
<tr>
<td>18.</td>
<td>Cadmium (as Cd), mg/l</td>
<td>&lt;0.01</td>
<td>0.01 Max</td>
<td>Yes</td>
<td>APHA 21st Ed., 3111</td>
</tr>
<tr>
<td>19.</td>
<td>Selenium (as Se), mg/l</td>
<td>&lt;0.005</td>
<td>0.01 Max</td>
<td>Yes</td>
<td>APHA 21st Ed., 3114</td>
</tr>
<tr>
<td>20.</td>
<td>Arsenic (as As), mg/l</td>
<td>&lt;0.005</td>
<td>0.01 Max</td>
<td>Yes</td>
<td>APHA 21st Ed., 3114</td>
</tr>
<tr>
<td>21.</td>
<td>Cyanide (as CN), mg/l</td>
<td>&lt;0.01</td>
<td>0.05 Max</td>
<td>Yes</td>
<td>APHA 21st Ed, 4500-CN</td>
</tr>
<tr>
<td>22.</td>
<td>Lead (as Pb), mg/l</td>
<td>&lt;0.01</td>
<td>0.05 Max</td>
<td>Yes</td>
<td>APHA 21st Ed., 3111</td>
</tr>
<tr>
<td>23.</td>
<td>Zinc (as Zn), mg/l</td>
<td>0.03</td>
<td>5 Max</td>
<td>Yes</td>
<td>APHA 21st Ed., 3111</td>
</tr>
<tr>
<td>24.</td>
<td>Anionic detergents, (MBAS), mg/l</td>
<td>&lt;0.01</td>
<td>0.2 Max</td>
<td>Yes</td>
<td>APHA 21st Ed, 5540</td>
</tr>
<tr>
<td>25.</td>
<td>Chromium(as Cr+6), mg/l</td>
<td>&lt;0.01</td>
<td>0.05 Max</td>
<td>Yes</td>
<td>APHA 21st Ed., 3500-Cr</td>
</tr>
<tr>
<td>26.</td>
<td>Mineral Oil, mg/l</td>
<td>&lt;0.01</td>
<td>0.01 Max</td>
<td>Yes</td>
<td>IS:3025 Pt-39-2003</td>
</tr>
<tr>
<td>27.</td>
<td>Alkalinity (as CaCO₃), mg/l</td>
<td>465</td>
<td>200 Max (600)</td>
<td>Yes</td>
<td>IS:3025 Pt-23-2003</td>
</tr>
<tr>
<td>28.</td>
<td>Aluminium (as Al), mg/l</td>
<td>&lt;0.02</td>
<td>0.03 Max</td>
<td>Yes</td>
<td>APHA 21st Ed., 3500-Al</td>
</tr>
<tr>
<td>29.</td>
<td>Boron (as B), mg/l</td>
<td>&lt;1</td>
<td>1 Max</td>
<td>Yes</td>
<td>ASTM D-3082</td>
</tr>
</tbody>
</table>

**Bacteriological tests**

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Limit</th>
<th>Max Limit</th>
<th>Result</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>*MPN Coliform/100 ml</td>
<td>No growth observed</td>
<td>10 Max</td>
<td>Yes</td>
<td>IS:1622-2003</td>
</tr>
</tbody>
</table>

* Detection Limit : ≥2 organisms
G) LIST OF APPROVED MAKES WATER TREATMENT:

<table>
<thead>
<tr>
<th>No.</th>
<th>Item Description</th>
<th>Approved Makes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>UPVC pipe Class 10kg/cm²</td>
<td>SUPREME / FINOLEX</td>
</tr>
<tr>
<td>2.</td>
<td>Gunmetal valve (full way valve) Class-I</td>
<td>ZOLOTO / LEHRY / DANFOSS</td>
</tr>
<tr>
<td>3.</td>
<td>Butterfly valve</td>
<td>AUDCO / DANFOSS</td>
</tr>
<tr>
<td>4.</td>
<td>Gate Valve</td>
<td>LEHRY / ZOLOTO</td>
</tr>
<tr>
<td>5.</td>
<td>Ball Valve</td>
<td>LEHRY / AUDCO</td>
</tr>
<tr>
<td>6.</td>
<td>Dosing Pump</td>
<td>ASIA LMI / TOSCHON / GRUNDFOS</td>
</tr>
<tr>
<td>7.</td>
<td>Dosing Tank</td>
<td>SINTEX / ROTO PLAST</td>
</tr>
<tr>
<td>8.</td>
<td>Dash Fasteners</td>
<td>HILT I / FISHER / CANON</td>
</tr>
<tr>
<td>9.</td>
<td>Automatic Air Vent</td>
<td>TBS / IBP</td>
</tr>
<tr>
<td>10.</td>
<td>Pipe Clamps / Hangers / Support</td>
<td>HILT I / EASY FLEX</td>
</tr>
<tr>
<td>11.</td>
<td>Paint</td>
<td>ICI / BERGER / ASIAN PAINTS</td>
</tr>
<tr>
<td>12.</td>
<td>Conduit</td>
<td>BEC / NATIONAL / UNIVERSAL</td>
</tr>
<tr>
<td>13.</td>
<td>Diaphragm Valve</td>
<td>AS APPROVED BY WATER TREATMENT MANUFACTURER'S</td>
</tr>
<tr>
<td>14.</td>
<td>Pressure Gauges</td>
<td>H GURU / FEIBIG</td>
</tr>
<tr>
<td>15.</td>
<td>Filter Feed Pumps / Soft water transfer pumps</td>
<td>KSB / GRUNDFOSS / WILO</td>
</tr>
<tr>
<td>16.</td>
<td>Multigrade Sand Filter / softener Vessel</td>
<td>AVENTURA / AQUANOMICS / PENTAIR /</td>
</tr>
<tr>
<td>17.</td>
<td>Softener Resin</td>
<td>THERMAX / ION EXCHANGE</td>
</tr>
<tr>
<td>18.</td>
<td>CPVC Pipes &amp; Fittings</td>
<td>ASTRAL / AJAY FLOWGUARD</td>
</tr>
<tr>
<td>19.</td>
<td>Water level indicator</td>
<td>ITAL / TECHNIKA / MINILEC</td>
</tr>
<tr>
<td>20.</td>
<td>Level Controller</td>
<td>FEMAC / TECHNIKA / TECHTROL</td>
</tr>
<tr>
<td>21.</td>
<td>Strainer</td>
<td>ZOLOTO / EMERALD / LEHRY</td>
</tr>
<tr>
<td>22.</td>
<td>Multiport Valve (Auto)</td>
<td>PHARER (U.S.A.) / FLACK (U.S.A.) / INITIATIVE</td>
</tr>
<tr>
<td>23.</td>
<td>Multiport Valve (Manual)</td>
<td>MIDAS / INITIATIVE</td>
</tr>
<tr>
<td>24.</td>
<td>Flanges</td>
<td>CLASS 150 / TABLE 'H'</td>
</tr>
<tr>
<td>25.</td>
<td>Float Valve</td>
<td>CIM / LEADER / LEHRY</td>
</tr>
<tr>
<td>26.</td>
<td>Pressure Switch</td>
<td>DANFOSS / PORTER</td>
</tr>
<tr>
<td>27.</td>
<td>Controls</td>
<td>HONEYWELL / STEAFA / PENN</td>
</tr>
<tr>
<td>28.</td>
<td>Vibration Eliminator</td>
<td>RESISTOFLEX / KANWAL</td>
</tr>
<tr>
<td>29.</td>
<td>Foot Valve</td>
<td>KIRLOSKAR / KALPANA / DANFOSS</td>
</tr>
<tr>
<td>30.</td>
<td>Water Meter</td>
<td>KAYCEE / KENT / DESMESH /</td>
</tr>
<tr>
<td>31.</td>
<td>Control Cable</td>
<td>UNIVERSAL / HAVELLS / BATRA HANLEY</td>
</tr>
<tr>
<td>32.</td>
<td>Control Cable Termination</td>
<td>ELEMEX / WEGA / PHONEX</td>
</tr>
<tr>
<td>33.</td>
<td>Selector Switch</td>
<td>SULZER - L&amp;T / KAYCEE / SIEMENS</td>
</tr>
<tr>
<td>34.</td>
<td>Contactor</td>
<td>L&amp;T / SIEMENS / MG / GE / ABB</td>
</tr>
<tr>
<td>35.</td>
<td>Indication Lamps / Push Button</td>
<td>L&amp;T / TRINITY / BCH / ABB</td>
</tr>
<tr>
<td>36.</td>
<td>Copper Wires</td>
<td>NATIONAL / FINOLEX / BONTON</td>
</tr>
<tr>
<td>37.</td>
<td>Cables</td>
<td>HAVELLS / GRANDLAY / BATRA HANLEY</td>
</tr>
<tr>
<td>38.</td>
<td>Magnetic Flow Meter</td>
<td>SBEM / ELECTRANET</td>
</tr>
</tbody>
</table>
SECTION – 3.2 SEWAGE TREATMENT PLANT WORKS

SECTION A.: STP WORKS

1. Introduction

Wastewater Treatment plant of capacity 17 KLD with Physico – chemical Treatment followed by biological treatment – technology based - MBBR Technology is to be installed for treating the domestic Sewage. The treated sewage from STP is proposed to be used for air-conditioning, irrigation and Flushing.

2. Influent Properties

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>PARAMETER</th>
<th>QUALITY OF WASTEWATER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>pH</td>
<td>6.5 – 8.5</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>BOD5</td>
<td>Upto 300 mg/L</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>COD</td>
<td>Upto 650 mg/L</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Suspended Solids</td>
<td>250 mg/L</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Oil &amp; Grease</td>
<td>Upto 50 mg/L</td>
<td></td>
</tr>
</tbody>
</table>

3. Desired Quality of Treated Water after Ultra Filtration

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>PARAMETER</th>
<th>QUALITY OF TREATED WATER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>pH</td>
<td>6.0 – 8.5</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>BOD5</td>
<td>Less than 5 mg/L</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>COD</td>
<td>Less than 20 mg/L</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Oil &amp; Grease</td>
<td>Below detectable limit</td>
<td></td>
</tr>
</tbody>
</table>

4. Scope of Work

4.1. Inclusion

The scope of work for the STP shall be, but not limited to as given herein:

The scope shall includes Design, Engineering, Procurement, Supply, Manufacture, Construction and Erection of Mechanical, Electrical, Piping, Painting and Instrumentation works, Storage at site, Testing, Commissioning, Training of owner’s personnel, trial runs for 30 days after commissioning and performance guarantee test run for 72 hrs continuous operation, guaranteeing, and handing over of Sewage Treatment Plant to the Owner, as per basic engineering design basis, specifications, equipment lists, tender drawings, etc., all complete.

The Preliminary Design details of bar screen, capacities of pumps, blowers, filters, dozers, etc. given below are indicative and are for tendering purpose only. However, the detailed design shall be carried out by the contractoragency and submit the same to Engineer-In-Charge for approval before proceeding for construction, fabrication and procurement. Any equipment, accessory, switchgears etc are missing in the schedule of quantity and specification to make the system functional, should be included by the vendor to make the plant operational.
4.2. **Process Scheme**

Sewage shall be collected in a Raw Sewage Collection Sump after passing through bar screens & Oil & Grease Trap. From the Raw Sewage Collection sump, the sewage would be transferred to the MBBR tank with the help of Pumps. The bio-reactions should be carried out in controlled environment in the bioreactor, which must be 2 in series for maximizing the BOD removal efficiency & avoid any short circuit. The bioreactor should fit with MBBR grid of stainless steel pipe to supply air in form of small bubbles from the bottom of the tanks, so that complete volume of tank is utilized. The bacterial population should be allowed to grow on the floating media, which should form an integral part of the reactor system.

The sludge must be removed before the treated sewage can be disposed off through secondary settler with tube media. The Clear water will be passed through filtration unit followed by a UV Sterilizer AND Ultra Filteration unit. The sludge formed & removed through secondary settler should be sent to the centrifuge for mechanical dewatering & drying. The filtrate from centrifuge should be drained back to receiving sump by gravity.

4.3. **Operation of the Plant**

The mode of plant operation shall be semi-automatic. Backwash & regeneration cycle for filters (activated carbon filters and multi grade pressure sand filters) as well as service cycle (after backwash/regeneration) shall be initiated manually. Normally, filters shall be backwashed / regenerated manually after 8 -10 hours cycle for period of 30-40 minutes.

The entire operation of the plant and its maintenance shall be as per the operation and instruction manual supplied by the contractor.

The contractor shall carry out the operation and maintenance of the plant including all consumables like chemicals, spares for one year after successful commissioning and stabilization of the plant.

Instruments listed below shall be provided as a minimum for the plants. All Instruments specified elsewhere in the tender document shall also be provided. However, any other instrumentation required to make the plant fully operational, safe and complete shall also be included in Contractor's scope of work. All alarms shall be available in the Control Room. All indications regarding feed & treated effluent quality & quantity, tank levels and others as specified in this document or elsewhere in the tender document or as required shall also go to the Control Room.

Pressure Gauge (PG) shall be provided at inlet & outlet of each filter (activated carbon filters, Pressure sand filters), downstream of media trap which are provided at outlet of each filter, and at discharge of each pump and blower. Isolation and drain valves shall be provided as required.

Flow meter shall be provided at the outlet of activated carbon filter to determine the output of the treatment system. The flow meter shall be of digital type to record daily discharge of the plant and cumulative flow of the plant.
For all pumps/blowers/agitators in the plant, both running and stop indication to be provided in Control Room on console. Facility for start & Stop from the STP control system shall be provided along with the local start & stop facility.

All instruments shall be of approved make and shall conform to the relevant codes and standards.

All instruments shall be suitable for corrosive environment.

5. **Engineering Design Data**

5.1. **Pressure sand filter and Activated Carbon filter**

The Activated Carbon Filters and multi grade pressure sand Filters shall be designed and constructed as per specifications. Vessels shall be designed to contain filter media, supporting media, under-drains and distribution system (corrosion resistant construction), all interconnecting piping with pipe supports and valves. All internal support beams shall be bolted or clamped in position. Supports rings may be welded to the shell.

5.2. **Structural Works**

Fabrication and Structural works shall include but not limited to the following:

1. All the tanks shall be of leak proof MS structures, Water Proofing and FRP lining shall be done on inner surface of the tanks (Payment shall be made under the respective items)

2. The size of the MS tanks shall be provided by the contractor according to process requirements.

3. All Filters shall be located in an open area including all tanks.

4. Air blowers for filters shall be located within the control room.

5. MS pavement shall be provided around all equipments and in operating areas as required (Payment shall be made under the respective item)

6. All Foundations for all equipments, vessels, tanks, pumps, blowers, pipe racks, instrument and electrical cable racks, etc as per specifications (included in the quoted rate of STP item)

7. Complete Structural works, e.g. pipe racks, cable racks, pipe supports, instrument supports, hand-railing, platforms, stairs, ladders, inserts, crossovers, etc. shall be as per standards and specifications. (Included in the quoted rate of STP item)

8. Steel platforms with ladders, steel stairs water storage tanks and hand-railing as Specified / required as per specifications and drawings. (included in the quoted rate of STP item)

9. Complete civil works including grouting of equipments shall be as per specifications mentioned elsewhere in the tender document.
5.3. **Miscellaneous**

1. Minimum clear distance between adjacent pumps and blower foundations shall not be less than 900 mm. Adequate space shall be provided for approach to all valves and instrumentation (especially in filters and regeneration area).

2. Effective volume of the sump / tank shall be between low water level and high water level (excluding free board & dead volume depth).

3. All pumps shall be flooded suction type fully primed under low level in the tank unless otherwise specified. Low level shall be above the top of pump casing.

4. All valves (filters, regeneration, chemical dosing) shall be approachable. Valve in elevated platform / rack shall be provided with chain for operation.

5. All pump pedestals shall have arrangement for collection of leakage and connection to the nearest suitable drain.

6. Minimum width of Plastic steps shall be 700 m.

7. Vehicular approaches shall be provided to units wherever required from maintenance/ operation point of view as well as for chemical/activated carbon/sand loading/unloading, etc.(Payment shall be made under respective item).

8. All units shall have proper approaches for maintenance, monitoring and control. Access to the platform shall be by ladders. Access shall be by stairway if unit requires frequent attention of operating personnel (included in the quoted rate of STP item).

9. All walkways, overhanging floors, platforms, stairways, sump pits, and ponds more than 1.0 m deep below GL shall be provided with guard railing of minimum height of 1.0 m. Access to get down by means of steps/rungs should also be provided (included in the quoted rate of STP item)

10. Minimum vertical clearance for roads crossing pipe racks shall be 6.0 m.

11. Minimum height of pedestal for Pumps and Blowers shall be 150 mm above floor/pavement level.

12. Minimum clearance of 500 mm shall be provided around motors / equipments (pedestal) etc.

13. All Motors located outdoors shall be covered with FRP Motor Protection Guard (flame proof / fire retardant type) (included in the quoted rate of STP item)

14. The filters shall be provided with adequate number of manholes (for media topping, removing/changing top distributor & bottom collector/strainers) and hand-holes for hydraulic unloading/loading of filters media. Platform shall be provided on top with ladder approach to both manholes for loading and unloading media /access. (deemed to be included in the quoted rate of STP item)
6. **BATTERY LIMIT CONDITIONS**

**Fabrication Works:** Construction of MSFRP lined tanks, Water proofing, FRP lining and providing puddle flanges shall be included in the items.

All other civil works like foundations for equipments, Steel ladders, piping, Inspection platforms, railing, etc shall be deemed to be included in the scope of Contractor.

**Electrical:** General area lighting in the STP area, Control room lighting, ventilation, etc shall be paid separately under respective item.

Power cable shall be provided upto incoming point of STP Control Panel. Cable sizing shall be provided based on the inputs from the STP vendor.

All other electrical works like panels, electrical, electro-mechanical equipment, internal cabling, earthing, terminations etc shall be deemed to be included in the quoted rate of STP item. The items missing in the Tender document and necessary to make the plant operational should be included in the Quote.

**Piping:** Piping till the inlet of the bar screen chamber shall be paid separately under respective item. From the Inlet of the bar screen chamber to outlet of the treated water and soft water pumps (including pump sets for treated and soft water pumping) shall be deemed to be included in the quoted rate of STP Item.

All the works in STP area required to make system complete and functional shall be deemed to be included in the quoted rate of STP item.

**Mechanical Completion / Pre-Commissioning / Commissioning Guarantee & Tolerances.**

7. **Mechanical Completion**

Mechanical completion of the Plant shall mean that all installations works of the Plant have been completed and hydro tested in accordance with approved construction drawings, approved specifications, applicable codes, accepted International good engineering practices and all the activities have been completed in a comprehensive manner by the Contractor and accepted by the Employer's designated representative.

8. **Pre-Commissioning**

Pre-commissioning activities are defined as those activities which are required to be performed after completion / installation, inspection, hydro testing, etc. of the Plant to make it ready for commissioning.

8.1. **Commissioning**

The Plant shall be considered “Ready for Commissioning” when all the facilities have been completed along with their auxiliaries and support facilities in every respect including charging of lubes, chemicals, activated carbon, sand, preparation of solution, etc. as recommended by Employer’s designated representative in standard format with all exceptions, if any, resolved.
Commissioning of the Plant shall mean taking the feed in the system, passing it through normal route and establishing the process control parameters. The Plant shall be considered to be commissioned successfully with instrumentation / control system, process, utilities & support system have been on uninterrupted stable operation for not less than 72 hours. Whether the 72 hours operation has been successful or not shall be decided by Employer’s designated representative based on observations recorded during 72 hours. The countdown for 72 hours operation shall start on after the system has been on stable operation with all controls and safety systems in normal operation for a period of not less than 48 hours.

8.2. **Tolerances**

The guaranteed figures are subject to the following tolerances for acceptance of the plant. However, penalties shall be imposed for any deviation from the guaranteed figures as highlighted in relevant section of this Technical Specification.

1. Hydraulic capacity measurement ± 2%.
2. Treated effluent quality measurement as per accuracies guaranteed by the instrument supplier. In case of any variation over the tolerances given above, contractor shall rectify the plant at its own cost within a time mutually agreed upon by the contractor and owner to bring the plant performance in line with the guaranteed figures.

8.3. **Performance Guarantee Test Run & Penalty**

After the system has been stabilized by the contractor during trial runs, the contractor shall conduct a performance guarantee test run for the complete system prior to handing over the plant to the Owner. The procedure for performance testing shall be submitted to Employer’s designated representative for review and shall be mutually agreed. The duration for the performance guarantee test run shall be 72 hours continuous operation of the plant. During the above test run, the following guarantee parameters as per tender document shall be fulfilled within the tolerances as specified.

i. Hydraulic Capacity of the STP

ii. Quality of Treated Effluent

Any loss of media (activated carbon, sand etc.) during pre-commissioning, commissioning, etc. prior to handing over of plant to the owner shall be made up by the contractor to the quantities specified in the design calculations as initial charge without any extra cost to the Owner.

If on any testing, any material or equipment or the unit does not meet the design, rated or guaranteed performance related there to, the contractor shall forthwith, within the scope of work of contractor and at no additional cost to the Owner, undertake such additional tests and / or operations as are necessary to identify the cause of such failure. Such tests and / or operations shall be conducted in conjunction with the Engineer-In-Charge, if the plant as a whole fails to meet the guarantees. If as a result of such tests and / or operations it is determined that the design, rated and /or guaranteed outputs or capacities have not been met because of defect in any material(s) (including machines and equipment) supplied by the Contractor, the Contractor shall forthwith in consultation with the Employer’s designated representative take steps necessary to cause the defect to be identified and rectified, either by replacement of the defected material, machine or equipment or part thereof or by repair or replacement thereof at solely cost and expenses of Contractor.
In the event that certain of the guaranteed performance have not been met, the Contractor shall make suitable additions, deletions or modifications, if required after obtaining approval of Employer's designated representative to the process and the Plant to ensure the guaranteed results within a reasonable period of say 2 to 3 weeks from the date of receipt of such intimation from Employer’s designated representative. If the Contractor fails to take any suitable action or fails to produce guaranteed performance results even after modification etc, a penalty as deemed fit including but not limited to the actual expenditure which the Owner/Employer's designated representative might incur to make the system meet the Project/Process requirements (by engaging other agencies at the risk and cost of the contractor) plus 15% towards overheads shall be deducted from any amount due to the contractor from R.A bills against the subject contract.

9. **Equipment / Material Supplies**

All equipments / materials will be procured from approved vendor/ approved make list attached. Any item for which approved make list is not provided, contractor shall obtain prior approval of Employer’s designated representative before placement of order.

9.1 **Standards, Specifications and Codes**

For the execution of work, standard and specifications for civil, structural, electrical, piping etc mentioned elsewhere in the tender document shall be strictly followed. In absence of any specifications/standards, BIS Codes shall be followed.

10. **Spares**

10.1. **Mandatory Spares**

Mandatory spares as 15% of the total quantity for the whole plant shall be provided by the contractor for activated carbon and sand. Also one set of laterals for ACF and Pressure Sand Filters shall be provided by the contractor as mandatory spares. In case strainer on plate is provided in place of laterals, 15% of the total quantity of nozzles shall be provided by the contractor as mandatory spare. Mandatory spares for any other equipment shall be as per manufacturer’s specifications. Mandatory spares are to be provided by the contractor within the quoted lump sum price for STP.

10.2. **Two Years Recommended Spares**

Two years normal operation spares as per the manufacturer's recommendations shall be provided by the STP contractor and cost of the same is deemed to be included in the quoted rates.

All spare parts supplied by the bidder shall be wrapped and packaged so that they will be preserved in original and new condition under the normal conditions of storage to be anticipated in India and shall be properly tagged and coded so that later identification as to intended equipment usage will be facilitated. They shall be packed separately clearly marked as 'spare parts'. Packing lists shall be furnished so that the parts can be handled without uncrating if desired.
11. **BASIC COST OF MATERIALS & APPROVAL OF SAMPLES:**

11.1. The contractor shall submit 2 or more samples of materials as nearer as possible to the basic cost of materials wherever mentioned in the Schedule of Rates (SOR). Engineer in-charge shall constitute a committee consisting of representatives from Owner, EIL and the contractor who shall analyze the markets for verifying the basic cost of materials through quotations, market visits etc. The sample shall be approved by the Engineer-in-charge/Owner after the above exercise is completed to ascertain the basic cost of materials.

11.2. For items which are in the scope of supply of the Contractor, it shall be implied that “wherever approved equivalent” is mentioned in the Schedule of Rates (SOR), it shall mean that “material meeting the basic cost of materials mentioned in the SOR” and “meeting all the technical properties and parameters” of the make proposed/mentioned in the SOR.

11.3 **Contractor Data Requirement**
Contractor must necessarily submit the drawings / documents as per the following during detail engineering:

Write-up including the following:
- Adequacy of treatment scheme to achieve guaranteed treated water quality & hydraulic capacity of the plant
- Instrument, Control and monitoring philosophy Adequacy of area allotted / area requirement

P&ID including interlocks

Plant Layout drawing

Equipment List

Detailed Electrical Load List (incl. running hours considered)

Type of internals (distributor and collecting system) used in Filters

Design calculation to arrive at chemical consumption, volume of regeneration and backwash water (type and quantity), water quality and quantity, equipment / unitizing, etc.

Chemical consumption

Utility consumption

Hydraulic / Pressure drop calculation (both operating and backwashing/regeneration)

GA drawings

Engineering data sheets for each item and instruments data sheets.

Operation and Maintenance Manual

Catalogues and performance data/curves of activated carbon, equipments, instruments etc.
SECTION B. LIST OF APPROVED MAKES/MANUFACTURES OF MATERIALS

NOTE:

i) Tenderer must tick the brand being offered. In case some other brand is being offered, it must be clearly stated and supporting document must be enclosed.

ii) All Brand Names/Manufacturers are Indian unless specified otherwise.

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>MATERIAL</th>
<th>BRANDNAME / MANUFACTURER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Submersible Sewage Pump</td>
<td>a) Grundfos, Denmark</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Wilo, France</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) DP, Holland</td>
</tr>
<tr>
<td>2.</td>
<td>Self Priming Monoblock Sewage and Sludge</td>
<td>a) Kirloskar Transfer Pumps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Johnson</td>
</tr>
<tr>
<td>3.</td>
<td>Filter Feed Pump/Treated Water Transfer Pumps</td>
<td>a) Grundfos, Denmark</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Wilo, France</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) DP, Holland</td>
</tr>
<tr>
<td>4.</td>
<td>Screw/centrifugal Pumps</td>
<td>a) Rotomech</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Tushaco</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) UT Pumps</td>
</tr>
<tr>
<td>5.</td>
<td>Air blowers</td>
<td>a) Beta</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Everest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Kay</td>
</tr>
<tr>
<td>6.</td>
<td>U-V Disinfecting System</td>
<td>a) Alfa UV</td>
</tr>
<tr>
<td>7.</td>
<td>Centrifuge</td>
<td>a) Pharmatech</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Weeco</td>
</tr>
<tr>
<td>8.</td>
<td>FRP Vessels (Filter Shell)</td>
<td>a) Well-Mate, USA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Aventura</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Pentair</td>
</tr>
<tr>
<td>9.</td>
<td>Metering Pumps</td>
<td>a) Asia, LMI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Toshcon Sesco</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Etatrunc, Italy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d) Grundfos</td>
</tr>
<tr>
<td>10.</td>
<td>HDPE Solution Tanks</td>
<td>a) Sintex</td>
</tr>
<tr>
<td>11.</td>
<td>U.F. Membranes</td>
<td>a) DOW, USA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Hydranutics, USA</td>
</tr>
<tr>
<td></td>
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<td>c) GE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d) Norrit</td>
</tr>
<tr>
<td>12.</td>
<td>Membrane Housing</td>
<td>a) Ecoline</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Aventura</td>
</tr>
<tr>
<td>S.NO.</td>
<td>MATERIAL</td>
<td>BRANDNAME / MANUFACTURER</td>
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<td>-------</td>
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<td>--------------------------</td>
</tr>
</tbody>
</table>
| B)    | Pipes and Fittings | a) Ashirwad  
b) Astral  
c) Finolex |
|       | PVC Pipes and Fittings | a)  
b)  
c)  |
| 1.    | Butterfly Valves | a) Audco  
b) Advance  
c) KSB  
d) Danfoss  
e) SKS |
| 2.    | Gunmetal Gate Valves, Non-return Valves | a) Leader  
b) Zoloto |
|       | PVC Ball Valvesa) | a) Plastro Plasson |
| 3.    | Solenoid Valves | a) Danfoss  
b) Aira - Airmax |
| 4.    | Water Level Controller (Magnetic Float Type) | a) Janus  
b) Cirrus  
c) Elegant Control  
d) Swlitzer |
| C)    | Valves | a)  
b)  
c)  
d)  
e)  |
|       | a)  
b)  
c)  
d)  
e)  |
| D)    | Electric Switch Gear and Starters | a) Siemens  
b) L & T  
c) ABB  
d) Merlin Gerin  
e) Legrand  
f) GE-Power |
| 1.    | Electric Switch Gear | a)  
b)  
c)  
d)  
e)  
f)  |
|       | PVC Insulated Armoured Power and Control Cables | a) Skytone  
b) Polycab  
c) Havell’s |
| 2.    | MCCB | a) L & T  
b) Merlin Gerin  
c) ABB |
| 3.    | MCB | a) L & T - Hager  
b) Merlin Gerin  
c) MDS - Lexic |
| 4.    | Starters, Relayes etc. | a) L & T  
b) ABB  
c) Control & Switch Gear  
d) GE - Power |
| 5.    |       | a)  
b)  
c)  
d)  |
<table>
<thead>
<tr>
<th>S.NO.</th>
<th>MATERIAL</th>
<th>BRANDNAME / MANUFACTURER</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Push button and indication lights</td>
<td>a) L &amp; T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Siemens</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Telemenaque</td>
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<tr>
<td></td>
<td></td>
<td>d) Vaishno</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e) BCH</td>
</tr>
<tr>
<td>7.</td>
<td>Digital Voltmeter &amp; Ammeter</td>
<td>a) AE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Cadel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Enercon</td>
</tr>
<tr>
<td>8.</td>
<td>Selector Switches</td>
<td>a) L &amp; T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Keycell</td>
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<td></td>
<td></td>
<td>c) Salzar</td>
</tr>
<tr>
<td>9.</td>
<td>HRC Control Fuses</td>
<td>a) L &amp; T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Siemens</td>
</tr>
<tr>
<td>10.</td>
<td>Digital Water Quality Monitoring Equipment</td>
<td>a) Fluid Control System, USA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Impell</td>
</tr>
<tr>
<td>11.</td>
<td>Water Flow Meter Turbine Type</td>
<td>a) Kranti</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Kent</td>
</tr>
<tr>
<td>12.</td>
<td>Electro Magnetic Flow Meter</td>
<td>a) Electronet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Rose Mount</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) IOTA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d) Rockwin</td>
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</tbody>
</table>
SECTION – 4

SCHEDULE OF WORKS
# SCHEDULE OF WORKS

## 1.0 WATER TREATMENT PLANT:

### 1.0 Water Supply Pump:

Supply, Installation, testing & commissioning of Horizontal/Vertical monobloc/centrifugal pumping set with C.I. body and SS304 impeller, SS shaft and C.I./M.S Base & head, mechanical seal, connected to a TEFC induction motor suitable for 400/440 volts, 3 phase 50 cycles A.C. supply with 150 mm dia SS body pressure gauge with gunmetal isolation cock, vibration eliminating pads as required, M.S fabricated base plate bolted to cement concrete foundations complete. 15m cable etc. as per requirement complete in all respects. (Pumps shall be installed in a set of two pumps one working and One standby).

#### a) Filter Feed pumps:
- **Capacity/Flow Rate**: 4.50 M³/Hr
- **Head**: 35 mtr
- **1 Set of Pump = 2 Nos. pump (1 working+1 standby)**
- **Approx H.P.**: 4.0 HP (3.0 KW) each or as per Manufacturer recommendation
- **Operation time**: 8.0 hr

#### b) Domestic / Soft Water Transfer pumps:
- **Capacity/Flow Rate**: 4.50 M³/Hr
- **Head**: 30 mtr
- **1 Set of Pump = 2 Nos. pump (1 working+1 standby)**
- **Approx H.P.**: 3.0 HP (2.5 KW) each or as per Manufacturer recommendation

Note: Normally it works to transfer the domestic water to domestic water overhead tank however it shall also act as a standby pump to transfer the soft water to the soft / treated water storage tank located in STP in case of short fall of soft water available from STP. All the bypass piping including fitting and valves.

### 2.0 Providing and fixing cast brass threaded horizontal/vertical type non return valves, complete to IS 778.

#### a) 25mm dia
- Nos 2
#### b) 32mm dia
- Nos 2
#### c) 40mm dia
- Nos 4
#### d) 50 mm dia
- Nos 2

### 3.0 Providing & fixing brass ball valve with hard chrome plated ball inside PTFE (Teflon) seat & ring with chrome plated centre handle with female BSP threads complete in all respects.

#### a) 25 mm dia
- Nos 2
#### b) 32 mm dia
- Nos 2
#### c) 40 mm dia
- Nos 4
#### d) 50 mm dia
- Nos 2

### 4.0 Providing and fixing cast iron butterfly valves nylon coated S.G. iron disk, stainless steel shaft, black nitrile rubber/EPDM seating 3mm asbestos gasket including nuts and bolts for flanged end connections complete with corresponding flanges.

#### a) 50 mm dia
- Nos 6
#### b) 65 mm dia
- Nos 6
#### c) 80 mm dia
- Nos 6

### 5.0 Supply, Installation, testing & commissioning C.I. Y type suction strainer with gunmetal or brass internal parts installed outside water tanks.

#### a) 50 mm dia
- Nos 4

### 6.0 Supply, Installation, testing & commissioning resilient rubber neoprene lined style archi vibration eliminators(expansion bellows) suitable for raw water upto pressure 20 kg/cm².

#### a) 25mm dia
- Nos 2
#### b) 32mm dia
- Nos 2

---

S.No. | Description | Unit | Qty
--- | --- | --- | ---
A) | WATER TREATMENT PLANT: |  | 
1.0 | Water Supply Pump: |  | 
| Supply, Installation, testing & commissioning of Horizontal/Vertical monobloc/centrifugal pumping set with C.I. body and SS304 impeller, SS shaft and C.I./M.S Base & head, mechanical seal, connected to a TEFC induction motor suitable for 400/440 volts, 3 phase 50 cycles A.C. supply with 150 mm dia SS body pressure gauge with gunmetal isolation cock, vibration eliminating pads as required, M.S fabricated base plate bolted to cement concrete foundations complete. 15m cable etc. as per requirement complete in all respects. (Pumps shall be installed in a set of two pumps one working and One standby). |  | 
| a) Filter Feed pumps: |  | 
| ■ Capacity/Flow Rate: 4.50 M³/Hr |  | 
| ■ Head: 35 mtr |  | 
| ■ 1 Set of Pump = 2 Nos. pump (1 working+1 standby) |  | 
| ■ Approx H.P.: 4.0 HP (3.0 KW) each or as per Manufacturer recommendation |  | 
| ■ Operation time: 8.0 hr |  | 
| b) Domestic / Soft Water Transfer pumps: |  | 
| ■ Capacity/Flow Rate: 4.50 M³/Hr |  | 
| ■ Head: 30 mtr |  | 
| ■ 1 Set of Pump = 2 Nos. pump (1 working+1 standby) |  | 
| ■ Approx H.P.: 3.0 HP (2.5 KW) each or as per Manufacturer recommendation |  | 
| Note: Normally it works to tranfer the domestic water to domestic water overhead tank however it shall also act as a standby pump to tranfer the soft water to the soft / treated water storage tank located in STP in case of short fall of soft water available from STP. All the bypass piping including fitting and valves. |  | 
| 2.0 | Providing and fixing cast brass threaded horizontal/vertical type non return valves, complete to IS 778. |  | 
| a) 25mm dia | Nos | R.O. |
| b) 32mm dia | Nos | R.O. |
| c) 40mm dia | Nos | 4 |
| d) 50 mm dia | Nos | 2 |
| 3.0 | Providing & fixing brass ball valve with hard chrome plated ball inside PTFE (Teflon) seat & ring with chrome plated centre handle with female BSP threads complete in all respects. |  | 
| a) 25 mm dia | Nos | 2 |
| b) 32 mm dia | Nos | 2 |
| c) 40 mm dia | Nos | 4 |
| d) 50 mm dia | Nos | R.O. |
| 4.0 | Providing and fixing cast iron butterfly valves nylon coated S.G. iron disk, stainless steel shaft, black nitrile rubber/EPDM seating 3mm asbestos gasket including nuts and bolts for flanged end connections complete with corresponding flanges. |  | 
| a) 50 mm dia | Nos | 6 |
| b) 65 mm dia | Nos | 6 |
| c) 80 mm dia | Nos | 6 |
| 5.0 | Supply, Installation, testing & commissioning C.I. Y type suction strainer with gunmetal or brass internal parts installed outside water tanks. |  | 
| a) 50 mm dia | Nos | 4 |
| 6.0 | Supply, Installation, testing & commissioning resilient rubber neoprene lined style archi vibration eliminators(expansion bellows) suitable for raw water upto pressure 20 kg/cm². |  | 
| a) 25mm dia | Nos | R.O. |
| b) 32mm dia | Nos | R.O. |
7.0 Supplying, installing, testing and commissioning of online magnetic flow meter complete in all respect for monitoring of water supply from Sintex tank to the overhead soft water storage tank

<table>
<thead>
<tr>
<th>Dia</th>
<th>No.</th>
<th>R.O.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 mm</td>
<td>No.</td>
<td>R.O.</td>
</tr>
<tr>
<td>32 mm</td>
<td>No.</td>
<td>R.O.</td>
</tr>
<tr>
<td>40 mm</td>
<td>No.</td>
<td>1</td>
</tr>
<tr>
<td>50 mm</td>
<td>No.</td>
<td>R.O.</td>
</tr>
</tbody>
</table>

8.0 Fixing on terrace polyethylene water storage tank, ISI : 12701 marked, with cover and suitable locking arrangement and making necessary holes inlet, outlet and overflow with fitting and base support of tank.

<table>
<thead>
<tr>
<th>Dia</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC Tank - 5000 Ltrs</td>
<td>1</td>
</tr>
</tbody>
</table>

TOTAL OF WATER SUPPLY PUMPS CARRIED OVER TO SUMMARY

B) WATER TREATMENT EQUIPMENTS:

1.0 Supply, installation, testing and commissioning of vertical self supporting Multigrade sand filter & Activated Carbon Filter. Filter vessel shall be constructed of FRP/composit material with inner shell of integrated Polyethylene with Fiber Reinforced Plastic as per manufacturer standard. The inner distribution system and the under bed draw off system shall be of Hub & Lateral type/Riser tube with top & bottom strainers of Polypropylene material. Filter shall be supplied with initial charge of Filter media like special graded sand with supporting media like silex, gravel etc. The filter shall complete with pressure gauge at inlet & outlet, gunmetal sample cock, PVC face piping/interconnected piping, multiport valve (control valve), air vent valve with piping, complete. (All the frontal piping, valves and their fitting should be designed on 1.5m/s velocity)

1.1 Multigrade sand Filter for Domestic Water Supply:
- Capacity: 4500 LPH (4.5 m³/hour)
- Filtration rate: 18000 LPH/sqm (18 m³/hr/m²)
- Filter dia (approx.): 600 mm
- Filter Turn Over: 8.0 hr
- Working pressure: 3.5 Kg/Sq.cm
- Test pressure: 5.5 Kg/Sq.cm

1.2 Activated carbon Filter for Domestic Water Supply:
- Capacity: 4500 LPH (4.5m³/hour)
- Filtration rate: 18000 Lph/sqm (18 m³/hr/m²)
- Filter dia (approx.): 600 mm
- Filter Turn Over: 8.0 hr
- Working pressure: 3.5 Kg/Sq.cm
- Test pressure: 5.5 Kg/Sq.cm

2.0 Supply, installation, testing and commissioning of Water Softening Plant. The Water softener vessel shall be constructed of FRP/composit material with inner shell of integrated Polyethylene with Fiber Reinforced Plastic as per manufacturer standard. The inner distribution system and the under bed draw off system shall be of Hub & Lateral type / Riser tube with top & bottom strainers of Polypropylene material. Softener shall be supplied with initial charge of cationic Ion exchange resin with supporting media like silex, gravel etc. The softener shall be complete with pressure gauge at inlet & outlet, sample cock, PVC face piping/interconnected piping, multiport valve (control valve), overflow & drain, outlet fitting complete regeneration assembly comprising of power valve, ejector, brine suction valve and all associated pipe work. A density meter for brine shall be included

Salt Saturation Arrangement:
The brine tank shall be provided with salt saturation arrangement (with air agitation) comprising of CPVC. Perforated (Min. 1 inch.) pipe grid laid in the bottom of brine tank, one no. positive discharge air blower of required capacity, valve & NRV on blower and CPVC pipe interconnection from blower to grid complete.

Softener Vessel
- Input Hardness: 125 PPM (Assumed)
- Out Put Hardness: < 35 PPM
<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
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<tbody>
<tr>
<td><strong>OBR:</strong> 13.00 CUM</td>
<td></td>
</tr>
<tr>
<td><strong>Dia:</strong> 600 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Height (HOS):</strong> 1500</td>
<td></td>
</tr>
<tr>
<td><strong>Resin Qty:</strong> 75 Liters</td>
<td></td>
</tr>
<tr>
<td><strong>Brine Tank:</strong> 100 Litrs</td>
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</tr>
<tr>
<td><strong>3.0</strong> Supply, installing, testing and commissioning of cpvc pipes (SCH 40) from filter Feed Pump discharge side and interconnection between multigrade filter and softener system to Sintex soft water storage tank complete in all respect including all fittings excluding valves or any other accessories which required to complete the job. (Maximum permissible limit of flow velocity in piping is 1.5m/s)</td>
<td>Set 1</td>
</tr>
<tr>
<td><strong>4.0</strong> Providing, installing, testing and commissioning of automatic level control systems control cabling from panel to tanks and starter of suitable size as required to make the equipment operating complete as per specifications:</td>
<td>Job 1</td>
</tr>
<tr>
<td>a) Sintex soft water storage tank control system in accordance with specifications.</td>
<td>Set 1</td>
</tr>
<tr>
<td>b) Overhead Soft water storage tank control system in accordance with specifications.</td>
<td>Set 1</td>
</tr>
<tr>
<td><strong>5.0</strong> Providing and fixing 25mm dia. gunmetal fitting for water level indicator gauge with isolation cock at top and bottom heavy gauge transparent polyethylene tube of upto 4.5 length with black floating indicator inside tube of upto 4.5 mtrs. length 100mm wide x 20mm thick teak wood indicating board painted with level indication in cms and litres complete fixing on sintex tank wall with proper fixing arrangement without damaging the tank wall.</td>
<td>Set 1</td>
</tr>
<tr>
<td><strong>6.0</strong> Supply, installation, testing &amp; commissioning of solenoid valve (suitable for water) at the inlet of soft water storage tank, including low level and high level controllers / probes mounted in soft water boiler feed tank in plant room for control / operation of solenoid. System to include cable from controller to the solenoid valve. dia of solenoid valve</td>
<td>Set 1</td>
</tr>
<tr>
<td>a) 32 mm dia</td>
<td>No. 1</td>
</tr>
<tr>
<td><strong>7.0</strong> Test report before water treatment plant filtration and post filtration to be tested at Authorised &amp; certified laboratory and submitted by the vendor ( All tests as per IS: 10500 shall be conducted)</td>
<td>Job 1</td>
</tr>
<tr>
<td><strong>TOTAL OF WATER TREATMENT EQUIPMENTS CARRIED OVER TO SUMMARY</strong></td>
<td></td>
</tr>
<tr>
<td><strong>C</strong> WTP PANEL (ELECTRICAL WORKS)</td>
<td></td>
</tr>
<tr>
<td><strong>1.0</strong> Design, fabrication, loading, unloading at store, supply &amp; supervision of WTP Panels fabricated out of 2mm thick for structural members (Load bearing members) and 1.6mm thick, 3mm thick cable gland plate, for door and covers (Non load bearing members) CRCA sheet in cubicle compartmentalize free standing floor mounted, dust and vermin proof with reinforcement of suitable size angle iron, channel 'T' irons and / or flats wherever necessary, 16 gauge CRCA sheet steel shall be used for final distribution panels. Cable Bus duct gland plates shall be provided on top as well as at the bottom of the panels. Panels shall be treated with all anticorrosive process &amp; 9 tanks process before painting as per specifications with 2 coats of zinc chromate primer and final approved shade of enamelled paint. 2 Nos. earthing terminals shall be provided for all distribution panels. Panels shall be suitable for 415V, 3-phase, 4-wire, 50Hz supply system and with 15% spare space, lifting hooks shall also be provided in case of large panels. Approval shall be taken for each panel before fabrication. Galvanized hardwares with zinc passivation shall be used in fabrication of panels.</td>
<td></td>
</tr>
<tr>
<td>a) WTP Panel</td>
<td></td>
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<tr>
<td><strong>Incoming (1 No.):</strong></td>
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<tr>
<td>1 No. 63A 4P MCCB (25 ka) with (S/C,U/V &amp; E/F) each shall have the followings:-</td>
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<tr>
<td><strong>Metering &amp; Indication:</strong></td>
<td></td>
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<tr>
<td>Combined Ammeter/Voltmeter with selector switch and 63/5A, 10VA, CL-1 Cts. and control 2A MCB</td>
<td></td>
</tr>
<tr>
<td>Set of Phase indicating lamps. Each backed up with 2 Amps Control MCB.</td>
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<tr>
<td>Panel to have all the pumps’ automation provision and the water level indicators’ configuration provision.</td>
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</tbody>
</table>
**Bus Bars:**
80A, TPN aluminium, colour coded bus bars suitable for 415V, 50Hz after the derating.

**Outgoings**
- Two (2) Nos. 40A TPN MCB (10 kA)
- Two (2) Nos. 25 A TPN MCB (10 kA)

| Two (2) Nos. DOL starter for 3.0 HP motor with single phasing prevention arrangement, O/L relays, ammeters with CTs, ON/OFF / Trip indication lamps and push buttons, potential free contacts for remote / local operations, indication, interlocking and Building Management system, and Auto Manual Selector Switch as required. (For Domestic / soft water Transfer Pump) | Set | 1 |
| Two (2) Nos. DOL starter for 4.0 HP motor with single phasing prevention arrangement, O/L relays, ammeters with CTs, ON/OFF / Trip indication lamps and push buttons, potential free contacts for remote / local operations, indication, interlocking and Building Management system, and Auto Manual Selector Switch as required. (For Filter Feed Pump) | |

**Complete Panel as described above**

**Note:** Vendor to carry out the analysis of water test before designing the system and suggest any modification if required as per water test report of the available water at site. Cost of Civil foundation should be included in the quoted rates as per the operating weight of the equipment as per foundation detail recommended by the manufacturer.
SECTION – 4.2 SEWAGE TREATMENT PLANT WORKS

PREAMBLE

The proposed Sewage treatment plant of 17 KLD shall consist of the following facilities:

1. The Sewage, Kitchen waste (through the desired Grease traps) shall be collected in a common Collection-cum-Equalization tank (designed for final capacity). Diffused aeration system shall be provided in this collection tank.

2. This will be followed with secondary biological treatment system which will be designed in the modular form. The blowers and diffused aeration system shall also be designed in modular form with a battery of blowers.

3. This will be followed with filtration and disinfection units, again designed in modular form i.e. one set dedicated to 1 module and common standby units. UV is proposed for 1st stage disinfection followed with post chlorination. Multigrade filter, Activated carbon filter and Softener are the proposed filtration and polishing units.

4. It is proposed to have storage tanks for Soft. The scheme is enclosed. The transfer pumps for soft water shall be installed in the STP plant room only.

5. All items of work under this Contract shall be executed strictly to fulfill the requirements laid down under “Basis of Design” in the specifications. Type of equipment, material specification, methods of installation and testing and type of control shall be in accordance with the specifications, approved shop drawings and the relevant Indian Standards, however capacity of each component and their quantities shall be such as to fulfill the above mentioned requirement.

6. The unit rate for all equipment or materials shall include cost in INDIAN RUPEES (INR) for equipment and materials including all taxes and duties and also including forwarding, freight, insurance and transport into Contractor's store at site, storage, installation, testing, balancing, commissioning and other works required to make the plant functional.

7. The rate for each item of work included in the Schedule of Quantities shall, unless expressly stated otherwise, include cost of:

   a. All materials, fixing materials, accessories, appliances tools, plants, equipment, transport, labour and incidentals required in preparation for and in the full and entire execution, testing, balancing, commissioning and completion of work called for in the item and as per Specifications and Drawings.

   b. Wastage on materials and labour.

   c. Loading, transporting, unloading, handling/double handling, hoisting to all levels, setting, fitting and fixing in position, protecting, disposal of debris and all other labour necessary in and for the full and entire execution and for the job in accordance with the contract documents, good practice and recognized principles.
d. Liabilities, obligations and risks arising out of Conditions of Contract.

e. All requirements of Specifications, whether such requirements are mentioned in the item or not. The Specifications and Drawings where available, are to be read as complimentary to and part of the Bill of Quantities and any work called for in one shall be taken as required for all.

f. In the event of conflict between Bill of Quantities and other documents including the Specifications, the most stringent shall apply. The interpretation of the Architect / Consultant /Project Manager shall be final and binding.

8 The Contractor shall procure and bring Materials/Equipment to the site only on the basis of drawings approved for construction and shop drawings and not on the basis of Bill of Quantities which are approximate only. This also applies to the Contractor's requisition for Owner supplied materials.

9 The contractor shall include for making all the opening in slabs, beams, walls etc. as required for his work. However, the contractor can coordinate with civil work to provide necessary sleeves. All openings shall be closed using water proofing compound or as specified by Project Manager.

10 The work shall be carried out in conformity with the plumbing drawings and within the requirements of architectural, WTP & STP, electrical, Firefighting, structural and other specialized services drawings.

11 The contractor shall cooperate with all trades and agencies working on the site. He shall make provision for hangers, sleeves, structural openings and other requirements well in advance to prevent hold up of progress of the construction schedule. All supports to the civil structure shall be provided with anchor fasteners.

12 On award of the work, contractor shall submit a schedule of construction in the form of a PERT chart or BAR chart for approval of the Project Manager.

13 On award of the work the contractor shall be issued two (2) sets of consultant's drawings. The drawings shall be the basis of contractor's shop drawings.

14 Shop drawings are detailed working drawings coordinated with other trading work, which incorporate the contractor's details for execution of the work and incorporate equipment manufacturer's details and dimensions to ensure that the same can be installed in the space provided.

15 All shop drawings should detail pipe routing and levels, showing location of other services at crossings etc., cable runs, route cable trays and all allied works and must be fully coordinated with other services, before execution of the works.

16 All shop drawings will be made on Autocad and coloured prints has to be produced for site work.

17 All rates quoted are inclusive of cutting holes and chases in walls and floors and making good the same with cement mortar / concrete / water proofing of appropriate mix and strength as directed by the Project Manager. Contractor shall
provide holes, sleeves, recesses in the concrete and masonry work as the work proceeds.

18  Any pipe crossing fire rated wall as per fire compartmentation will be provide with higher size of GI sleeve. All floor crossing pipes will be provided with higher size GI sleeve.

19  The contractor shall, from time to time, clear away all debris and excess materials accumulated at the site failing which the same shall be done by Project Manager at contractor’s risk and cost and cost of cleanup shall be deducted from the contractors prorata bill.

20  After the fixtures, equipment and appliances have been installed and commissioned, contractor shall cleanup the same and remove all plaster, paints, stains, stickers and other foreign matter or discoloration leaving the same in a ready to use condition.

21  On completion of all works, contractor shall demolish all stores, remove all surplus materials and leave the site in a broom clean condition, failing which the same shall be done by the Project Manager at the Contractor’s risk and cost. Cost of the cleanup shall be deducted from the contractor's bills on pro-rata basis in proportion to his contact value.

NOTE:- Contractor shall ensure submission of Design basis report, detailed GA drawings (Plan & Section), P & I diagram, schematic diagram for the above mentioned components and additional components required/necessary to make the plant functional such as inserts, puddle flanges, vent pipes, additional pumps, valves etc for complete functionality of the plant. if so required for the complete working of the STP and got it approved by the Owner’s Architect / Consultants. The vendor shall inspect the complete system atleast once in a month till the end of DLP for its proper functionality and report for the same has to be submitted monthly.
A SEWAGE TREATMENT PLANT

Design, Supplying, installing, testing & commissioning of **Pre Fabricated** in MS construction with FRP lined **Sewage Treatment Plant of 17 KLD** (including excavation, back filling & disposal of surplus earth and Civil construction work, if any) for the following duty:

**Nature of effluent** - Domestic Sewage from toilet, kitchen waste water, domestic Laundry waste (if any) shall be discharged into the STP. Design to take consideration of same.

**INLET EFFLUENT CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>6.5 – 8.5</td>
</tr>
<tr>
<td>BOD</td>
<td>350 Mg/L</td>
</tr>
<tr>
<td>COD</td>
<td>650 Mg/L</td>
</tr>
<tr>
<td>Oil &amp; Grease</td>
<td>50 Mg/L</td>
</tr>
</tbody>
</table>

**DISCHARGE EFFLUENT CHARACTERISTICS AFTER TREATMENT** (Ultra Filter)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>6.0 – 8.5</td>
</tr>
<tr>
<td>BOD</td>
<td>Less than 5 Mg/L</td>
</tr>
<tr>
<td>SS Solids</td>
<td>Less than 2 Mg/L</td>
</tr>
<tr>
<td>COD</td>
<td>Less than 20 Mg/L</td>
</tr>
<tr>
<td>Oil &amp; Grease</td>
<td>Below detectable level</td>
</tr>
<tr>
<td>Turbidity</td>
<td>Less than 1 NTU</td>
</tr>
</tbody>
</table>

**Sewage treatment plant shall include the following items:**

- Screen Chamber
- Oil & Grease Trap
- Sewage equalization tank/sump
- MBBR tank
- Secondary Tube Settler Tank
- Sludge Holding Tank
- UV System
- Air Blowers, Pumps & equipment
- Piping, valves etc
- Chlorine Contact cum filter feed Tank
- Tertiary Treatment
- Ultra Filtration system
- Inlet and Outlet connection to Treated soft water storage Tanks
- Electrical Control Panel & Cabling

1.0 Supply, installation, testing & commissioning of 2 Nos. Stainless Steel Perforated, Corrugated Bar Screen with suitable lifting arrangement of (size 300 mm wide x 500 mm high approx)

| Set 1 |

2.0 Supply, installation, testing & commissioning of non clogging type submersible pumps having CI casing & CI/SS impeller complete with all accessories, motor of required capacity, pressure gauge on delivery line with isolation cock, level controller (with wiring) to control the level of sump automatically. Pumps shall have following duty:

- Sludge transfer pump (Set=2 Nos - 1 working + 1 Standby)
- Flow rate (each) = 1.0 m3/hr
- Head = 10 Mtr

(Solid handling size for this pump shall be 40 mm).

- Cost shall be inclusive of PVC flexible Hose pipe (for piping submerged in effluent) with GI (Heavy) piping (for piping non-submerged in effluent)

- Provision of guide ropes to guide submersible pump from upper level to operational level in sump basin with channels / angle section of MSEP shall be made by the STP contractor.

3.0 Supplying, installing, testing & commissioning of **non clog type submersible pumps having CI Head & Base, Brass/SS Impeller (SS impeller for sludge transfer pumps)** along with motor, pressure gauge with isolation cock, Isolation valve, NRV on delivery line. Isolation valve, stainer at suction. Mechanical seal, suitable vibration elimination pads of approved design, drain pipe with valve (Note: The exact specifications and details may vary depending on the specific requirements and standards of the project or region.)
3.1 Sludge transfer pump (2 Nos - 1 working + 1 Standby)
Flow rate (each) = 1.0 m³/hr
Head = 15 Mtr

4.0 Air diffusion system shall include the following:

4.1 2 Nos. twin type rotary air blowers (1W + 1S) capable of delivering 50 cum/hr of free air at 0.50 kg/cm² driven through "V" belt or directly coupled through flexible coupling to a TEFC motor of suitable HP Suitable for 415 ± 10% volts, 3 phase, 50 cycles A/C supply.

4.2 Air piping shall comprise of pipes droppers/ laterals with uPVC header (tested for 6kg/sq.cm) complete with all fittings such as tees, crosses, plugs, sockets, elbows, reducers, supports & clamps, puddle flanges etc cutting chases & making good. Contactor to submit detailed P & I indicating their proposal.

4.3 Non clog, Self Cleaning type air dispersion system including required valves and fitting capable of handling 3-5 cfm of air with oxygen transfer efficiency of 3-4% per meter water depth. Air dispersion grid shall be assembled in modular form so that they can be replaced / repaired easily from platform at the top. (Imported fine bubble membrane diffusers).

Note:
Air dispersion system shall be provided for Sewage Sump, aeration tanks and Sludge Holding Tank.

5.0 Providing and fixing all piping (as described below) and isolation control valves for making the system complete.

uPVC : Submerged air piping
MS Epoxy : Air piping & pumped effluent riser (non-submerged)

6.0 Supply, installation, testing and commissioning of PVC tube deck settling media to be installed in Secondary Tube Settler tank along with suitable sludge removal arrangement either by pumps.

7.0 Supply, installing, testing & commissioning of ultra violet dis-infection unit. The unit shall have over 99.9 % bacterial reduction from inlet to outlet. The dis-infection chamber shall be constructed of SS 316L on all welted parts. The UV lamp shall be of low pressure mercury vapour type with hard glass enclosure, the sockets shall be water tight & vibration resistant. The lamp life shall be rated for 6000 hours. The unit shall be complete with temperature safety control, lamp out alert circuit & UV radiometer with 4 – 20 mA output.

The UV unit shall have with reactor, cabinet housing, cabinet cooling, treatment chamber, electrical panel, temperature safety control, lampout alert, UV radiometer along with UV monitoring system and UV monitoring readout panel. The UV Dosage should be > 60,000 uW – Sec / sq.cm. The lamps should be selected based upon the flow requirement of respective unit.

7.1 Flow Rate :2.0 m³/hr,

8.0 Supplying, installing, testing & commissioning of Horizontal centrifugal non clog water pumps with CI Head & Base, Brass/SS Impeller along with motor, pressure gauge with isolation cock, Isolation valve, NRV on delivery line. Isolation valve, stainer (with by-pass) at suction. Mechanical seal, suitable vibration elimination pads of approved design, drain pipe with valve (25 dia) for the pump. The pump shall be suitable for 415±10% volts 3 phase AC supply (1 Working + 1 Standby).

8.1 Filter Feed Pump
Capacity : 2.0 m³/hr each
Head : 35 M
RPM : 2900
1 Set= 2nos.(1Working + 1Standby)

8.2 Soft Water Transfer Pump
Capacity : 3.0 m³/hr each
Head : 40 M
RPM : 2900
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Set = 2 nos. (1 Working + 1 Standby)</td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>Providing &amp; fixing of <strong>ball valves and butterfly valve</strong> of required sizes as per approved scheme complete tested to a pressure not less than 20 Kg/Sq.cm. Including rubber gasket, flanges, nuts, bolts, washers &amp; painting complete as required.</td>
</tr>
<tr>
<td></td>
<td>Lot 1</td>
</tr>
<tr>
<td>10.0</td>
<td>Providing &amp; fixing of <strong>Non Return Valves, CI Dual plate wafer type check valve</strong> of required sizes as per approved scheme complete tested to a pressure not less than 20Kg/sqcm, including rubber gasket, flanges, union, nuts, bolts, washers &amp; painting complete as required.</td>
</tr>
<tr>
<td></td>
<td>Lot 1</td>
</tr>
<tr>
<td>11.0</td>
<td>Constructing the following tanks and chambers in <strong>MS / RCC construction</strong> as per the approved calculations including FRP LINING inside the tanks after applying two coats of red oxide primer and epoxy painting on outside of the approved colour and shade of enamel paint over two coat of primer. The above cost shall include the cost of all the required MS structure for skid platform, walking platform, handrails, staircase, puddle flanges, foot rests, manhole cover etc with painting of desired shade of enamel paint over a coat of primer.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>11.1</td>
<td>Screen Chamber &amp; Oil and Grease Trap - Volume = 1.5 CUM (Net Volume) - RCC</td>
</tr>
<tr>
<td></td>
<td>Set 1</td>
</tr>
<tr>
<td>11.2</td>
<td>Sewage equalization tank / sump - Volume = 9.5 CUM (Net Volume) - RCC</td>
</tr>
<tr>
<td></td>
<td>Set 1</td>
</tr>
<tr>
<td>11.3</td>
<td>MBR tank - Volume = 4.0 CUM (Effective Volume) - MSFRP</td>
</tr>
<tr>
<td></td>
<td>Set 2</td>
</tr>
<tr>
<td>11.4</td>
<td>Secondary Tube Settler Tank - Volume = 2.50 CUM (Net Volume) - MSFRP</td>
</tr>
<tr>
<td></td>
<td>Set 1</td>
</tr>
<tr>
<td>11.5</td>
<td>Sludge Holding Tank - Volume = 3.0 CUM (Net Volume) - MSFRP</td>
</tr>
<tr>
<td></td>
<td>Set 1</td>
</tr>
<tr>
<td>11.6</td>
<td>Chlorine Contact Tank / Filter Feed tank - Volume = 5.00 CUM (Net Volume) - MSFRP</td>
</tr>
<tr>
<td></td>
<td>Set 1</td>
</tr>
<tr>
<td>11.7</td>
<td>Treated (Soft Water) Water Tank - Volume = 5.0 CUM (Net Volume) - HDPE</td>
</tr>
<tr>
<td></td>
<td>Nos. 2</td>
</tr>
<tr>
<td>12.0</td>
<td>Providing, fixing, testing &amp; commissioning of vertical FRP <strong>filter with adequate dirt holding capacity (suitable for 3.5 Kg/Sqcm working pressure)</strong>. As per manufacturer's specifications complete with initial charge filter media. The filter shall also be provided with set of internals for raw water inlet and bottom collecting system. Complete with frontal piping and Multiport Valve.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>12.1</td>
<td>Dual Media Filter</td>
</tr>
<tr>
<td></td>
<td>Test pressure : 5.5 Kg/Sq.cm</td>
</tr>
<tr>
<td></td>
<td>Filtration Rate 15000 L/Sqm/Hr</td>
</tr>
<tr>
<td></td>
<td>Flow Rate : 2.0 m³/hr</td>
</tr>
<tr>
<td></td>
<td>MOC FRP</td>
</tr>
<tr>
<td></td>
<td>Set 1</td>
</tr>
<tr>
<td>12.2</td>
<td>Activated Carbon Filter</td>
</tr>
<tr>
<td></td>
<td>Test pressure : 5.5 Kg/Sq.cm</td>
</tr>
<tr>
<td></td>
<td>Filtration Rate 15000 L/Sqm/Hr</td>
</tr>
<tr>
<td></td>
<td>Flow Rate : 2.0 m³/hr</td>
</tr>
<tr>
<td></td>
<td>MOC FRP</td>
</tr>
<tr>
<td></td>
<td>Set 1</td>
</tr>
<tr>
<td>12.3</td>
<td>Softener</td>
</tr>
<tr>
<td></td>
<td>Supply, installation, testing and commissioning of Water Softening Plant. The <strong>Water softener vessel</strong> shall be constructed of FRP composite material with inner shell of integrated Polyethylene with Fiber Reinforced Plastic as per manufacturer standard. The inner distribution system and the under bed draw off system shall be of Hub &amp; Lateral type / Riser tube with top &amp; bottom strainers of Polypropylene material. Softener shall be supplied with initial charge resin with supporting media like silex, gravel etc. The softener shall be complete with pressure gauge at inlet &amp; outlet, sample cock, PVC face piping / interconnected piping, multiport valve (control valve), overflow &amp; drain, outlet fitting complete regeneration HDPE tank and assebmly comprising of power valve, ejector, brine suction valve and all associated pipe work.</td>
</tr>
<tr>
<td></td>
<td>Plant Sizes:</td>
</tr>
<tr>
<td></td>
<td>Flow Rate : 2.0 m³/hr</td>
</tr>
</tbody>
</table>
### MOC FRP

Considering Total Hardness 400 PPM & OBR 20 m³

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working Pressure</td>
<td>3.5 Kg/Sq.cm</td>
</tr>
<tr>
<td>Test pressure</td>
<td>5.5 Kg/Sq.cm</td>
</tr>
</tbody>
</table>

12.4 Supply, installation testing and commissioning of packaged type Ultra filtration unit with all components and accessories complete to make the system functional and shall be installed after water treatment system in STP.

a) Suitable to handle Flow Rate of 1.5 m³/hr

13.0 Supply, installation, testing and commissioning of Basket Type Centrifuge with top discharge of Suitable Capacity with CI frame, SS304 bucket complete with 1 set of centrifugal pump for sludge transfer to centrifuge.

14.0 SUBMERSIBLE PUMPS

Supply, installation, testing & commissioning of Submersible single stage single entry pumps connected to TEFC submersible motor for 415 + 10% volts, 3 phase, 50 cycles A.C. power supply with mechanical seal, pump connector unit with rubber diaphragm and bend, vertical discharge pipe, in built level controller with sequence operational module. One pump working at low level, both pumps at high level with a hooter alarm and with dry run protection. The pump shall be provided with a lifting devise of pull chain / guide rail & minimum 80 mm dia (G.I. heavy class) rising main of 5m length including interconnecting piping, valves (Ball Valve / Butterfly), Non return valves (GM/CI) 15 m cable and starter panel etc. as per requirement complete in all respects.

(Pumps to be suitable to handle solids upto 10-12 mm size with S.S. body, S.S. shaft, S.S. impeller with 15 mtrs cable, double mechanical seal).

a) STP Plant Room Drainage (Set = 2 Nos. 1 Working + 1 Standby)

<table>
<thead>
<tr>
<th>Capacity / Flow rate</th>
<th>Head</th>
<th>Solid Handling</th>
<th>Motor H.P</th>
<th>RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0 LPS (each pump)</td>
<td>12 Mtrs.</td>
<td>15 mm</td>
<td>as per manufacturer design</td>
<td>2900</td>
</tr>
</tbody>
</table>

15.0 Supply, installation, testing and commissioning of chlorine dosing pump of 0-6 lpm

16.0 Supply, installation, testing & commissioning of Electro-magnetic type Flow Meter at inlet of reactor tanks 40 mm size.

17.0 Providing & fixing level controllers for water pumps to start/stop the pump at set level. Including wiring, cabling from pump to panel & all other accessories as required to operate the system automatically.

18.0 Supply, installation, testing and commissioning of Motorised valve with By-pass arrangement of required dia and controller for filling the re-cycled treated water OH Tank.

19.0 Approval from pollution board at initial & various other stages of works including preparation of report / drawings as per pollution board requirement. Contractor shall include the cost of all chemicals consumed during testing & commissioning and the cost of such items of works which are not explicitly mentioned above, but are mandatory to have pollution board approval. Only technical liaisoning in our scope.

### TOTAL CARRIED TO SUMMARY

**B. ELECTRICAL INSTALLATION FOR SEWAGE TREATMENT PLANT**

Design, fabrication, assembling, wiring, supply, installation, testing and commissioning of motor control centre shall be fabricated out of 14 gauge CRCA sheet steel in form in 3b formation with reinforcement of suitable size angle iron, channel 'T' sections irons and /or flats wherever necessary. Cable gland plates shall be provided on top as well as at the bottom of the panels. Panels shall be treated with all anticorrosive process before painting as per specifications with 2 coats of red oxide primer and final approved shade of powder coated paint. 2 Nos. earthing terminals shall be provided for 3 phase, 4 wire, 50 Hz supply system. Lifting hooks shall also be provided in case of large panels. Approval shall be taken for each panel before fabrication. Cadmium Plated hardware shall be used in fabrication of panels. Quoted rates shall inclusive of cables, cable trays, control cabling, earthing (in accordance to specification) with earthing from panel to each motor / equipment.
<table>
<thead>
<tr>
<th>1.0</th>
<th><strong>MCC –1 (Sewage Treatment Plant)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incoming</strong></td>
<td></td>
</tr>
<tr>
<td>100 amps TPN MCCB with the following accessories:</td>
<td></td>
</tr>
<tr>
<td>Multifunction Digital meter (consisting of Voltage, Amps, kW, P.F. parameters) with RS 485 Port and CT.</td>
<td>(Model No. EM6436 or Equivalent)</td>
</tr>
<tr>
<td>Phase indicating lamps shall be protected by 2 amp SP MCB</td>
<td></td>
</tr>
<tr>
<td>3 Sets</td>
<td></td>
</tr>
<tr>
<td><strong>Bus Bar</strong></td>
<td></td>
</tr>
<tr>
<td>125 amps TPN (25 KA) aluminium bus bar with heat shrinkable insulation sleeves</td>
<td></td>
</tr>
<tr>
<td><strong>Outgoings</strong></td>
<td></td>
</tr>
<tr>
<td>a. 2 Nos. suitable rating MPCB for 0.5 HP approx. DOL starter and outgoing feeder to EQT effluent transfer pumps motor - Main (including 1 nos. standby). Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.</td>
<td></td>
</tr>
<tr>
<td>b. 2 Nos. suitable rating MPCB for 0.5 HP approx direct on line starter and outgoing feeder to air blowers (including 1 no. standby). Each compartment shall contain auto/manual selector switch and indicating lamps with MCB's for 'ON/OFF/TRIP' status of motor</td>
<td></td>
</tr>
<tr>
<td>c. 2 Nos. suitable rating MPCB for 1 HP direct on line starter for plant room sump pump and outgoing feeders to sludge disposal pump (including 1 no. standby). Compartment shall contain auto/manual selector switch and indicating lamps with MCB’s for ‘ON/OFF/TRIP’ status of motor (Filter feed pump)</td>
<td></td>
</tr>
<tr>
<td>d. spare space for accommodate 2 Nos. suitable rating MPCB for Nos. 2 HP direct on line starter and outgoing feeders to flushing water pump (including 1 no. standby). Each compartment shall contain auto / manual selector switch and indicating lamps with MCB for ‘ON/OFF/TRIP’ status of motor.</td>
<td></td>
</tr>
<tr>
<td>e. 1 No. suitable rating MPCB for Nos. 2 HP direct on line starter for submersible pump each compartment shall contain auto / manual selector switch and indicating lamps with MCB for ‘ON/OFF/TRIP’ status of motor.</td>
<td></td>
</tr>
<tr>
<td>Spare MCB’s of following capacities:</td>
<td></td>
</tr>
<tr>
<td>i. 20 amps TPN MCB’s</td>
<td>2 Nos.</td>
</tr>
<tr>
<td>ii 32 amps TPN MCB’s</td>
<td>2 Nos.</td>
</tr>
<tr>
<td><strong>Note:</strong></td>
<td></td>
</tr>
<tr>
<td>All MCCB’s to be suitable for motor duty and shall be of 25 KA breaking capacity.</td>
<td></td>
</tr>
<tr>
<td>Provision shall be made for providing potential free contacts to all pumps starters for connection to building automation system.</td>
<td></td>
</tr>
<tr>
<td>All motor starter shall be provided with Automatic level controller.</td>
<td></td>
</tr>
<tr>
<td>Overflow alarm must be provided at the plant room.</td>
<td></td>
</tr>
<tr>
<td>Electrical panel must have the Auto annunciator to indicate the system failure if any</td>
<td></td>
</tr>
<tr>
<td><strong>MCC –1 for STP as described above</strong></td>
<td>No. 1</td>
</tr>
</tbody>
</table>

**TOTAL CARRIED TO SUMMARY**

**C. SEWER CONNECTION PIPING WORK UPTO SEWAGE TREATMENT PLANT**

<table>
<thead>
<tr>
<th>1.0</th>
<th><strong>Excavating trenches of required width for pipes, cables etc including excavation for socket and dressing of sides ramming of bottoms depth upto 1.50 m including timbering, shuttering, centering etc. as required getting out the excavated soil and then returning the soil as required in layers not exceeding 20 cm in depth including consolidating each deposited layer by ramming, watering etc. and disposal of surplus excavated soil within the site premises as specified by Project Manager.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) All kind of soil</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.1</th>
<th><strong>Pipes cables etc exceeding 80 mm dia but not exceeding 300 mm dia.</strong></th>
<th><strong>Metre</strong></th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td><strong>Extra for excavating trenches for pipes, cables etc. in all soils for depth exceeding 1.50 m but not exceeding 3.0 metre. (Rate is extra over</strong></td>
<td><strong>Metre</strong></td>
<td>150</td>
</tr>
</tbody>
</table>
Providing, fixing, jointing, testing and commissioning of UPVC Drainage Pipe conforming to IS : 15328-2000 with all fittings such as bends, tees, elbow. The wall thickness of pipe and technical characteristic conforms to IS : 15328-2000 type SN8. The fitting dimension conforming to BS : EN 1401-1998. The jointing to be completed with rubber ring/solvent weld joint.

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Material</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 160 mm dia.</td>
<td>Metre R,O</td>
<td>200mm dia.</td>
</tr>
<tr>
<td>b) 200 mm dia.</td>
<td>Metre 80</td>
<td>c) 250 mm dia.</td>
</tr>
<tr>
<td>c) 315 mm dia.</td>
<td>Metre R.O</td>
<td></td>
</tr>
</tbody>
</table>

Constructing brick masonry manhole with 1st class brick in cement mortar 1:4 (1 cement : 4 coarse sand) R.C.C. top slab with 1:2:4 mix (1 cement :2 coarse sand :4 graded stone aggregate 20 mm nominal size), foundation concrete 1:4:8 mix (1 cement :4 coarse sand :8 graded stone aggregate 40 mm nominal size) inside and outside plastering 12 mm thick with cement mortar 1:3 (1 cement :3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) finished complete as per standard design including excavation, refilling and disposal of surplus earth.

<table>
<thead>
<tr>
<th>Size</th>
<th>Material</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Inside size 90 x 80 cm and 75 cm deep</td>
<td>Each 2</td>
<td></td>
</tr>
<tr>
<td>b) Heavy Duty C.I Manhole Cover with frame (560 mm Dia) fixed in 15 cm thick cement mortar 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)</td>
<td>Each 2</td>
<td></td>
</tr>
<tr>
<td>c) Inside size 120 x 90 cm and 100 cm deep.</td>
<td>Each 2</td>
<td></td>
</tr>
<tr>
<td>d) Heavy Duty C.I Manhole Cover with frame (560 mm Dia) fixed in 15 cm thick cement mortar 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)</td>
<td>Each 2</td>
<td></td>
</tr>
</tbody>
</table>

Constructing brick masonry circular type manhole 0.91m internal dia at bottom and 0.56 m dia at top with 75 class designation bricks in cement mortar 1:4 (1cement: 4 coarse sand), inside & outside cement plaster 12 mm thick with cement mortar 1:3 (1 cement: 3 coarse sand) finished with a floating coat of neat cement, foundation concrete 1:3:6 (1 cement:3 coarse sand: 6 graded stone aggregate 40 mm nominal size), and making necessary channel in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement, all complete as per standard design.

<table>
<thead>
<tr>
<th>Depth</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 0.91 m deep with SFRC cover and frame (Heavy duty grade HD-20 grade designation) 560 mm internal diameter conforming to IS 12592, total weight of the cover and frame to be not less than 182 Kg, fixed in cement concrete 1 : 2 : 4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) including centering shuttering all complete.</td>
<td>Each 2</td>
</tr>
<tr>
<td>b) Extra depth for circular type manhole 0.91 m internal dia (at bottom ) with bricks of class designation 75 Beyond 0.91 m to 1.67 m</td>
<td>RM 1</td>
</tr>
</tbody>
</table>

**5 Operation and Comprehensive Maintenance of the Sewage Treatment plant & Water Treatment Plant:**

24 hours Comprehensive maintenance of the system supplied, installed, Commissioned by the successful tenderer for 2 years beyond the Defects Liability Period (DLP). This will include start up / commissioning routine servicing, regular maintenance, preventive maintenance of equipments and components and break down repairs as and when occurred, ensuring that system does not remain out of service for a period more than 8 hours in case of major breakdowns and one hour in the case of minor breakdowns due to any unforeseen break down. The necessary spares required for satisfactory maintenance of the system will be supplied by the contractor at their cost. (Necessary consumables and chemicals required for the operation of STP and WTP will be supplied by vendor)

The successful tenderer shall keep the essential spares at site to avoid the delay in attending faults / maintenance.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Two years after DLP – Quote Lumpsum for two years. (carried to summary)</td>
</tr>
<tr>
<td>b.</td>
<td>Five years after DLP – Quote Lumpsum for two years. (not to be carried to summary)</td>
</tr>
</tbody>
</table>

**TOTAL CARRIED TO SUMMARY**

**Note:**
Vendor to ensure that proposed system can be installed in the available space and height as per site. Cost of Civil foundation should be included in the quoted rates as per the operating weight of the equipment/ as per foundation detail recommended by the manufacturer. Till the completion of DLP all statutory requirement shall be responsibility of contractor/vendor without charging any extra cost. The vendor should also include the cost of connection from existing Manhole.
SECTION – 5

WORK PROGRAMME
A. The bidder shall include as an attachment a programme of work indicating the order in which the bidder purposes to carry out the Works in the completion time quoted together with a key plan indicating his temporary access routes. The submission of the schedule shall not relieve the successful bidder of his obligations under Clause 14 of the Conditions of Contract.

B. The programme of work shall be set out in the form of a bar chart. The programme shall show the proposed dates of commencement and completion for each part of the Works and shall reflect all due completion dates required in terms of the Contract.

Signature of the Bidder
or his Authorized Representative
Volume - 3

FINANCIAL BID

Supply, installation testing and commissioning of WATER TREATMENT PLANT AND SEWAGE TREATMENT PLANT Works complete in all respect for Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi.
FINANCIAL BID

To

The Director (GA)
Food Safety and Standards Authority of India
FDA Bhawan, Kotla Road, New Delhi-110002

Description of work: Supply, installation testing and commissioning of WATER TREATMENT PLANT AND SEWAGE TREATMENT PLANT Works complete in all respect for Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, FDA Bhawan, Kotla Road, New Delhi.

Sir,

We offer to execute the works as described in Bill of Quantities / contract schedule of rates, technical specifications and BID document above in accordance with the conditions of contract accompanying this bid for the contract price as detailed below:

Water Treatment Plant Works

SCHEDULE OF WORKS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>A)</td>
<td>WATER TREATMENT PLANT:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>Water Supply Pump :</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supply, Installation, testing &amp; commissioning of Horizontal/Vertical monobloc/centrifugal pumping set with C.I. body and SS304 impeller, SS shaft and C.I./M.S Base &amp; head, mechanical seal, connected to a TEFC induction motor suitable for 400/440 volts, 3 phase 50 cycles A.C. supply with 150 mm dia SS body pressure gauge with gunmetal isolation cock, vibration eliminating pads as required, M.S fabricated base plate bolted to cement concrete foundations complete. 15m cable etc. as per requirement complete in all respects. (Pumps shall be installed in a set of two pumps one working and One standby).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Filter Feed pumps :</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Capacity/Flow Rate - 4.50 M³/Hr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Head - 35 mtr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ 1 Set of Pump = 2 Nos. pump (1 working+1 standby)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Approx H.P. - 4.0 HP (3.0 KW) each or as per Manufacturer recommendation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Operation time - 8.0 hr</td>
<td>Set 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>Domestic / Soft Water Transfer pumps :</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Capacity/Flow Rate - 4.50 M³/Hr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Head - 30 mtr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ 1 Set of Pump = 2 Nos. pump (1 working+1 standby)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Approx H.P. - 3.0 HP (2.5 KW) each or as per Manufacturer recommendation</td>
<td>Set 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1.0

Note: Normally it works to transfer the domestic water to domestic water overhead tank however it shall also act as a standby pump to transfer the soft water to the soft / treated water storage tank located in STP in case of short fall of soft water available from STP. All the bypass piping including fitting and valves

2.0 Providing and fixing cast brass threaded horizontal/vertical type non return valves, complete to IS 778.

<table>
<thead>
<tr>
<th>Dia</th>
<th>Nos</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>25mm</td>
<td></td>
<td>R.O.</td>
</tr>
<tr>
<td>32mm</td>
<td></td>
<td>R.O.</td>
</tr>
<tr>
<td>40mm</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>50mm</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

3.0 Providing & fixing brass ball valve with hard chrome plated ball inside PTFE (Teflon) seal & ring with chrome plated centre handle with female BSP threads complete:in all respects.

<table>
<thead>
<tr>
<th>Dia</th>
<th>Nos</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 mm</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>32 mm</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>40 mm</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>50 mm</td>
<td></td>
<td>R.O.</td>
</tr>
</tbody>
</table>

4.0 Providing and fixing cast iron butterfly valves nylon coated S.G. iron disk, stainless steel shaft, black nitrile rubber/EPDM seating 3mm asbestos gasket including nuts and bolts for flanged end connections complete with corresponding flanges.

<table>
<thead>
<tr>
<th>Dia</th>
<th>Nos</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 mm</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>65 mm</td>
<td></td>
<td>R.O.</td>
</tr>
<tr>
<td>80 mm</td>
<td></td>
<td>R.O.</td>
</tr>
</tbody>
</table>

5.0 Supply, Installation, testing & commissioning C.I. Y type suction strainer with gunmetal or brass internal parts installed outside water tanks.

<table>
<thead>
<tr>
<th>Dia</th>
<th>Nos</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 mm</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

6.0 Supply, Installation, testing & commissioning resilient rubber neoprene lined style archi vibration eliminators(expansion bellows) suitable for raw water upto pressure 20 kg/cm².

<table>
<thead>
<tr>
<th>Dia</th>
<th>Nos</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>25mm</td>
<td></td>
<td>R.O.</td>
</tr>
<tr>
<td>32mm</td>
<td></td>
<td>R.O.</td>
</tr>
<tr>
<td>40mm</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

7.0 Supplying, installing, testing and commissioning of online magnetic flow meter complete in all respect for monitoring of water supply from Sintex tank to the overhead soft water storage tank

<table>
<thead>
<tr>
<th>Dia</th>
<th>No.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 mm</td>
<td></td>
<td>R.O.</td>
</tr>
<tr>
<td>32 mm</td>
<td></td>
<td>R.O.</td>
</tr>
<tr>
<td>40 mm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>50 mm</td>
<td></td>
<td>R.O.</td>
</tr>
</tbody>
</table>

8.0 Fixing on terrace polyethylene water storage tank, ISI : 12701 marked, with cover and suitable locking arrangement and making necessary holes inlet, outlet and overflow with fitting and base support of tank.

<table>
<thead>
<tr>
<th>Dia</th>
<th>Nos</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC Tank</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL OF WATER SUPPLY PUMPS CARRIED OVER TO SUMMARY

<table>
<thead>
<tr>
<th>Dia</th>
<th>Nos</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC Tank</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
### B) WATER TREATMENT EQUIPMENTS:

1.0 Supply, installation, testing and commissioning of vertical self-supporting Multigrade sand filter & Activated Carbon Filter. Filter vessel shall be constructed of FRP/composite material with inner shell of integrated Polyethylene with Fiber Reinforced Plastic as per manufacturer standard. The inner distribution system and the under bed draw off system shall be of Hub & Lateral type/Riser tube with top & bottom strainers of Polypropylene material. Filter shall be supplied with initial charge of Filter media like special graded sand with supporting media like silex, gravel etc. The filter shall complete with pressure gauge at inlet & outlet, gunmetal sample cock, PVC face piping/interconnected piping, multiport valve (control valve), air vent valve with piping, complete. (All the frontal piping, valves and their fitting should be designed on 1.5m/s velocity)

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Multigrade sand Filter for Domestic Water Supply:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Capacity</td>
<td>-</td>
<td>4500 LPH (4.5 m³/hour)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Filtration rate</td>
<td>-</td>
<td>18000 LPH/sqm (18 m³/hr/m²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Filter dia (approx.)</td>
<td>-</td>
<td>600 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Filter Turn Over</td>
<td>-</td>
<td>8.0 hr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Working pressure</td>
<td>-</td>
<td>3.5 Kg/Sq.cm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Test pressure</td>
<td>-</td>
<td>5.5 Kg/Sq.cm</td>
<td>Set 1</td>
<td></td>
</tr>
</tbody>
</table>

| 1.2 Activated Carbon Filter for Domestic Water Supply: |   |   |   |   |
|■ Capacity | - | 4500 LPH (4.5m³/hour) |   |   |
|■ Filtration rate | - | 18000 lph/sqm (18 m³/hr/m²) |   |   |
|■ Filter dia (approx.) | - | 600 mm |   |   |
|■ Filter Turn Over | - | 8.0 hr |   |   |
|■ Working pressure | - | 3.5 Kg/Sq.cm |   |   |
|■ Test pressure | - | 5.5 Kg/Sq.cm | Set 1 |   |

2.0 Supply, installation, testing and commissioning of Water Softening Plant. The Water softener vessel shall be constructed of FRP/composite material with inner shell of integrated Polyethylene with Fiber Reinforced Plastic as per manufacturer standard. The inner distribution system and the under bed draw off system shall be of Hub & Lateral type/Riser tube with top & bottom strainers of Polypropylene material. Softener shall be supplied with initial charge of cationic ion exchange resin with supporting media like silex, gravel etc. The softener shall be complete with pressure gauge at inlet & outlet, sample cock, PVC face piping/interconnected piping, multiport valve (control valve), overflow & drain, outlet fitting complete regeneration assembly comprising of power valve, ejector, brine suction valve and all associated pipe work. A density meter for brine shall be included

**Salt Saturation Arrangement:**

The brine tank shall be provided with salt saturation arrangement (with air agitation) comprising of CPVC. Perforated (Min. 1 inch.) pipe grid laid in the bottom of brine tank, one no. positive discharge air blower of required capacity, valve & NRV on blower and CPVC pipe interconnection from blower to grid complete.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Softener Vessel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Input Hardness:</td>
<td>-</td>
<td>125 PPM (Assumed)</td>
<td></td>
</tr>
<tr>
<td>■ Out Put Hardness:</td>
<td>&lt;</td>
<td>35 PPM</td>
<td></td>
</tr>
</tbody>
</table>
3.0 Supply, installing, testing and commissioning of cpvc pipes (SCH 40) from filter Feed Pump discharge side and interconnection between multigrade filter and softener system to Sintex soft water storage tank complete in all respect including all fittings excluding valves or any other accessories which required to complete the job. (Maximum permissible limit of flow velocity in piping is 1.5m/s)

4.0 Providing, installing, testing and commissioning of automatic level control systems control cabling from panel to tanks and starter of suitable size as required to make the equipment operating complete as per specifications:

a) Sintex soft water storage tank control system in accordance with specifications.

b) Overhead Soft water storage tank control system in accordance with specifications.

5.0 Providing and fixing 25mm dia. gunmetal fitting for water level indicator gauge with isolation cock at top and bottom heavy gauge transparent polythene tube of upto 4.5 mtrs. length with black floating indicator inside tube of upto 4.5 mtrs. length 100mm wide x 20mm thick teak wood indicating board painted with level indication in cms and litres complete fixing on sintex tank wall with proper fixing arrangement without damaging the tank wall.

6.0 Supply, installation, testing & commissioning of solenoid valve (suitable for water) at the inlet of soft water storage tank, including low level and high level controllers / probes mounted in soft water boiler feed tank in plant room for control / operation of solenoid. System to include cable from controller to the solenoid valve. dia of solenoid valve

a) 32 mm dia

7.0 Test report before water treatment plant filtration and post filtration to be tested at Authorised & certified laboratory and submitted by the vendor (All tests as per IS: 10500 shall be conducted)

TOTAL OF WATER TREATMENT equipments carried over to summary

C) WTP PANEL (ELECTRICAL WORKS)

1.0 Design, fabrication, loading, unloading at store, supply & supervision of WTP Panels fabricated out of 2mm thick for structural members (Load bearing members) and 1.6mm thick, 3mm thick cable gland plate, for door and covers (Non load bearing members) CRCA sheet in cubicle compartmentalize free standing floor mounted, dust and vermin proof with reinforcement of suitable size angle iron, channel 'T' iron and / or flats wherever necessary, 16 gauge CRCA sheet steel shall be used for final distribution panels. Cable Bus duct gland plates shall be provided on top as well
as at the bottom of the panels. Panels shall be treated with all anticorrosive process & 9 tanks process before painting as per specifications with 2 coats of zinc chromate primer and final approved shade of enamelled paint. 2 Nos. earthing terminals shall be provided for all distribution panels. Panels shall be suitable for 415V, 3-phase, 4-wire, 50Hz supply system and with 15% spare space, lifting hooks shall also be provided in case of large panels.

Approval shall be taken for each panel before fabrication. Galvanized hardwares with zinc passivation shall be used in fabrication of panels.

<table>
<thead>
<tr>
<th>a) WTP Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incoming (1 No.):</strong></td>
</tr>
<tr>
<td>1 No. 63A 4P MCCB (25 ka) with (S/C,U/V &amp; E/F) each shall have the followings:-</td>
</tr>
</tbody>
</table>

**Metering & Indication:**

- Combined Ammeter/Voltmeter with selector switch and 63/5A, 10VA, CL-1 Cts. and control 2A MCB

- Set of Phase indicating lamps. Each backed up with 2 Amps Control MCB.

- Panel to have all the pumps’ automation provision and the water level indicators’ configuration provision.

**Bus Bars:**

- 80A, TPN aluminium, colour coded bus bars suitable for 415V, 50Hz after the derating.

**Outgoings**

| Two (2) Nos. 40A TPN MCB (10 kA) |
| Two (2) Nos. 25 A TPN MCB (10 kA) |

- Two (2) Nos. DOL starter for 3.0 HP motor with single phasing prevention arrangement, O/L relays, ammeters with CTs, ON/OFF / Trip indication lamps and push buttons, potential free contacts for remote / local operations, indication, interlocking and Building Management system, and Auto Manual Selector Switch as required. (For Domestic / soft water Transfer Pump)

- Two (2) Nos. DOL starter for 4.0 HP motor with single phasing prevention arrangement, O/L relays, ammeters with CTs, ON/OFF / Trip indication lamps and push buttons, potential free contacts for remote / local operations, indication, interlocking and Building Management system, and Auto Manual Selector Switch as required. (For Filter Feed Pump)

Complete Panel as described above

**Note:** Vendor to carry out the analysis of water test before designing the system and suggest any modification if required as per water test report of the available water at site. Cost of Civil foundation should be included in the quoted rates as per the operating weight of the equipment/ as per foundation detail recommended by the manufacturer.
 SECTION – 4.2 SEWAGE TREATMENT PLANT WORKS

PREAMBLE

The proposed Sewage treatment plant of 17 KLD shall consist of the following facilities:

1. The Sewage, Kitchen waste (through the desired Grease traps) shall be collected in a common Collection-cum-Equalization tank (designed for final capacity). Diffused aeration system shall be provided in this collection tank.

2. This will be followed with secondary biological treatment system which will be designed in the modular form. The blowers and diffused aeration system shall also be designed in modular form with a battery of blowers.

3. This will be followed with filtration and disinfection units, again designed in modular form i.e. one set dedicated to 1 module and common standby units. UV is proposed for 1st stage disinfection followed with post chlorination. Multigrade filter, Activated carbon filter and Softener are the proposed filtration and polishing units.

4. It is proposed to have storage tanks for Soft. The scheme is enclosed. The transfer pumps for soft water shall be installed in the STP plant room only.

5. All items of work under this Contract shall be executed strictly to fulfill the requirements laid down under “Basis of Design” in the specifications. Type of equipment, material specification, methods of installation and testing and type of control shall be in accordance with the specifications, approved shop drawings and the relevant Indian Standards, however capacity of each component and their quantities shall be such as to fulfill the above mentioned requirement.

6. The unit rate for all equipment or materials shall include cost in INDIAN RUPEES (INR) for equipment and materials including all taxes and duties and also including forwarding, freight, insurance and transport into Contractor’s store at site, storage, installation, testing, balancing, commissioning and other works required to make the plant functional.

7. The rate for each item of work included in the Schedule of Quantities shall, unless expressly stated otherwise, include cost of:

   a. All materials, fixing materials, accessories, appliances tools, plants, equipment, transport, labour and incidentals required in preparation for and in the full and entire execution, testing, balancing, commissioning and completion of work called for in the item and as per Specifications and Drawings.

   b. Wastage on materials and labour.

   c. Loading, transporting, unloading, handling/double handling, hoisting to all levels, setting, fitting and fixing in position, protecting, disposal of debris and all other labour necessary in and for the full and entire execution and for the job in accordance with the contract documents, good practice and recognized principles.
d. Liabilities, obligations and risks arising out of Conditions of Contract.

e. All requirements of Specifications, whether such requirements are mentioned in the item or not. The Specifications and Drawings where available, are to be read as complimentary to and part of the Bill of Quantities and any work called for in one shall be taken as required for all.

f. In the event of conflict between Bill of Quantities and other documents including the Specifications, the most stringent shall apply. The interpretation of the Architect / Consultant /Project Manager shall be final and binding.

8 The Contractor shall procure and bring Materials/Equipment to the site only on the basis of drawings approved for construction and shop drawings and not on the basis of Bill of Quantities which are approximate only. This also applies to the Contractor's requisition for Owner supplied materials.

9 The contractor shall include for making all the opening in slabs, beams, walls etc. as required for his work. However, the contractor can coordinate with civil work to provide necessary sleeves. All openings shall be closed using water proofing compound or as specified by Project Manager.

10 The work shall be carried out in conformity with the plumbing drawings and within the requirements of architectural, WTP & STP, electrical, Firefighting, structural and other specialized services drawings.

11 The contractor shall cooperate with all trades and agencies working on the site. He shall make provision for hangers, sleeves, structural openings and other requirements well in advance to prevent hold up of progress of the construction schedule. All supports to the civil structure shall be provided with anchor fasteners.

12 On award of the work, contractor shall submit a schedule of construction in the form of a PERT chart or BAR chart for approval of the Project Manager.

13 On award of the work the contractor shall be issued two (2) sets of consultant's drawings. The drawings shall be the basis of contractor's shop drawings.

14 Shop drawings are detailed working drawings coordinated with other trading work, which incorporate the contractor's details for execution of the work and incorporate equipment manufacturer's details and dimensions to ensure that the same can be installed in the space provided.

15 All shop drawings should detail pipe routing and levels, showing location of other services at crossings etc., cable runs, route cable trays and all allied works and must be fully coordinated with other services, before execution of the works.

16 All shop drawings will be made on Autocad and coloured prints has to be produced for site work.

17 All rates quoted are inclusive of cutting holes and chases in walls and floors and making good the same with cement mortar / concrete / water proofing of appropriate mix and strength as directed by the Project Manager. Contractor shall provide holes, sleeves, recesses in the concrete and masonry work as the work
Any pipe crossing fire rated wall as per fire compartmentation will be provide with higher size of GI sleeve. All floor crossing pipes will be provided with higher size GI sleeve.

The contractor shall, from time to time, clear away all debris and excess materials accumulated at the site failing which the same shall be done by Project Manager at contractor's risk and cost and cost of cleanup shall be deducted from the contractors prorata bill.

After the fixtures, equipment and appliances have been installed and commissioned, contractor shall cleanup the same and remove all plaster, paints, stains, stickers and other foreign matter or discoloration leaving the same in a ready to use condition.

On completion of all works, contractor shall demolish all stores, remove all surplus materials and leave the site in a broom clean condition, failing which the same shall be done by the Project Manager at the Contractor’’ risk and cost. Cost of the cleanup shall be deducted from the contractor's bills on pro-rata basis in proportion to his contact value.

Contractor shall ensure submission of Design basis report, detailed GA drawings (Plan & Section), P & I diagram, schematic diagram for the above mentioned components and additional components required/necessary to make the plant functional such as inserts, puddle flanges, vent pipes, additional pumps, valves etc for complete functionality of the plant. if so required for the complete working of the STP and got it approved by the Owner’s Architect / Consultants. The vendor shall inspect the complete system atleast once in a month till the end of DLP for its proper functionality and report for the same has to be submitted monthly.
**A**  SEWAGE TREATMENT PLANT

<table>
<thead>
<tr>
<th>Unit</th>
<th>Qty</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design, Supplying, installing, testing &amp; commissioning of Pre Fabricated in MS construction with FRP lined Sewage Treatment Plant of 17 KLD (including excavation, back filling &amp; disposal of surplus earth and Civil construction work, if any) for the following duty:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Nature of effluent** - Domestic Sewage from toilet, kitchen waste water, domestic Laundry waste (if any) shall be discharged into the STP. Design to take consideration of same.

**INLET EFFLUENT CHARACTERISTICS**
- pH - 6.5 – 8.5
- BOD - 350 Mg/L
- COD - 650 Mg/L
- Oil & Grease - 50 Mg / L

**DISCHARGE EFFLUENT CHARACTERISTICS AFTER TREATMENT (Ultra Filter)**
- pH - 6.0 – 8.5
- BOD - Less than 5 Mg/L
- S. Solids - Less than 2 Mg/L
- COD - Less than 20 Mg/L
- Oil & Grease - below detectable level
- Turbidity - Less than 1 NTU

Sewage treatment plant shall include the following items:
- Screen Chamber
- Oil & Grease Trap
- Sewage equalization tank/sump
- MBBR tank
- Secondary Tube Settler Tank
- Sludge Holding Tank
- UV System
- Air Blowers, Pumps & equipment
- Piping, valves etc
- Chlorine Contact cum filter feed Tank
- Tertiary Treatment
- Ultra Filtration system
- Inlet and Outlet connection to Treated soft water storage Tanks
- Electrical Control Panel & Cabling

1.0 Supply, installation, testing & commissioning of 2 Nos. Stainless Steel Perforated, Corrugated Bar Screen with suitable lifting arrangement of (size 300 mm wide x 500 mm high approx) Set 1

2.0 Supply, installation, testing & commissioning of non clogging type submersible pumps having CI casing & CI/SS impeller complete with all accessories, motor of required capacity, pressure gauge on delivery line with isolation cock, level controller (with wiring) to control the level of sump automatically. Pumps shall have following duty:

- Sludge transfer pump ( Set=2 Nos - 1 working + 1 Standby) Set 1
Flow rate (each) = 1.0 m³/hr

Head = 10 Mtr

(Solid handling size for this pump shall be 40 mm).

Cost shall be inclusive of PVC flexible Hose pipe (for piping submerged in effluent) with GI (Heavy) piping (for piping non-submerged in effluent)

Provision of guide ropes to guide submersible pump from upper level to operational level in sump basin with channels / angle section of MSEP shall be made by the STP contractor.

3.0 Supplying, installing, testing & commissioning of non clog type submersible pumps having CI Head & Base, Brass/SS Impeller (SS impeller for sludge transfer pumps) along with motor, pressure gauge with isolation cock, isolation valve, NRV on delivery line. Isolation valve, stainer at suction. Mechanical seal, suitable vibration elimination pads of approved design, drain pipe with valve (25 dia) for the pump. The pump shall be suitable for 415±10% volts 3 phase AC supply (1 Working + 1 Standby).

3.1 Sludge transfer pump (2 Nos - 1 working + 1 Standby)
Flow rate (each) = 1.0 m³/hr

Head = 15 Mtr

Set 1

4.0 Air diffusion system shall include the following:

4.1 2 Nos. twin type rotary air blowers (1W + 1S) capable of delivering 50 cum/hr of free air at 0.50 kg/cm² driven through “V” belt or directly coupled through flexible coupling to a TEFC motor of suitable HP Suitable for 415 ± 10% volts, 3 phase, 50 cycles A/C supply. Set 1

4.2 Air piping shall comprise of pipes droppers/ laterals with uPVC header (tested for 6kg/sq.cm) complete with all fittings such as tees, crosses, plugs, sockets, elbows, reducers, supports & clamps, puddle flanges etc cutting chases & making good. Contactor to submit detailed P & I indicating their proposal. Lot 1

4.3 Non clog, Self Cleaning type air dispersion system including required valves and fitting capable of handling 3-5 cfm of air with oxygen transfer efficiency of 3-4% per meter water depth. Air dispersion grid shall be assembled in modular form so that they can be replaced / repaired easily from platform at the top. (Imported fine bubble membrane diffusers). Lot 1

Note:
Air dispersion system shall be provided for Sewage Sump, aeration tanks and Sludge Holding Tank.

5.0 Providing and fixing all piping (as described below) and isolation control valves for making the system complete.

uPVC : Submerged air piping

MS Epoxy : Air piping & pumped effluent riser (non-submerged) Job 1

6.0 Supply, installation, testing and commissioning of PVC tube deck settling media to be installed in Secondary Tube Lot 1
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0</td>
<td>Supply, installing, testing &amp; commissioning of <strong>ultraviolet disinfection unit</strong>. The unit shall have over 99.9% bacterial reduction from inlet to outlet. The disinfection chamber shall be constructed of SS 316L on all welded parts. The UV lamp shall be of low pressure mercury vapour type with hard glass enclosure, the sockets shall be water tight &amp; vibration resistant. The lamp life shall be rated for 6000 hours. The unit shall be complete with temperature safety control, lampout alert &amp; UV radiometer with 4 – 20 mA output.</td>
</tr>
<tr>
<td></td>
<td>The <strong>UV unit</strong> shall have with reactor, cabinet housing, cabinet cooling, treatment chamber, electrical panel, temperature safety control, lampout alert, UV radiometer along with UV monitoring system and UV monitoring readout panel. The UV Dosage should be &gt; 60,000 uW – sec / sq.cm. The lamps should be selected based upon the flow requirement of respective unit.</td>
</tr>
<tr>
<td>7.1</td>
<td>Flow Rate: 2.0 m³/hr, Set 1</td>
</tr>
<tr>
<td>8.0</td>
<td>Supplying, installing, testing &amp; commissioning of <strong>Horizontal centrifugal non clog water pumps with CI Head &amp; Base</strong>, <strong>Brass/SS Impeller</strong> along with motor, pressure gauge with isolation cock, Isolation valve, NRV on delivery line. Isolation valve, Stainer (with by-pass) at suction. Mechanical seal, suitable vibration elimination pads of approved design, drain pipe with valve (25 dia) for the pump. The pump shall be suitable for 415±10% volts 3 phase AC supply (1 Working + 1 Standby).</td>
</tr>
</tbody>
</table>
| 8.1     | **Filter Feed Pump**  
|         | Capacity: 2.0 m³/hr each  
|         | Head: 35 M  
|         | RPM: 2900  
|         | 1 Set= 2nos.(1Working + 1Standby) |
| 8.2     | **Soft Water Transfer Pump**  
|         | Capacity: 3.0 m³/hr each  
|         | Head: 40 M  
|         | RPM: 2900  
|         | 1 Set= 2nos.(1Working + 1Standby) |
| 9.0     | Providing & fixing of **ball valves and butterfly valve of required sizes as per approved scheme complete** tested to a pressure not less than 20 Kg/Sq.cm. Including rubber gasket, flanges, nuts, bolts, washers & painting complete as required. |
|         | Lot 1 |
| 10.0    | Providing & fixing of **Non Return Valves, CI Dual plate wafer type check valve of required sizes as per approved scheme complete** tested to a pressure not less than 20 Kg/sqcm, including rubber gasket, flanges, union, nuts, bolts, washers & painting complete as required. |
|         | Lot 1 |
| 11.0    | Constructing the following tanks and chambers in **MS / RCC construction** as per the approved calculations including FRP LINING inside the tanks after applying two coats of... |
redoxide primer and epoxy painting on outside of the approved colour and shade of enamal paint over two coat of primer. The above cost shall include the cost of all the required MS structure for skid platform, walking platform, handrails, staircase, puddle flanges, foot rests, mahole cover etc with painting of desired shade of enamel paint over a coat of primer.

| 11.1 Screen Chamber & Oil and Grease Trap - Volume = 1.5 CUM (Net Volume) - RCC | Set | 1 |
| 11.2 Sewage equalization tank/sump - Volume = 9.5 CUM (Net Volume) - RCC | Set | 1 |
| 11.3 MBBR tank - Volume = 4.0 CUM (Effective Volume) - MSFRP | Set | 2 |
| 11.4 Secondary Tube Settler Tank - Volume = 2.50 CUM (Net Volume) - MSFRP | Set | 1 |
| 11.5 Sludge Holding Tank - Volume = 3.0 CUM (Net Volume) - MSFRP | Set | 1 |
| 11.6 Chlorine Contact Tank/Filter Feed tank - Volume = 5.00 CUM (Net Volume) - MSFRP | Set | 1 |
| 11.7 Treated (Soft Water) Water Tank - Volume = 5.0 CUM (Net Volume) - HDPE | Nos. | 2 |

12.0 Providing, fixing, testing & commissioning of vertical FRP filter with adequate dirt holding capacity (suitable for 3.5 Kg/Sqcm working pressure). As per manufacturer's specifications complete with initial charge filter media. The filter shall also be provided with set of internals for raw water inlet and bottom collecting system. Complete with frontal piping and Multiport Valve.

| 12.1 Dual Media Filter |
| Test pressure : 5.5 Kg/Sq.cm |
| Filtration Rate 15000 L/Sqm/Hr |
| Flow Rate : 2.0 m³/hr |
| MOC FRP | Set | 1 |

| 12.2 Activated Carbon Filter |
| Test pressure : 5.5 Kg/Sq.cm |
| Filtration Rate 15000 L/Sqm/Hr |
| Flow Rate : 2.0 m³/hr |
| MOC FRP | Set | 1 |

| 12.3 Softener |
| Supply, installation, testing and commissioning of Water Softening Plant. The Water softener vessel shall be constructed of FRP composi material with inner shell of integrated Polyethylene with Fiber Reinforced Plastic as per manufacturer standard. The inner distribution system and the under bed draw off system shall be of Hub & Lateral type / Riser tube with top & bottom strainers of Polypropylene material. Softener shall be supplied with initial charge resin with supporting media like silex, gravel etc. The softener shall be complete with pressure gauge at |
**Plant Sizes:**

<table>
<thead>
<tr>
<th>Flow Rate</th>
<th>2.0 m³/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOC FRP</td>
<td></td>
</tr>
</tbody>
</table>

Considering Total Hardness 400 PPM & OBR 20 m³

| Working Pressure | 3.5 Kg/Sq.cm |
| Test pressure   | 5.5 Kg/Sq.cm |

**12.4** Supply, installation testing and commissioning of packaged type Ultra filtration unit with all components and accessories complete to make the system functional and shall be installed after water treatment system in STP.

a) Suitable to handle Flow Rate of 1.5 m³/hr

**13.0** Supply, installation, testing and commissioning of Basket Type Centrifuge with top discharge of Suitable Capacity with CI frame, SS304 bucket complete with 1 set of centrifugal pump for sludge transfer to centrifuge.

**14.0** SUBMERSIBLE PUMPS

Supply, installation, testing & commissioning of Submersible single stage single entry pumps connected to TEFC submersible motor for 415 + 10% volts, 3 phase, 50 cycles A.C. power supply with mechanical seal, pump connector unit with rubber diaphragm and bend, vertical. discharge pipe, in built level controller with sequence operational module. One pump working at low level, both pumps at high level with a hooter alarm and with dry run protection. The pump shall be provided with a lifting devise of pull chain / guide rail & minimum 80 mm dia (G.I. heavy class) rising main of 5m length including interconnecting piping, valves (Ball Valve / Butterfly), Non return valves (GM/CI) 15 m cable and starter panel etc. as per requirement complete in all respects.

(Pumps to be suitable to handle solids upto 10-12 mm size with S.S. body, S.S. shaft, S.S. impeller with 15 mtrs cable, double mechanical seal).

a) STP Plant Room Drainage (Set = 2 Nos. 1 Working + 1 Standby)

<table>
<thead>
<tr>
<th>Capacity / Flow rate</th>
<th>3.0 LPS (each pump)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>12 Mtrs.</td>
</tr>
<tr>
<td>Solid Handling</td>
<td>15 mm</td>
</tr>
<tr>
<td>Motor H.P.</td>
<td>as per manufacturer design</td>
</tr>
<tr>
<td>RPM</td>
<td>2900</td>
</tr>
</tbody>
</table>

**15.0** Supply, installation, testing and commissioning of chlorine dosing pump of 0-6 lpm

**16.0** Supply, installation, testing & commissioning of Electromagnetic type Flow Meter at inlet of reactor tanks 40 mm size.
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.0</td>
<td>Providing &amp; fixing <strong>level controllers</strong> for water pumps to start/stop the pump at set level. Including wiring, cabling from pump to panel &amp; all other accessories as required to operate the system automatically.</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>18.0</td>
<td>Supply, installation, testing and commissioning of <strong>Motorised valve with By-pass arrangement of required dia and controller</strong> for filling the re-cycled treated water OH Tank.</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>19.0</td>
<td><strong>Approval from pollution board</strong> at initial &amp; various other stages of works including preparation of report / drawings as per pollution board requirement. Contractor shall include the cost of all chemicals consumed during testing &amp; commissioning and the cost of such items of works which are not explicitly mentioned above, but are mandatory to have pollution board approval. Only technical liaisoning in our scope.</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**TOTAL CARRIED TO SUMMARY**

### B. ELECTRICAL INSTALLATION FOR SEWAGE TREATMENT PLANT

Design, fabrication, assembling, wiring, supply, installation, testing and commissioning of motor control centre shall be fabricated out of 14 gauge CRCA sheet steel in form in 3b formation with reinforcement of suitable size angle iron, channel 'T' sections irons and /or flats wherever necessary. Cable gland plates shall be provided on top as well as at the bottom of the panels. Panels shall be treated with all anticorrosive process before painting as per specifications with 2 coats of red oxide primer and final approved shade of powder coated paint. 2 Nos. earthing terminals shall be provided for 3 phase, 4 wire, 50 Hz supply system. Lifting hooks shall also be provided in case of large panels. Approval shall be taken for each panel before fabrication. Cadmium Plated hardware shall be used in fabrication of panels. Quoted rates shall inclusive of cables, cable trays, control cabling, earthing (in accordance to specification) with earthing from panel to each motor / equipment.

#### 1.0 MCC –1 (Sewage Treatment Plant)

**Incoming**

100 amps TPN MCCB with the following accessories:

- Multifunction Digital meter (consisting of Voltage, Amps, kW, P.F. parameters) with RS 485 Port and CT.  
  (Model No. EM6436 or Equivalent)

- Phase indicating lamps shall be protected by 2 amp SP MCB  
  3 Sets

**Bus Bar**

125 amps TPN (25 KA) aluminium bus bar with heat shrinkable insulation sleeves

**Outgoings**
a. 2 Nos. suitable rating MPCB for 0.5 HP approx. DOL starter and outgoing feeder to EQT effluent transfer pumps motor - Main (including 1nos. standby). Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.

b. 2 Nos. suitable rating MPCB for 0.5 HP approx direct on line starter and outgoing feeder to air blowers (including 1 no. standby). Each compartment shall contain auto/manual selector switch and indicating lamps with MCB’s for ‘ON/OFF/TRIP’ status of motor.

c. 2 Nos. suitable rating MPCB for 1 HP direct on line starter for plant room sump pump and outgoing feeders to sludge disposal pump (including 1 no. standby). Compartment shall contain auto/manual selector switch and indicating lamps with MCB’s for ‘ON/OFF/TRIP’ status of motor (Filter feed pump).

d. spare space for accommodate 2 Nos. suitable rating MPCB for Nos. 2 HP direct on line starter and outgoing feeders to flushing water pump (including 1 no. standby). Each compartment shall contain auto / manual selector switch and indicating lamps with MCB for ‘ON/OFF/TRIP’ status of motor.

e. 1 No. suitable rating MPCB for Nos. 2 HP direct on line starter for submersible pump each compartment shall contain auto / manual selector switch and indicating lamps with MCB for ‘ON/OFF/TRIP’ status of motor.

Spare MCB’s of following capacities:

i. 20 amps TPN MCB’s 2 Nos.

ii 32 amps TPN MCB’s 2 Nos.

**Note:**

All MCCB’s to be suitable for motor duty and shall be of 25 KA breaking capacity.

Provision shall be made for providing potential free contacts to all pumps starters for connection to building automation system.

All motor starter shall be provided with Automatic level controller.

Overflow alarm must be provided at the plant room

Electrical panel must have the Auto annunciator to indicate the system failure if any

MCC –1 for STP as described above  No. 1

**TOTAL CARRIED TO SUMMARY**

**C. SEWER CONNECTION PIPING WORK UPTO SEWAGE TREATMENT PLANT**
1.0 Excavating trenches of required width for pipes, cables etc including excavation for socket and dressing of sides ramming of bottoms depth upto 1.50 m including timbering, shuttering, centering etc. as required getting out the excavated soil and then returning the soil as required in layers not exceeding 20 cm in depth including consolidating each deposited layer by ramming, watering etc. and disposal of surplus excavated soil within the site premises as specified by Project Manager.

   a) All kind of soil

1.1 Pipes cables etc exceeding 80 mm dia but not exceeding 300 mm dia. Metre 200

1.2 Extra for excavating trenches for pipes, cables etc. in all soils for depth exceeding 1.50 m but not exceeding 3.0 metre.(Rate is extra over corresponding basis item for depth upto 1.5 m) Metre 150

2.0 Providing, fixing, jointing, testing and commissioning of UPVC Drainage Pipe conforming to IS : 15328-2000 with all fittings such as bends, tees, elbow. The wall thickness of pipe and technical characteristic conforms to IS : 15328-2000 type SN8. The fitting dimension conforming to BS : EN 1401-1998. The jointing to be completed with rubber ring/solvent weld joint.

   a) 160 mm dia. Metre R.O
   b) 200mm dia. Metre 80
   c) 250 mm dia. Metre 200
   d) 315 mm dia Metre R.O

3.0 Constructing brick masonry manhole with 1st class brick in cement mortar 1:4 (1 cement : 4 coarse sand) R.C.C. top slab with 1:2:4 mix (1 cement :2 coarse sand :4 graded stone aggregate 20 mm nominal size), foundation concrete 1:4:8 mix (1 cement :4 coarse sand :8 graded stone aggregate 40 mm nominal size) inside and outside plastering 12 mm thick with cement mortar 1:3 (1 cement :3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 mix (1 cement :2 coarse sand : 4 graded stone aggregate 20 mm nominal size) finished complete as per standard design including excavation, refilling and disposal of surplus earth

   a) Inside size 90 x 80 cm and 75 cm deep Each 2
   b) Heavy Duty C.I Manhole Cover with frame (560 mm Dia) fixed in 15 cm thick cement mortar 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) Each 2
   c) Inside size 120 x 90 cm and 100 cm deep. Each 2
   d) Heavy Duty C.I Manhole Cover with frame (560 mm Dia) fixed in 15 cm thick cement mortar 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) Each 2

4.0 Constructing brick masonry circular type manhole 0.91m internal dia at bottom and 0.56 m dia at top with 75 class designation bricks in cement mortar 1:4 (1cement: 4 coarse
sand), inside & outside cement plaster 12 mm thick with cement mortar 1:3 (1 cement: 3 coarse sand) finished with a floating coat of neat cement, foundation concrete 1:3:6 (1 cement:3 coarse sand: 6 graded stone aggregate 40 mm nominal size), and making necessary channel in cement concrete 1:2:4 (1 cement :2 coarse sand : 4 graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement, all complete as per standard design.

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>0.91 m deep with SFRC cover and frame (Heavy duty grade HD-20 grade designation) 560 mm internal diameter conforming to IS 12592, total weight of the cover and frame to be not less than 182 Kg, fixed in cement concrete 1 : 2 : 4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) including centering shuttering all complete. Each 2</td>
</tr>
<tr>
<td>b</td>
<td>Extra depth for circular type manhole 0.91 m internal dia (at bottom ) with bricks of class designation 75 Beyond 0.91 m to 1.67 m RM 1</td>
</tr>
</tbody>
</table>

5 **Operation and Comprehensive Maintenance of the plant:**

24 hours Comprehensive maintenance of the system supplied, installed, Commissioned by the successful tenderer for 2 years beyond the Defects Liability Period (DLP). This will include start up / commissioning routine servicing, regular maintenance, preventive maintenance of equipments and components and break down repairs as and when occurred, ensuring that system does not remain out of service for a period more than 8 hours in case of major breakdowns and one hour in the case of minor breakdowns due to any unforeseen break down. The necessary spares required for satisfactory maintenance of the system will be supplied by the contractor at their cost. (Necessary consumables and chemicals required for the operation of STP and WTP will be supplied by vendor)

The successful tenderer shall keep the essential spares at site to avoid the delay in attending faults / maintenance.

a. Two years after DLP – Quote Lumpsum for two years. (To be carried to Summary)

b. Five years after DLP – Quote Lumpsum for five years. (Not to be carried to Summary)

**TOTAL CARRIED TO SUMMARY**

**Note:** Vendor to ensure that proposed system can be installed in the available space and height as per site. Cost of Civil foundation should be included in the quoted rates as per the operating weight of the equipment/ as per foundation detail recommended by the manufacturer. Till the completion of DLP all statutory requirement shall be responsibility of contractor/vendor without charging any extra cost. The vendor should also include the cost of connection from existing Manhole.

**TOTAL COST (in figures)**

**TOTAL COST (in words)**
The above bid is in accordance with the detailed bid documents, Bill of Quantities and Conditions of Contract. We hereby confirm that this bid complies with the bid validity and earnest money deposit required under the bidding document.

We further confirm that our offer is totally in accordance with the requirements of bid documents. We understand that you are not bound to accept the lowest or any bid you receive. This bid along with your written acceptance shall constitute a binding contract between us, till the formal agreement is prepared and executed.

Yours faithfully,
Authorized signatory ..........................................................
Name and title of signatory ..................................................
Name of bidder ..............................................................
Address ...............................................................

Contact No - Tel. No. ...........Mob. No...............Email id..................
Date ......................

Note:- The authority to sign the Bid Documents must a company the Bid.

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