



INDIAN INSTITUTE OF TECHNOLOGY MADRAS

ENGINEERING UNIT

CHENNAI – 600 036

Tender No: 34R/ 2013 – 14 / Civil

ENVELOPE - II

TECHNICAL BID

Name of Work: Design, Construction, Supply, Installation, Testing, Commissioning,
Operation and Maintenance of 4MLD Sewage Treatment Plant at IIT Madras.

INDEX

Sl.no.	Description	Page No.
1	Particulars of work	2
2	Scope of work	3
3	Design parameters	3
4	Documents to be enclosed	9
5	Additional conditions	9
6	Annexure	10



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SUPERINTENDING ENGINEER, Indian Institute of Technology Madras, Chennai - 600 036 invites sealed lumpsum tenders, in three envelope system (Application for eligibility, technical and financial bid) for the following work from the contractors who satisfy the Eligibility Criteria given below.

1. PARTICULARS OF WORK

1. Name of work: Design, Construction, Supply, Installation, Testing, Commissioning, Operation and Maintenance of 4MLD Sewage Treatment Plant at IIT Madras.
2. Approximate Estimate Cost put to Tender (for reference only) : Rs. 600 Lakhs.
3. Earnest Money Deposit (EMD) : Rs12,00,000/-
4. Cost of Tender Document (Non-refundable) : Rs1575/- (including VAT)
5. Time period for completion : 8 months
6. Validity of the tender : 90days from the date of opening of the tender
7. Date of Prebid Meeting & Venue : 18-03-2014 at 11.30 AM
IC&SR Building,
IIT Madras,
Chennai – 600036.
8. Last Date for Submission of the bids : 01-04-2014 @ 3.00 PM
9. Date of Opening of the Eligibility document : 01-04-2014 @ 3.10 PM
10. Date of opening of the Financial bid will be intimated later to eligible Contractors.
11. Place of submission of tenders: : Office of the Superintending Engineer,
Engineering unit, Administrative Building 3rd Floor,
IIT Madras, Chennai – 600 036.

2. SCOPE OF WORK

Design, Construction, Supply, Installation, Testing, Commissioning Operation and Maintenance of 4MLD Sewage Treatment Plant at IIT Madras.

The scope of the system includes the following. Any item not stated explicitly but is required for the Smooth operation of the scheme will be deemed to have been included in the offer.

1. Design and Construction of receiving chamber, coarse screen chamber, stilling chamber, fine screen chamber, grit chamber, along with required bar screens, pipe lines / masonry ducts etc as required.
2. Design and Construction of Raw sewage balancing tank for required capacity.
3. Design, Supply installation, testing and commissioning of submersible sewage pump sets of suitable capacity 3 nos.
4. Design and construction of Main sewage treatment units of 2nos of 2MLD capacity comprising of the required capacity tank/tanks inlet and outlet pipe lines, aeration system, sludge pumps, motor control centre for the pumps and other electro mechanical equipments complete as required.
5. Design and Construction of chlorination chamber along with the required sodium hypo chloride dosing system, dosing pumps, storage room for the chemicals etc as required.
6. Design and Construction of treated water sump of capacity not less than 1lakh litre along with pumps as required.
7. Design, Supply, installation, testing and commissioning (SITC) of ultra filtration system comprising of feed pumps, disc type filters, back water pumps, required pipe lines, valves, motor control centre for the pumps and other electro-mechanical equipments etc as required.
8. Design and Construction of ultra filtered water storage tank of capacity of not less than 2 lakh litre.
9. Design, SITC of filtered water distribution pumps of capacity along with the motor control centre, suction of delivery lines with the required valves, NRV etc as required 3 nos.
10. Design and construction of sludge processing unit.

Exclusions: 1. Bringing in power supply to the pump house and the filtration plants.

3. DESIGN PARAMETERS

The design criterion for the treatment plant are given below. Any parameter not stated explicitly shall be adopted from the relevant clause in the CPHEEO manual.

Design Parameters

3.1 The plant has to be accommodated within an area of 3500 sqm.

3.2 Capacity of the plant

Average Flow: Present 2.50 MLD
Average Flow: Ultimate 4.00 MLD
Peak Factor 2.50
Peak Flow: Present 6.25 MLD
Peak Flow: Ultimate 10 MLD

3.3. Material of construction:

1. All tanks shall be of RCC construction (M35 Grade concrete).
2. All tanks and chambers shall have a minimum free board of 0.30M.
3. All pipelines shall be of DI/cast iron/pvc/GI with ISI marked suitable for the pressure and flow.
4. Unless specified otherwise all pumps shall be of submersible type manufactured by reputed manufacturers.
5. All compressed air pipelines shall be of GI of relevant class to withstand 1.5 times the operating pressure.
6. All protective railing shall be of stainless steel.
7. All process control valves shall be suitable for automation.
8. All compressors used for aeration shall be of rotary type.
9. The ultra filters shall be of disc type with steel/ FRP housing.

3.4 Characteristics of the raw and treated sewage.

1. The plant shall be designed for treatment of Sewage water with the following inlet and outlet characteristics.

Characteristics of raw sewage

BOD	250 -- 350 mg/l
COD	400 – 600 mg/l
TSS	200 - 250 mg/l
Ammonia	10 – 15 mg/l

Characteristics of treated sewage before ultra-filtration

BOD	≤ 10 mg/l
TSS	≤ 10 mg/l
FC	≤ 230/ 100 ml.

Characteristics of effluent after ultra-filtration

BOD	≤ 2 mg/l
COD	≤ 5 mg/l
TSS	≤ Nil mg/l
FC	Nil

2. The design of the plant shall generally follow the hydraulic flow pattern attached with this tender. (Annexure -1 & 2).
3. All civil structural drawings shall be got proof checked from the Institution approved by IIT Madras.
4. Necessary soil investigation shall be done by the successful contractor without any additional cost through an approved agency / Institution of IIT Madras.

Treatment Scheme:

3.5 Receiving Chamber:

Raw Sewage will be received into a Receiving Chamber to reduce the incoming velocity. From the receiving chamber the sewage will be taken into Coarse Screens. The chamber shall be of adequate size to meet the requirements of workability inside it.

Average Flow : 4.00 MLD

Peak Factor : 2.50

Peak Flow : 10.00 MLD

Number of Units : 1 No.

Hydraulic Retention Time : Minimum 30 Seconds at Peak Flow

3.6 Coarse Screening:

Coarse Screen Chambers shall be provided for removal of floating and oversized material coming with thesewage. Coarse Screens should be capable of screening out the medium & large floating material such as plastic bags, debris, weeds, paper, cloth, rags etc. It shall be Rake type inclined Bar Screen and shall have sturdy design to take care of all sorts of materials that may come along with the sewage.

If any other type of screen is proposed the same has to be indicated clearly with all technical details and drawings.

Average Flow:4.00 MLD

Peak Factor:2.50

Peak Flow:10 MLD

Number of Units:1 Mechanical (Working) + 1Manual

(Stand by) each of 100% of PeakFlow capacity.

Approach Velocity at Average Flow: 0.30 m/s

Velocity through Screen at Average Flow: 0.60 m/s max.

Velocity through Screen at Peak Flow: 1.50 m/s max.

3.7. Raw Sewage sump and Pumping Station:

1. Sewage after coarse screening shall enter into Raw Sewage Sump. The capacity of the sump should be selected such that adequate hydraulic retention time is available during average and peak flow conditions. The effective liquid volume shall be provided below the invert level of the incoming sewer after leaving provision for freeboard.
2. The capacity of the raw sewage sump shall be so selected that with any combination of inflow and pumping, the operating cycle for any Pump will not be less than 5 minutes. Suitable

combination of submersible Pumps shall be provided in the sump to cater to the pumping requirements at average and peak flow conditions.

3. Based on incoming flow conditions, adequate numbers of pumps shall operate automatically to cater to the pumping requirements. Suitable arrangement shall be provided for lifting of Pumps.
4. Suitable air supply from the air compressors with distribution has to be provided to the tank to prevent settlement of the solids.
5. Online Flow measurement shall be done by installing an ultrasonic Flow Measurement Device on the common discharge header of Raw Sewage Transfer Pumps.

3.8. Inlet Chamber:

Raw Sewage from Sewage Pumping Station shall be received into an Inlet Chamber from where it will be taken into Fine Screens. It shall be of adequate size to meet the requirements of workability inside it.

Average Flow : 4.00 MLD

Peak Factor : 2.50

Peak Flow : 10 MLD

Number of Units : 1 No.

Hydraulic Retention Time : 30 Sec min. at Peak Flow

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3.9 Fine Screening:

1. Fine Screens should be capable of screening out most of the small floating materials above 6 mm size.
2. It shall be of Matt type. Suitable arrangement to collect the screenings into wheel Barrows shall be provided.

Number of Units : 1 Mechanical (Working) + 1

Manual(Stand by) each of 100% of PeakFlow capacity.

Approach Velocity at Average Flow : 0.30 m/s

Velocity through Screen at Average Flow : 0.60 m/s max.

Velocity through Screen at Peak Flow : 1.50 m/s max.

3.10 De-gritting:

Screened Sewage will travel to Manual Grit Channels for removal of grit and small inorganic particulate matter of specific gravity above 2.65 and particle size above 150 microns. The grit separated shall be properly collected and transferred for disposal.

No. of Units: 1 Working + 1 Standby suitable for 100% of PeakFlow capacity each

Type : Manual

3.11 Main treatment Units:

1. The capacity of the main treatment tank/unit shall be 2MLD and 2 such units shall be provided.

2. The flow arrangement shall be such that both units can be operated individually or in a combined manner.
3. The following details of the process employed for the main treatment shall be provided.
 1. Type of process
 2. Description of various steps involved in the process
 3. Number, capacity and dimensions of tank/ structure proposed in the main process,
 4. Material of construction.
 5. Number and capacity of equipment used for aeration
 6. Number and capacity of pumps used for recirculation of sludge
 7. Number and capacity of pumps used for surplus sludge removal.
 8. Method, number and capacity of equipment used for separation and removal of the treated water for the next stage.
 9. Type of control used for obtaining the desired quality of treated water.
 10. Total power required for the process.
 11. Total time required for the cycle.

A detailed dimensioned drawing of this stage has to be included.

3.12 Chlorination.

- 1) Treated sewage shall be collected in a Chlorination Tank where disinfectant will be added at suitable dosing rate for disinfection.
- 2) The type of chlorination shall be with addition of sodium hypo chloride.
- 3) Baffle walls shall be provided in the Tank to facilitate hydraulic mixing of treated sewage.
- 4) Adequate reaction time shall be provided to ensure proper disinfection of treated sewage to the required level.

Design Flow: Average Flow

Type of construction –RCC tank

Number of Units: 1 No.

Hydraulic Retention Time: 30 Minutes min.

3.13 Treated waste water sump:

- 1) Chlorinated water from the chlorination tank shall flow to the treated water sump under gravity.
- 2) At this stage part of the treated water will be let out to the outflow channel leading to the Buckingham canal.

- 3) Only 1.8 MLD of water will be collected in the treated water tank for further ultra-filtration.
- 4) The dimension of the tank shall be suitable for the flow rate and retention time specified below.

Number of Units: 1 No.

3.14 Ultra filtration unit.

Capacity 1.8MLD
Type: Disc Type.
No. of filter units – 2
Type of construction- steel/FRP
No. of feed pumps -2
No. of backwash pump – 2

3.15. Ultra filtered water tank.

Capacity of the tank: 2 Lakh litre
No of pumps. 3

Type: centrifugal pump
Capacity: As required

3.16 Sludge Sump and pump.

Capacity: As required for Ultimate Average Flow of 4.00 MLD and the type of inlet sewage.

Number of Units: 1 no.

Hydraulic Retention Time: 8 hrs. min. of average daily sludge production

No. of pumps- 2

Type of pump –Screw type.

3.17 Sludge Centrifuge

1. No. of centrifuge - 2nos
2. Capacity: as suitable
3. Polymer dosing system with 2 nos. dosing pumps.

3.18 Balancing Tank Capacity Calculation

1. The balancing tank should have a capacity: not less than 3.00 Lakh litre capacity

3.19 CPWD standard specifications with up to date correction slip and relevant Indian Standards shall be followed for design and execution of the work.

3.20 All RCC works shall be M35 grade concrete.

4. DOCUMENTS TO BE ENCLOSED

- 4.1 Envelope 2 shall contain the following documents;
- 1) Duly signed Technical bid document as published in the IIT Madras web site.
 - 2) Design Basis Report.
 - 3) Design calculations of the proposed system.
 - 4) Detailed Architectural, structural and service drawings.
 - 5) Detailed specifications for the various items and components of the work.
 - 6) Detailed measurement sheets and schedule of quantities for the various items and components of the work.
 - 7) List of materials / make / brand proposed to be used.

5. ADDITIONAL CONDITIONS

- 5.1. The schedule of quantities referred to above is only limited for the purpose of assessing the quantum of work involved by the tenderers. It is not meant for subsequent measurement and payment in the course of execution of the work. Before submitting their tenders, the tenderers shall, therefore, tenderer have to satisfy themselves that the quantities given in the tender documents for the various items and components of the work are correct.
- 5.2. The contractor shall execute the work as per the drawings and specifications as given in the tender documents, and shall have no claim for any payment on account of deviations and variations in quantity of any item(s) or component(s) of the work, unless they are authorised deviations from the parameters, drawings and specifications contained in the tender documents.
- 5.3. The rates of deviated items shall be determined on the lines of clause 12.2 of Conditions of Contract.

Certified that the Technical bid as published on the web site contains 11 pages (including Annexure 1&2).

Signature of the Contractor

Superintending Engineer
Engineering Unit.
Administrative Building,
3rd Floor, Engineering Unit,
IIT Madras, Chennai – 600 036.