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***Project: Gopalpur Palm Resort –
Swosti Group***

Request for Proposal:

Supply, Installation, Testing & Commissioning of Effluent Treatment Plant, Sewage Treatment Plant Water Treatment Plant & Hydro pneumatic System ,RO Plant With Electrical Installation for STP, ETP, WTP & RO and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam,

on

Item Rate Contract Basis

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INTRODUCTION

Background

Swosti Premium Ltd., a leading hospitality group in Odisha, the owner and developer of a hospitality project titled Gopalpur Palm Resort located at Gopalpur, Odisha(hereafter referred to as “The Client”) is undertaking the development of a world-class hospitality destination under the brand “**Gopalpur Palm Resort**” at Gopalpur-on-Sea, District Ganjam, Odisha. The project envisions a premium coastal resort comprising a luxury hotel of B+G+9 storied building with 124+ keys, banquet and MICE facilities, restaurants, landscaped areas, spa & wellness, swimming pools, and associated amenities.

In pursuit of delivering a high-standard facility within a fixed timeframe, Swosti Premium Ltd. intends to select a reputed Original Equipment Manufacturer(OEM) for major Equipment for Supply, Installation, Testing & Commissioning of Effluent Treatment Plant, Sewage Treatment Plant Water Treatment Plant & Hydro pneumatic System ,RO Plant With Electrical Installation for STP, ETP, WTP & RO and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam,, on a **Item Rate Contract** Basis.-

Project Summary

Pkg. No.	Name of Work	Estimated Cost	Construction Period	Maintenance Period
03	Supply, Installation, Testing & Commissioning of Effluent Treatment Plant, Sewage Treatment Plant Water Treatment Plant & Hydro pneumatic System ,RO Plant With Electrical Installation for STP, ETP, WTP & RO and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam,	₹250 Lakhs*	9 (Nine) Months	1 Year (DLP)+ 5 (Five) Years Paid

*Estimated Cost is exclusive of GST and based on current project planning and scope.

Scope of Work

The selected Bidder (hereafter referred to as the “**Contractor**”) shall be responsible for the following deliverables as per the terms of the Item Rate contract:

- **Supply, Execution, Testing & Commissioning** based on issued GFC drawings
- **Procurement & Execution** of materials, manpower, equipment, and tools
- **MEP related facilitation with Civil Contractor in Coordination** with PMC as per client-appointed agency's requirement.

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PREAMBLE

- 1 The work shall be carried out strictly in compliance with this tender and design requirement. The onus of demonstrating satisfactory performance of entire system shall be sole responsibility of the contractor and supplied material shall be as per specifications and approved shop drawings. Relevant Indian Standards shall be adhered. It is to be understood that all liabilities and risks arising out of the stated conditions of contract shall be covered by contractor and Owner/Consultant shall be indemnified.
- 2 The unit rate for all items in the BOQ shall be quoted in Indian Rupees (INR) and include cost of equipment, wastage, accessories, tools, appliances, labour, installation, testing & commissioning upto satisfactory handover.
- 3 The contractor shall ensure that unit price of each item includes cost of Equipment, materials, fixing accessories, appliances, tools, plants, 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.
- 4 The contractor to ensure that all waste and debris is collected and satisfactorily disposed off from site.
- 5 The contractor shall ensure that unit price of each item includes loading, transporting, unloading, handling/double handling, hoisting to all levels, setting, fixing in position and insurance upto satisfactory handover including security.
- 6 The specifications and drawings shall be read in conjunction to the Bill of Quantities. In case 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
- 7 The quantities mentioned in the BOQ are for contractor guidance only.The actual procurement of material shall be done only after written approval of shop drawings & technical submittals. This shall also apply to the Contractor's requisition for Owner supplied materials. The contractor shall be solely responsible for material supplied at site.
- 9 The contractor shall ensure work is carried out in conformity with the approved shop drawings and taking cognizance of latest architectural and other disipline drawings. The execution at site should be based on coordinated shop drawings or after obtaiing written approval of Project Manager/Architect/Consultant.
- 10 The progress of work shall be in accordance with approved pert chart which will be prepared by Contractor at the time of award of work and duly revised from time to time.
- 11 All shop drawings will be made on Autocad or Revit as per Project Manager requirement. Coloured prints shall be provided for site work. The shop drawings will clearly indicate requirement of hangars, supports, quantities and instructions for installation.
- 12 The information contained in this bid document, or any other information subsequently provided to Bidders—whether verbally, in documentary form, or by any other means—by or on behalf of the Client or any of its employees or advisers, is provided to the Bidders on the terms and conditions set out in this bid and such other terms and conditions subject to which such information is provided.
- 13 This bid document is not an agreement, nor is it an offer or invitation by the Client to any prospective Bidder or any other person. The purpose of this bid is to provide interested Bidders with information that may be useful in formulating their Proposals pursuant to this bid process. This document includes statements that reflect various assumptions and assessments made by the Client in relation to the Services. Such assumptions, assessments, and statements do not purport to contain all the information that each Bidder may require. This bid may not be appropriate for all persons, and it is not possible for the Client, its employees, or advisers to consider the objectives, technical expertise, and particular needs of each party who reads or uses this bid.
- 14 The assumptions, assessments, statements, and information contained in this document may not be complete, accurate, adequate, or correct. Each Bidder should therefore conduct its own investigations, analysis, and due diligenG.M(B D),Swosti Premium Ltd and should check the accuracy, adequacy, correctness, reliability, and completeness of the information contained in this

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bid and obtain independent advice from appropriate sources. Information provided in this bid to Bidders covers a wide range of matters, some of which depend on interpretations of law. The information provided is not an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The Client accepts no responsibility for the accuracy or otherwise of any interpretation or opinion on the law expressed herein.

- 15 The Client, its employees, and advisers make no representation or warranty and shall have no liability to any person, including any Bidder, under any law, statute, rule or regulation, or under the principles of tort, restitution, or unjust enrichment, for any loss, damage, cost, or expense which may arise from or be incurred or suffered on account of anything contained in this bid or otherwise, including the accuracy, adequacy, correctness, reliability, or completeness of this document, or any assumption, statement, or information contained in or deemed to form part of this bid, or arising in any way in this selection process.
- 16 The issuance of this bid document does not imply that the Client is bound to select any Bidder for the provision of the Services, and the Client reserves the right to reject all or any of the Proposals without assigning any reasons whatsoever. •The Client may, in its absolute discretion—but without being under any obligation to do so—update, amend, or supplement the information, assessment, or assumptions contained in this bid.
- 17 The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Proposal, including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by the Client, or any other costs incurred in connection with or relating to its Proposal. All such costs and expenses shall remain with the Bidder, and the Client shall not be liable in any manner whatsoever for the same or for any other costs or expenses incurred by a Bidder in the preparation or submission of the Proposal, regardless of the conduct or outcome of the selection process.

Swosti Hotels

(A Unit of Swosti Premium Ltd.)

Corporate Office: Swosti Premium,
Jaydev Vihar, Bhubaneswar – 751013, Odisha

Email: info@swostihotels.com

Website: www.swostihotels.com

File No.: PMC/SPL/GPR/2025/01

Letter No.: 002 / Gopalpur, Date: 10th March 2026

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LETTER OF INVITATION

Swosti Premium Ltd, on behalf of Gopalpur Palm Resort (A Unit of Swosti Premium Ltd), invites sealed bids for the Supply, Installation, Testing & Commissioning of Effluent Treatment Plant, Sewage Treatment Plant Water Treatment Plant & Hydro pneumatic System ,RO Plant With Electrical Installation for STP, ETP, WTP & RO and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam, on a Item Rate Contract Basis for selection of a qualified agency to whom the project may be awarded.

The bid documents will be made available from 10.04.2026 10.00 am IST to 28.04.2026 5 pm IST at designated link or upon request physically from Swosti Corporate Office, Bhubaneswar or through official mail ID .Bid document can be downloaded from the website - <https://www.swostihotels.com/tenders.html>

The completed proposals shall be submitted in hard copy (physical submission) at the address specified in the bid document no later than 3:00 PM on **29.04.2026**.

Three days before the scheduled Pre-Bid Meeting the intending bidders are requested to visit the site for accessing bid document and submit their queries in written form via their official mail ids or through registered postal service addressed to Swosti corporate office.

The Pre-Bid Meeting will be held on **18.04.2025 at 11.00** AM via Zoom/Physical mode. Meeting link/Venue shall be shared subsequently.

All received proposals will be opened at **4:00 PM on 29.04.2026** in the presence of authorized representatives of the bidders (not mandatory), at the venue communicated via email.

Swosti Premium Ltd reserves the right to reject any or all bids without assigning any reason thereto and shall not be liable for any costs incurred by bidders in the preparation or submission of proposals.

All subsequent corrigenda, clarifications, or updates (if any) will be circulated through official communication only via:

gm.communications@swostihotels.com

pmc.swosti@arkitechno.com

Gopalpur Palm Resort

(A Unit of Swosti Hotels)

gm.communications@swostihotels.com

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Swosti Premium Ltd. Gopalpur Palm Resort Project,Gopalpur,Ganjam

DATED: 10.04.2026

DETAILED TENDER NOTICE

1. Last Date & Time of issue of tender documents from 10.04.2026 to 28.04.2026
2. Last Date & Time of receipt of tender 29.04.2026 upto 3.00 p.m.

G.M(B D),SWOSTI PREMIUM LTD Swosti Premium Ltd ,Bhubaneswar on behalf of Swosti Premium Ltd invites sealed item rate tenders from eligible contractors for similar works.

Name of work: **Supply, Installation, Testing & Commissioning of Effluent Treatment Plant, Sewage Treatment Plant Water Treatment Plant & Hydro pneumatic System ,RO Plant With Electrical Installation for STP, ETP, WTP & RO and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam,**

Estimated cost of work put to tender : Rs. 250 Lacs

Time of completion : 9 Months

Earnest Money Deposit: **Rs. 2,50,000/- (Rupees Two Lacs Fifty Thousand only)** is to be submitted with tender document as earnest money. The above payment shall be made in the shape of deposit at pay order/demand draft of a scheduled bank issued in favour of **Swosti Premium Ltd payable** at New Delhi.

Works to be completed in coordination with the main Civil & MEP Interior works contractor. No extra for non-availability of fronts or coordination with main agency shall be payable on account of the same.

Tender documents can be downloaded from SWOSTI PREMIUM LTD website (www.Swosti Premium Ltd .ac.in) and submitted with non-refundable DD of **Rs. 11800/-** in favour of **Swosti Premium Ltd** as cost of tender.

- 1) The tenders shall be placed in sealed envelopes with a name of work and due date written on the envelope and addressed to the G.M(B D),SWOSTI PREMIUM LTD SWOSTI PREMIUM LTD. Complete tender documents shall be submitted by the approved contractors in **two envelopes**. **1st envelope** shall contain the earnest money in the shape of Demand Draft / Pay Order of a scheduled Bank requisite shape as per condition & eligibility criteria and cost of tender as stated above along with “Technical Bid “ and supporting documents . The **2nd** sealed envelop shall contain the ”Financial Bid” . Both the sealed envelopes shall be contained in another envelop , sealed and super scribed with the “Name of the Work”, the name and detailed address of the bidder as well as contact phone number & e-mail id. This sealed envelop has to be submitted at designated place as indicated in the bid document.
- 2) The eligible contractors who have carried out similar works in Reputed

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Private Hotel Chain/Govt Deptts/PSU/Reputed Pvt sector /MNCs are to submit the experience certificates for the works and registration certificates with Govt. Depts. if any. The said certificates along with the EMD be enclosed in Envelope-1.

- 3) Experience of having successfully completed similar works during last seven years ending on the 31.12.2025. **The Similar works shall mean works of execution of ETP,STP,WTP and RO of similar capacity as in BoQ of this bid document.** The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from date of completion to last date of receipt of tenders.

Three similar works not less than 40 % of est.cost	Rs 100.00 lacs each Or
Two similar works not less than 60 % of est cost	Rs 150.00 lacs each Or
One similar work not less than 90 % of est cost	Rs 225.00 lacs each

The work of similar nature should have been executed under Central/State/Autonomous/Central PSU/State PSU/local authority/Reputed Hotelier Group formed under any Act in Central/State .

- 4) **The bidder should be Original Equipment Manufacturer or authorized dealers of OEM for ETP,WTP,STP & RO and certificate/corroborative documentary evidences are required be submitted along with the bid.**
- 5) The applications not supported with requisite experience certificates, GST registration certificate and ITCC in Envelope-1 shall not be entertained
- 6) Solvency certificate for Rs. 90 lacs from any nationalized /scheduled bank. The applicant shall submit the solvency certificate, not older than six months prior to 30th September 2025, issued by any scheduled bank, in original.
- 7) Average Annual Turnover over HVAC works should be at least Rs 500 lacs during immediate last 3 consecutive financial years ending 31st Mar 2025.
- 8) Should not have incurred any loss in the more than two years in the last five years ending 31st Mar 2025.
- 9) Company should not have been barred / blacklisted for taking up similar work in any organization- A certification to this effect on the letter head of the bidder.
- 10) Performance certificates issued by past employers must be submitted by the vendors for the works, in support of their experience.
- 11) Bidder shall furnish list of the supervisory persons and other technical persons he wishes to deploy in this job along with their experience details.
- 12) Letter of Authority for signing and negotiation of bid.
- 13) The 2nd **envelope** shall contain the financial bids including Priced Schedule

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of Quantities sealed,

- 14) The 1st envelop should contain Form of Tender, Conditions of Tender, Articles of Agreement, Brief Specifications, Condition of contract, Drawings all duly signed by the authorized signatory of the firms.

1st and 2nd envelopes are to be put in a single envelope duly super-scribed the name of work, and addressed to G.M(B D),SWOSTI PREMIUM LTD and with their address. In case the tenderer does not fulfill the laid down eligibility criteria or fails to deposit the earnest money in prescribed form, financial bid shall not be opened.

Tenderers shall seal the tender after affixing their initials and put stamp on each and every page of tender document before submission. The tender of the contractor, who submits in-complete tender document or submits more than one tender for one work, shall not be considered at all.

Tenders will be received by the **G.M(B D),SWOSTI PREMIUM LTD up to 3.00 P.M on 29.04.2026** and will be opened by him or his authorized representative in the office of Registrar, SWOSTI PREMIUM LTD on the same day at **4.00 P.M.**

First the Technical Bids will be opened and screened. The bids shall be examined whether the EMD is in order and the bidder meets the minimum eligibility criteria specified above. . Those bidders whose EMD is in order, meets the minimum eligibility criteria, has submitted all the required documents and meet the technical requirements shall be considered for opening of financial bid. Conditional tenders would not be accepted. Financial bids in respect of contractors who do not fulfill above criterion shall not be opened.

- 15) No Xerox / certified copies of tenders shall be accepted, if submitted these tenders shall be rejected.

- 16) **Pre- bid meeting** - A pre bid meeting will be held as on **18th April 2026** at 11.00 AM - Any doubts or queries of the potential bidders will be addressed during the hybrid meeting. Venue: Hotel SWOSTI PREMIUM LTD /Zoom Link.

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SECTION-1 INSTRUCTION TO BIDDERS (ITB)

1. The time allowed for carrying out the construction work will be 6 months from the 7th day after the date of written orders to commence the work.
2. The site for the work is available.
3. During execution of works, because of some unforeseen circumstances to enable him to complete the work as per terms of the contract, shall not relieve the contractor from any liability or obligations under the contract and he shall be responsible for the acts, defaults and neglects of any sub-contractor, his agents or workmen as fully as if they were the acts, defaults or neglects of the contractor, his agents or workmen.
4. The Contractor shall be required to deposit an amount equal to 3% of the tendered value of the work as performance guarantee in the form of an irrevocable bank guarantee bond of any scheduled bank or State Bank of India in accordance with the form prescribed or in the form of fixed deposit receipt etc. within 15 days of the issue of letter of acceptance. The performance guarantee shall have the validity up to 31st Jan 2027.
5. Tenderers are advised to inspect and examine the site and its surrounding at their own cost and satisfy themselves before submitting their tenders as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risk, contingencies and other circumstances which may influence or affect their tender. A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed. The tenderer shall be responsible for arranging and maintaining at own cost all materials, tools and plants, water, electricity, access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specification of the work to be done, local condition and other factors having a bearing on the execution of the work.
6. The Accepting Authority -SWOSTI PREMIUM LTD does not bind himself to accept the lowest or any other tender and reserves to him/herself the authority to reject in whole or part, any or all of the tenders received without the assignment of any reason. All tenders in which any of the prescribed conditions are not fulfilled or for any condition including that of conditional rebate is put forth by the tenderer shall be summarily rejected.

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7. Canvassing, whether directly or indirectly, in connection with tenders is strictly prohibited and the tenders submitted by the contractor who resort to canvassing will be liable to rejection.
8. The Accepting Authority reserves to himself the right of accepting the whole or any part of the tender and the tender shall be bound to perform the same at the rates quoted.
9. Tenders shall remain open for acceptance for a period of 60 days from the date of opening of the tenders. If any tenderer withdraws his tender before the said period for issue of letter of acceptance, whichever is earlier or makes any modification in the terms and condition of the tender which are not acceptable to the SWOSTI PREMIUM LTD , then SWOSTI PREMIUM LTD shall, without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely besides black listing of the tenderer.
10. The notice-inviting tender shall form a part of the contract document. The successful tenderer/contractor shall, sign the necessary contract documents consisting of the notice inviting tender, all the documents including additional conditions, specification and drawings, if any forming the tender as issued at the time of invitation of tender and acceptance thereof with any correspondence leading thereto within the time specified in the letter communicating the acceptance of the tender. In case of delay, the earnest money may be forfeited and the tender cancelled or the contract enforced as per the terms of the tender and the invitation to tender and the tenderer shall thus be bound by the condition of contract even though the formal agreement has not been executed and signed within the specified time by the tenderer.
11. The work shall be carried out as per general of conditions of contract (Tender Contract) and form part of the agreement/document.
12. Contract is liable to be terminated by the SWOSTI PREMIUM LTD without payment of any compensation, if subsequent to the acceptance of tender the contractor is black- listed by, or enters into partnership of any black listed contractor of the SWOSTI PREMIUM LTD or any other department, or Govt. or its, undertakings.
13. Cost of Bidding
 - 13.1 The bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer will in no case be responsible and liable for those costs.
14. Clarification of Bidding Documents
 - 14.1** A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing/mail at the Employer's address indicated in the invitation to bid not later than 7 days before the Date of Submission of Tenders. Email- admin-project@Swosti Premium Ltd.ac.in

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15. Currencies of Bid and Payment

15.1 The unit rates and the prices shall be quoted by the bidder entirely in Indian Rupees. All payments will be invariably made in Indian Currency (Indian Rupees.)

16. PROTECTION OF ENVIRONMENT AND OTHER LAWS:

The contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and other local Acts/ Laws/ rules made there under, regulations, notifications and bye-laws of local authorities or any other law, bye-laws, regulations that may be passed or notification that may be issued in this respect in future by the State/ Local authority.

17. Evaluation of Bids Received : Detailed at following section

For and on behalf of the
Swosti Group of Hotels, Resorts, Travels & Educations
GM Corporate Communications.
Cell- 9938244538
Email: gm.communications@swostihotels.com

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Bid Data Sheet

Bid Identification No.: SWOSTI/GPR/TENDER/CCW/03/2026-27

The Swosti Premium Ltd., invites sealed, offline bids from reputed and experienced civil construction firms for the following work on Item Rate basis contract. Project details are as under:

Tender Summary

Sl. No.	Particulars	Details
1	Name of Work	Supply, Installation, Testing & Commissioning of Effluent Treatment Plant, Sewage Treatment Plant Water Treatment Plant & Hydro pneumatic System ,RO Plant With Electrical Installation for STP, ETP, WTP & RO and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam,on Item Rate Contract Basis
2	Project Location	Plot No. 182/552/617 & 184/618, Khata No. 102 (AJA), Gopalpur-on-Sea, Ganjam District, Odisha
3	Nature of Contract	Item Rate Contract
4	Estimated Project Cost	₹250 Lakhs (Two Hundred Fifty Lakhs Only)
5	Time for Completion	09(Nine) Calendar Months from date of LOA
6	Number of Packages	01 (One)
7	Eligibility	Reputed private sector entities having successfully completed similar scale works. Relevant Project Experience must include: <ul style="list-style-type: none">•Hotel/Office Buildings•Commercial or Hospitality Projects
8	Cost of Tender Document	₹11,800/- (Including GST)(Non-refundable, to be paid via Demand Draft(DD) in favor of "Swosti Premium Ltd.")- Including GST
9	Availability of Tender Documents	From 10.04.2025 to 28.04.2025 up to 5.00 PM –. a) From the Swosti Hotels website - https://www.swostihotels.com/tenders.html
10	Seeking Queries on RFP Document(Through email/Letter)	18.04.2025 upto 3:00 PM a) E-mail id. manoj@arkitechno.com b) Address : Swosti Hotels Corporate Office: Swosti Premium, Jaydev Vihar, Bhubaneswar – 751013, Odisha
11	Pre-Bid Meeting	18.04.2025 at 11:00 AM at Swosti Corporate Office, Bhubaneswar/Zoom Link in virtual mode
12	Last Date of Submission of	29.04.2025 up to 3:00 PM (Sealed Envelopes at Swosti Corporate)

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Sl. No.	Particulars	Details
	Bids	
13	Opening of Technical Bids	29.04.2025 at 4:00 PM in presence of PMC & Client
14	Technical Presentation (By technically qualified bidders)	Not Applicable
15	Opening of Financial Bids	Exact date and time shall be informed to qualified bidders atleast 48 hours of date of opening.
16	Mode of Tender	Offline, Physical Submission – Two Envelope System (Technical + Financial)
17	Bid Validity	90 Days from Last Date of Submission of Bids
18	Communication Email	manoj@arkitechno.com pmc.swosti@arkitechno.com

The bids must be submitted in hard copy (manual mode) in two separate sealed envelopes contained in another sealed envelope, marked clearly as “Technical Bid” and “Financial Bid”, mentioning the name and address of bidder, superscribed with title of work put to bids, along with all documents as prescribed in the bid document hereunder.

The client reserves the right to cancel the bidding process and/or reject any or all bids without assigning any reason there to. Corrigendum to bidding process/bid document if issued, subsequent to pre-bid meeting, shall be shared directly with bidders seeking clarification on or before pre-bid meeting/ participating in pre-bid meeting via email provided by them.

Authorized Signatory

Mr. Nihar Ranjan Sahoo, GM Corporate Communications.

Swosti Group of Hotels, Resorts, Travels & Educations

Cell- 9938244538

Email: gm.communications@swostihotels.com

Gopalpur Palm Resort Project
On behalf of Swosti Premium Ltd.

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Evaluation Criteria

(Clause 1.1 of Instructions to Bidders – Gopalpur Palm Resort Project)

INTRODUCTION

- This Evaluation Criteria outlines the method by which bidders for the bids received will be evaluated based on their technical and financial qualifications, experience, project-specific understanding, organizational setup, and resource readiness.
- The evaluation will be conducted in accordance with the Instructions to Bidders (ITB) and is applicable to **Cover-I: Technical Bid**. Only those bidders who qualify under the technical evaluation will be considered for the opening and evaluation of their **Cover-II: Financial Bid**.

EVALUATION OF TECHNICAL BID (COVER-I)

The Technical Bid will be evaluated based on the following five main criteria:

Sl. No	Evaluation Criteria	Maximum Marks
a	Financial Strength	25
b	Experience in Similar Nature of Work	25
c	Working Methodology and execution of similar nature of work(DBR)	25
d	Key Personnel	25
	Total	100

Criteria/Sub-Criteria of TECHNICAL EVALUATION

Financial Strength – 25 Marks

Component	Max. Marks	Evaluation Basis
(i) Annual Financial Turnover (as per Bid Data Sheet)	20	70% marks for minimum eligibility criteria; 100% for twice the minimum. In between – on pro-rata basis.
(ii) Liquid Assets (as per Clause of Bid Data Sheet)	5	70% marks for minimum eligibility criteria; 100% for twice the minimum. In between – on pro-rata basis.

Experience in Similar Nature of Work – 25 Marks

Description	Max. Marks	Evaluation Basis
Completion of Similar Projects of Bid	25	70% marks for minimum eligibility; 100% for

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Description	Max. Marks	Evaluation Basis
Data Sheet)		twice the minimum. In between – on pro-rata basis.

Methodology and Work Program – 25 Marks

Bidder shall submit a detailed Design Basis Report covering approach to execution of civil works.

Assessment will be based on content, specificity, and alignment to project needs.

Component	Marks
Technical Specifications for Materials & Workmanship	10
Project Execution Schedule / Work Programme	10
Approach & Methodology (project-specific)	5
Total	25

Key Personnel – 25 Marks

The following key personnel must be proposed and CVs submitted:

Position	Qualifications & Experience	Max. Marks	Evaluation Basis
Project Manager(1 No)	B.E./B.Tech Mech/Elect with 10+ years	15	Graduation (5), Experience (Exp. 10 yrs-7 , Higher - 10)
Site Engineer-(1 No)	B.E. with 3 yrs/Diploma with 7+ years in Mech	5	Graduation (2),Dip- (1), Experience (Exp. 7 yrs-2 , Higher - 3)
Site Engineer-Elect (1 No)	B.E. with 3 yrs/Diploma with 7+ years in Elect	5	Graduation (2),Dip- (1), Experience (Exp. 7 yrs-2 , Higher - 3)

GENERAL NOTES

- Bidders must furnish all necessary supporting documentation for substantiating the information.
- Only those bidders who score **70 marks or more (out of 100)** in Technical Evaluation shall be considered for opening of their “Financial Proposal”

Enhancement Factors for Past Financial Years (for Turnover/Experience Updating):

Year Before	Enhancement Factor
One	1.10
Two	1.21

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Three	1.33
Four	1.46
Five	1.61

SECTION-2-FORMS & FORMATS

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DOCUMENTS TO BE FURNISHED BY BIDDER

1. Documents as specified in Section 1, must be submitted by the Bidder in the Formats mentioned in Section 2 along with the BID.
2. Any other document, if asked by Employer for clarification during evaluation, shall be submitted by the bidder.

CHECKLIST OF DOCUMENTS TO BE SUBMITTED IN TECHNICAL BID

	Criteria	Document to be submitted	Submitted (Yes/No)
1	Cost Of Bid Document	DD/BC	
2	EMD/ Bid Security -	In the form of BG/Bid Security fee deposit details.	
3	Written power of attorney of the signatory of the Bid to commit the Bidder(If any)	Copy of power of attorney	
4	Whether Indian firms (Y/N)	Certificate of Incorporation	
5	OEM firms with proven track record of execution of similar HVAC Projects in IT buildings, commercial complexes, hospitality projects, or high-rise structures (G+9 or above).	Relevant Certificate	
6	Constitution or legal status of Bidder	Incorporation Certificate, Partnership Deed, Trade License, MoA, AoA	
7	Place of registration	Qualification Information	
8	Principal place of business	Qualification Information	
9	Major items of construction equipment proposed to carry out the Contract	Invoices of equipment / Lease agreement/Letter of Commitment	
10	Qualifications and experience of key site management and technical personnel proposed for the Contract	Detailed CV	
11	Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past five financial years	CA Certificate along with Audited Financial report for the relevant Financial Years	
12	Evidence of adequacy of working capital for this contract [access to line (s) of credit and availability of other financial resources]; Liquid assets and / or availability of credit facilities	Banker's certificate	
13	Authority to seek references from the Bidder's bankers	Bankers Details	

[Type here]

14	Information regarding any litigation or arbitration resulting from contracts executed by the bidder in the last five years or currently under execution	List of Litigation, if any	
15	Methodology & Programme.	To be submitted	
16	Bids from Joint venture - Bids from Joint ventures / Consortiums / Association of Parties are not acceptable	NA	
17	Annual minimum turnover	Turnover from HVAC Construction works certified by chartered Accountant	
18	The Firm should demonstrate making profit	CA/ Statutory auditor certificate	
19	Should have valid PAN and GSTIN	Scan copy of valid PAN and GSTIN	
20	Experience of successful completion of works / substantial completion of works (90% of the value of the contract to be considered as substantial completion) as referred in Bid Data Sheet C I.2.3).	Completion Certificate from Competent Authority mentioning all the details as per Bid Data Sheet/TDS Certificate for Pvt Sector Project	
21	Bid Validity Undertaking	Undertaking	
22	Affidavit	Affidavit by the bidder duly signed by the Notary Public and as specified in Section 2,	
23	Design Basis Report	NA	
24	Certificate of No Relationships	As per format given in Section-2 of the tender document	
25	Information Regarding Any Conflicting Activities and Declaration Thereof	As per format given in Section-2 of the tender document	
26	Proposal for Sub-Contract	To be mentioned	

[Type here]

Undertaking by Tenderer

I/We have read and examined and understood the notice inviting tender, schedules, Specifications applicable, drawings & Designs, General Rules and Directions, Conditions of Contract, clauses of contract, special conditions, & all other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work.

I / We hereby tender for the execution of the work specified for the SWOSTI PREMIUM LTD within the time specified in schedule of quantities and in accordance in all respects with the specifications, designs, drawings and instructions in General Rules and Directions and Conditions of contract and with such materials as are provided for, by, and in respect in accordance with, such conditions so far as applicable.

We agree to keep the tender open for Ninety (90) days from the due date of its opening and not to make any modifications in its terms and condition.

A sum of Rs.....Rupees.....

.....)
has been deposited in demand draft of a scheduled bank issued by a scheduled bank as earnest money. If I / we, fail to furnish the prescribed performance guarantee within prescribed period, I / we agree that the said G.M.(BD), SWOSTI PREMIUM LTD or his successors in office shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, if I / we fail to commence work as specified, I / we agree that Director, SWOSTI PREMIUM LTD or his successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the performance guarantee absolutely, otherwise the said earnest money shall be retained by him towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered, up to maximum of the 25 percentage and those in excess of that limit at the rates to be determined in accordance with the terms of contract. Further, I / We agree that in case of forfeiture of earnest money or both Earnest Money & Performance Guarantee as aforesaid, I / We shall be debarred for participation in the re-tendering process of the work.

I / We hereby declare that I / we shall treat the tender documents drawings and other records connected with the work as secret / confidential documents and shall no communicate information / derived there from to any person other than a person to whom I / we am / are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

Dated.

Witness:

Address:

Signatures of Contractor

Postal Address

Occupation:

[Type here]

LETTER OF SUBMISSION

The GM Corporate Communications.
Swosti Group of Hotels, Resorts, Travels & Educations
Cell- 9938244538
Email: gm.communications@swostihotels.com
Gopalpur Palm Resort Project
On behalf of Swosti Premium Ltd

Sir,

.I/We, the undersigned, have read and examined in detail, the HVAC specifications and all bidding documents and hereby declare that:

Price and Validity

1. All the rates quoted in our proposal are in accordance with the terms and conditions as specified in the bid document. All the prices and other terms and conditions of this proposal are valid for a period of 90 calendar days from the date of opening of bid.
2. We do hereby confirm that our bid prices include all taxes/levies. GST indicated separately.
3. We hereby declare that if any tax law is altered, we shall pay the same.
4. The quoted rates are inclusive of ESI , PF and Green Tax no extra on such heads would be payable on such account.

Earnest Money

We have enclosed EMD in the form of demand draft no..... , dated.....favoring Swosti Premium Ltd. payable at Bhubaneswar issued / drawn on ... Bank for Rs.__/- (Rupees ___Thousand only), as desired.

Deviations

We declare that all the works shall be performed strictly in accordance with the technical specifications and other tender conditions with no deviations.

Qualifying Data

We confirm that all information/data have been submitted as required in tender document.

We hereby declare that our proposal is made in good faith, without collusion for fraud and the information contained in the proposal is true and correct to the best of our knowledge and belief. I/We agree that in case any information is found to be incorrect the tender is liable to be rejected at any point of tendering process.

Bid submitted by us is properly sealed and prepared so as to prevent any subsequent alteration and replacement.

We understand that you are not bound to accept the lowest or any bid you may receive.

Thanking you,

Yours faithfully,

(Signature and seal of Tenderer with name, designation and contact no.)

[Type here]

NON-BLACK LISTING DECLARATION

FORMAT OF UNDERTAKING, TO BE FURNISHED ON COMPANY LETTER HEAD WITH REGARD TO BLACKLISTING/ NON- DEBARMENT, BY ORGANISATION

UNDERTAKING REGARDING BLACKLISTING / NON – DEBARMENT

To,
SWOSTI
PREMIUM LTD
Bhubaneswar

We hereby confirm and declare that we, M/s -----, is not blacklisted/ De-registered/ debarred by any Government department/ Public Sector Undertaking/ Private Sector/ or any other agency for which we have Executed/ Undertaken the works/ Services during the last 5 years.

Signature of Contractor

With stamp

[Type here]

GENERAL INSTRUCTIONS FOR SITE VISIT

I, , aged years, son/daughter of , presently residing at and authorized by (name of tenderer) (“Tenderer”) to solemn this affidavit on behalf of the Tenderer, solemnly affirm on oath as hereunder:

The Tenderer confirms that the Tenderer has duly undertaken the visit of the proposed project site of SWOSTI PREMIUM LTD located at Gopalpur ,Ganjam

The Tenderer has inspected and examined its surroundings and has satisfied itself about the site conditions and site logistics. The Tenderer confirms that it is aware of the ground conditions and nature of the site, means of access to the site and the accommodation area required for establishing the labour camp. The Tenderer agrees and confirms it shall be solely responsible for arranging and maintaining the afore- mentioned at its own cost including all materials, tools & plants, water, electricity, access, facilities for workers and all other services required for executing the Work unless otherwise specifically provided for in the contract documents.

The Tenderer confirms and agrees that the submission of the tender implies that the requisite site visit has already been undertaken and that the Tenderer has acquainted itself with the local conditions and other factors having a bearing on the execution of the Work.

DEPONENT VERIFICATION

I, , aged years, son/daughter of , presently residing at and authorized by Tenderer verify that the information mentioned above is true and correct to the best of my knowledge and belief.

DEPONE

LETTER OF ACCEPTANCE

(To be issued to the successful bidder on the letterhead of Swosti Premium Ltd.)

[Date: _____]

To,

[Name and Address of the Contractor]

Subject: Letter of Acceptance for Supply, Installation, Testing & Commissioning of Water Cooled Screw Chillers and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd., Gopalpur, Ganjam, on a Lump sum Contract Basis)

Dear Sir(s),

This is to notify you that your Bid dated _____ for execution of the following work on a Lumpsum basis:

“Supply, Installation, Testing & Commissioning of Water Cooled Screw Chillers and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd., Gopalpur, Ganjam, on a Lump sum Contract Basis)”

for the Contract Price of Rs. _____ (Rupees _____ only), as corrected and modified¹ in accordance with the Instructions to Bidders, is hereby accepted by Swosti Premium Ltd.

We note that as per your bid,
 You do not intend to subcontract any component of work
or

You propose to employ [Insert Name of Sub-Contractor] as sub-contractor for executing [Insert Work Component]

(Delete whichever is not applicable)

You are hereby requested to furnish a detailed Work Programme along with milestone-wise activity chart and cash flow forecast (S-curve) as per the Bid Data Sheet within 14 (fourteen) days from the issue of this Letter of Acceptance (LoA).

Further, you are required to furnish the Performance Security as specified in the Bidding Documents for an amount of Rs. _____, in the form prescribed, within 21 (twenty-one) days of receipt of this Letter of Acceptance.

Failure to comply with the above conditions may result in actions as specified in Clause 23 and 24 of the Bid Data Sheet.

We look forward to the successful execution of the project.

Yours faithfully,

Authorized Signatory
Swosti Premium Ltd.
Bhubaneswar

NOTICE TO PROCEED WITH THE WORK

(To be issued on Letterhead of Swosti Premium Ltd.)

[Date: _____]

To,
[Name and Address of the Contractor]

Subject: Notice to Proceed – Supply, Installation, Testing & Commissioning of Water Cooled Screw Chillers-HVAC High Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd., Gopalpur, Ganjam, on a Lump sum Contract Basis)

Dear Sir(s),

Pursuant to your furnishing of the required Performance Security in accordance with Clause of Bid Data Sheet, and the execution of the Contract Agreement for the work titled:

“Supply, Installation, Testing & Commissioning of Water Cooled Screw Chillers-HVAC High Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd., Gopalpur, Ganjam, on a Lump sum Contract Basis”

at a Bid Price of Rs. _____ (Rupees _____ only),
you are hereby instructed to proceed with the execution of the said works effective immediately, in strict accordance with the terms and conditions of the contract documents.

We trust that you will mobilize your resources promptly and commence the work at site without delay as per the agreed programme and milestones.

Wishing you a successful execution.

Yours faithfully,

Authorized Signatory
Swosti Premium Ltd.
Bhubaneswar

PERFORMANCE BANK GUARANTEE

To

_____ [name of Client]
_____ [address of Client]

WHEREAS _____ [name and address of Contractor] (hereafter called "the Contractor") has undertaken, in pursuance of Contract No. ___ dated _
_____ to execute _____ [name of Contract and brief description of Works] (hereinafter called "the Contract").

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 obligation 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]* _____ (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 there under or of any of the Contract documents which may be made between your 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 also be operable at our _____ Branch at Bhubaneswar, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

The guarantor/bank hereby confirms that it is on the SFMS (Structural Finance Messaging System) platform & shall invariably send an advice of this Bank Guarantee to the designated bank of Odisha Bridge & Construction Corporation Ltd details of which is as under:

Sl No.	Particulars	Details
1	Name of Beneficiary	Swosti Premium Ltd
2	Name of Bank	Union Bank Of India
3	Account No	128713100000061
4	IFSC Code	UBIN0578827

This guarantee shall be valid until 28 days from the date of expiry of the Defect Liability Period. Signature and Seal of the guarantor _

Name of Bank _____ Address _____ Date _

* An amount shall be inserted by the Guarantor, representing the percentage the Contract Price specified in the Contract including additional security for unbalanced Bids, if any and denominated in Indian Rupees.

BID SECURITY– Cover-IV

Bid Security (EMD): 8,50,000.00 INR

Affidavit (on Non-Judicial Stamp, attested by Notary Public)

Declaring authenticity of all submitted information and non-involvement in any corrupt or fraudulent practice.

Authorized Signature: _____

Name & Title: _____

Name of the Bidder: _____

Company Stamp/Seal

BANK CERTIFICATE

(To be issued by the Bidder's Bank on official letterhead and submitted by the Bidder in Cover-IV)

TO WHOMSOEVER IT MAY CONCERN

This is to certify that M/s. [Insert Name of Bidder] is a reputed company with good financial standing and banking conduct.

If the contract for the work, namely:

“Construction of Gopalpur Palm Resort – Core Civil Works (Lumpsum Package)”

is awarded to the above-mentioned firm, we confirm that we shall be in a position to provide overdraft / cash credit / fund-based credit facilities to the extent of:

₹ [Insert Amount in Figures and Words]

to meet their working capital requirements for executing the said contract.

SI No.	Particulars	Details
1	Name of Beneficiary	Swosti Premium Ltd
2	Name of Bank	Union Bank Of India
3	Account No	128713100000061
4	IFSC Code	UBIN0578827

INFORMATION REGARDING ANY CONFLICTING ACTIVITIES AND DECLARATION THEREOF

(To be submitted on Bidder's Letterhead)

To,
The G M (B.D)

Swosti Premium Ltd.
Bhubaneswar

Subject: Declaration Regarding Conflicting Activities

Dear Sir,

I, the undersigned, hereby declare that our firm/company is not engaged in any activities that can be termed as conflicting in nature with respect to this tender for the project titled:

"Supply, Installation, Testing & Commissioning of Water Cooled Screw Chillers and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd., Gopalpur, Ganjam, on a Lump sum Contract Basis)"

I also acknowledge that in case of any misrepresentation or concealment of facts related to this declaration, our proposal and/or contract shall be liable for rejection/termination by the Client, and the decision shall be binding upon us without any claim whatsoever.

Authorized Signatory: _____

Name & Designation: _____

Name of the Bidder: _____

Stamp/Seal: _____

Date: _____

Communication Address: _____

Note:

Conflicting activities refer to any potential conflict of interest arising from prior, current, or proposed agreements, engagements, or affiliations with the Client that may impair the bidder's objectivity, integrity, or impartiality in the execution of the project.

AFFIDAVIT

[To be submitted by the bidder in a non-judicial stamp paper duly signed by the Notary Public]

1. I, the undersigned, do hereby certify that all the statements made in the required attachments are true and correct.

2. The undersigned also hereby certifies that neither our firm M/s.....
.....have abandoned any work on building in India nor any contract awarded to us by the State of Odisha for such works have been rescinded, during last five years prior to the date of this bid.

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

4. The undersigned understand and agrees that further qualifying information may be requested and agrees to furnish any such information at the request of the Department/ project implementing agency.

Authorized Signature: Name & Title of Signatory:
Name of Bidder :

SECTION-3 **BOQ,SPECIFICATIONS& TENDER DRAWINGS :**

These Particular are to be read in conjunction with other documents issued along with tender. In case of any discrepancy between Design drawings, General conditions or Bill of quantity, Following order of preference shall be applicable.

- BOQ
- Specification
- Tender drawings

The contractor shall refer the tender drawings attached at end of this section.

The contractor shall refer the following annexure while bidding and will read them in conjunction with specifications as well as bill of quantity

Annexure - I	:	Design Criterion
Annexure -II	:	List of approved makes
Annexure -III	:	Codes and Standards
Annexure -IV	:	Technical Specifications
Annexure -V	:	Technical Data Sheets

ANNEXURE-I

DESIGN CRITERION

1.0 DESIGN CRITERION

Following shall be basis for developing the design:

Site Location	:	Gopalpur, Odisha
Geographical Data	:	20°15' N, 85°49' E
Altitude	:	46 m above the sea level

1.1 Outdoor Design Temperatures

The recommended outdoor design conditions for Bhubaneswar, (which is approximately 170 km from Gopalpur) mentioned in ISHRAE Weather Data Book-2022 has been selected

S. No.	Season	Outdoor Temperatures	
		DBT	WBT
1.	Summer	38.9 °C (102.02°F)	27.0 °C (80.6 °F)
2.	Monsoon	35.0 °C (95.0 °F)	30.1 °C (86.18 °F)
3.	Winter	14.1 °C (57.38 °F)	-

The outdoor temperatures are based on 0.4 % cumulative frequency of occurrence.

1.2 Envelope Details

Based on recommendations from ECBC for Warm-Humid zone, the minimum performance requirements are given below:

S No.	Description	Recommendation (Btu/Hr.Sqft °F)
1.	Exposed Masonry Wall	0.11
2.	Exposed Roof	0.05
3.	Window to Wall Ratio	As per design
4.	Glazing U-Value	0.50
5.	Glazing SHGC	0.27
6.	Spandrel	0.06

1.WORK DESCRIPTION:

The general character and the scope of work to be carried out under this contract are illustrated in Drawings, Specifications and Schedule of Quantities. The Contractor shall carry out and complete the said work under this contract in every respect in conformity with the contract documents and with the direction of and to the satisfaction of the Client's site representative. The contractor shall furnish all labour, materials and equipment (except those to be supplied by the Client) as listed under Schedule of Quantities and specified otherwise, transportation and incidental necessary for supply, installation, testing and commissioning of the complete Sewage Treatment Plant as described in the Specifications and as shown on the drawings. This also includes any material, equipment, appliances and incidental work not specifically mentioned herein or noted on the Drawings/Documents as being furnished or installed, but which are necessary and customary to be performed under this contract. The Sewage Treatment Plant shall comprise of following:

Sewage Treatment Plant

- a. Screen chambers with SS Screen & Grease Trap
- b. Sewage Equalization Tank
- c. Tube settler
- d. Anoxic & MBBR Tank, Sludge Tank
- e. Tertiary Treatment Plant
- f. UF & UV Unit
- g. Electro Mechanical Equipment's.
- h. Electrical Cabling & Panel etc.
- i. Treated Water Tank
- j. UF Water Tank
- k. Screw Press
- l. Other Miscellaneous Items.
- m. Approval from Local Authorities
- n. Cutting holes, chases & like through all types of walls /floors and finishing for all services crossings, including sealing, cover plates, making good structure and finishes to an approved standard.
- o. Balancing, testing & commissioning of the entire STP.
- p. One time lab testing during commissioning, list of recommended spares, as-installed drawings, operation & maintenance manual for the entire STP contract.
- q. Training of Client's staff.

2.SITE MANAGEMENT

The Contractor shall be required to provide following staffing for the project:

- Design Engineer who will work with Consultant for getting shop drawings, technical submittal and variation in quantity statement approved.
- Procurement team.
- Full time dedicated Engineer (minimum 10 year experience) & one supervisor posted at site.
- The contractor shall submit organization chart and CV prior to starting work at site.
- The Contractor shall have required stores, tools & plant, security and facility to transport materials to place of installation for speedy execution of work.

3.REGULATIONS & PERMITS

Prior to starting work at site, the contractor shall obtain required permits/ licenses required for satisfactory execution and operation of the installation. All receipted amounts shall be reimbursed by Client on production of proof of payment by the contractor.

The executed work shall strictly conform to applicable laws, regulations and Indian Standards which become applicable. In case the specifications and drawings contained in this document call for higher standard than those required by prevailing regulations, then these specifications & drawings shall become applicable. However, in case of any conflict or violation between the document/drawings and prevailing laws, then the applicable laws & regulations shall be governing & binding.

4.SHOP DRAWINGS

A set of design drawings listed in this document are available at Consultant office and may be issued with the tender document. These design drawings are for reference of the contractor and indicate proposed arrangement and the extent of work covered in the contract. The data given in the drawings and specifications is as exact as could be procured, but its accuracy is not guaranteed. The contractor cannot execute work or scale these drawings for reference.

Following shall be the procedure followed by contractor while preparation of shop drawings:

- The contractor shall refer the design drawings for understanding the scope and proposed routes to be followed during execution.
- Collate latest architectural backgrounds from the Client representative/Architect/Consultant.
- Examine all related services drawings but not limited to structural, plumbing, electrical, HVAC, Interior, landscape and others including as-built works before starting the work. Any discrepancy must be report to the Client's site representative in writing and obtain approval for go-ahead.
- Within one week of award of work, the Contractor shall prepare a list of shop drawing along with submission schedule for approval of Client representative/Consultant. The

list of drawings must include layouts for Plant room, Pump room, Typical drawings showing exact location of supports, flanges, bends, tee connections, reducers, detailed piping drawings showing exact location and type of supports, valves, fittings etc.; electrical panels inside/outside views, power and control wiring schematics, cable trays, supports and terminations.

Maximum headroom shall be maintained at all points and in case the same is inadequate, then written approval from Client representative must be obtained prior to execution at site.

These shop drawings shall depict information required to complete the Project as per specifications and as required by the Consultant/Client representative. These Drawings shall contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other contractors. Each shop drawing shall contain tabulation of all measurable items of equipment/materials/works and progressive cumulative totals from other related drawings to arrive at a variation-in- quantity statement at the completion of all shop drawings.

Where the work under this contract is proposed to be installed in close proximity or is interfering with other trades, then based on client representative/consultant directions, the contractor shall prepare all services coordinated working drawings and sections at a suitable scale (not less than 1:50), clearly showing proposed installed in relation to the work of other trades.

- The contractor shall thereafter furnish six sets of detailed shop drawings to Client representative/Consultant for obtaining comments/approval. The Contractor will make unlimited number of re-submissions of shop drawings unless Client representative/Consultant/Architect approval is obtained.
- The Contractor will thereafter submit six sets of final shop drawings to the Client representative for their exclusive use and all other agencies.
- No material or equipment may be delivered or installed at the job site until the contractor has in his possession, the approved shop drawing for the particular material/equipment/installation.
- In case installation is carried out without following above process or obtaining a waiver to follow the procedure from Client representative, the work shall be rejected and contractor shall rectify the same at their own cost.
- Shop drawings shall be submitted for approval minimum four weeks in advance of planned delivery and installation of any material to allow Client representative/Consultant ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved program.

Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the contract requirements, nor does it in any way relieve the contractor of the responsibility or requirement to furnish material and perform work as required by the contract.

5. TECHNICAL DOCUMENTATION

The contractor prior to supplying material at site will submit the following documentation to Consultant/Client representative for approval:

- Manufacturers drawings, catalogues, pamphlets and other documents in triplicate. Each item shall be properly labeled, indicating the specific services for which material or equipment is to be used, giving reference to the governing section and clause number and clearly identifying in ink the items and the operating characteristics. Data of general nature shall not be accepted.
- Samples of all materials shall be submitted to the Client's site representative prior to procurement. These will be submitted in two sets for approval and retention by Client's representative and shall be kept in their site office for reference and verification till the completion of the Project. Wherever directed, a mockup or sample installation shall be carried out for approval before proceeding for further installation.
- Where the contractor proposes to use an alternate make or model of equipment other than that specified, all new drawings and detailing required thereafter shall be prepared by the contractor at his own expense including any re-design required for other discipline/trade. Any delay on such account shall also be at the cost of and consequence of the Contractor.

Contractor to refer Annexure –I for list of approved makes & materials for this project.

6. VARIATION IN QUANTITY STATEMENT

After approval of major & relevant shop drawings, the contractor shall submit four copies of a comprehensive variation in quantity statement. This statement must be submitted prior to completing ordering of equipment and should identify imported/local materials in this contract as well as proposed spares/tools. The Consultant shall provide recommendation to Client representative for acceptance of anticipated variation in contract amounts and also advise Client to initiate action for procurement of spare parts and tools at the completion of project.

7. QUALITY ASSURANCE

The contractor to ensure that all materials and equipment supplied shall be new and of best available quality conforming to the relevant Indian Standard Specifications and to these specifications. Makes shall be strictly in conformity with list of approved manufacturers as per Annexure - I. Owners reserve the right to reject any item which in their assessment is second hand

Any deviations from above shall be clearly highlighted prior to supply and shall be brought to the notice of the Client representative/Consultant for further instructions in the matter.

Prior to starting execution work at site, the Contractor shall verify the sufficiency of the size of the shaft openings, clearances and ceiling spaces for proper installation. Failure to communicate insufficiency of any of the above shall constitute Contractor acceptance of the same. The Contractor shall locate all equipment in fully accessible locations which can be easily serviced, operated or maintained. Valve or other devices requiring attendance shall be finalized and

communicated in sufficient time. Failing this, the Contractor shall make all the necessary repairs and changes at own expense. Access panel shall be marked.

8.WORKS NOT COVERED UNDER THIS CONTRACT

Following works are excluded from the scope under this contract. These shall be executed by respective contractor in accordance with approved shop drawings where these details must be highlighted. However, contractor shall be responsible for providing details and thereafter supervision to ensure satisfactory & timely execution of these associated items as they have a bearing on this contract.

Civil Works

- RCC/PCC Foundations for major equipment only.
- Construction of tanks & sumps, rain water harvesting pits, de-silting chamber including water proofing.
- Masonry drains channels and sumps in plant room.
- Core cutting in slabs/floors and wall work.
- Any major chasing/chipping/civil masonry work.

9.INTEGRATION WITH BUILDING AUTOMATION SYSTEM

The scope of Plumbing and Firefighting Contractor shall include the following for the interface to Building Automation System and no additional cost shall be paid for providing the interface feasibility.

- Stop/Manual/ Auto switches along with potential free contacts for monitoring the manual operation status, to be provided for those equipment whose start / stop is controlled by Building Automation System.
- Potential free 'NO' contacts for monitoring 'Run' status of equipment wherever required.
- Necessary contactor with potential free contacts and Stop/Manual/ Auto switches to be provided for all equipment wherever the starter is not provided and which requires starting / stopping through Building Automation System.
- Sockets /Nipples including shut-off valve for mounting sensors/transmitters on pipe lines.
- The space provision in all the equipment panel (MCC) for mounting Current/Potential transformers & transducers and power supply to the transducer shall be provided by the Plumbing and Firefighting contractor. Separate current transformers shall be provided by Plumbing and Firefighting contractor for monitoring current / KWH (wherever required) through BAS.
- The installation of current transformer & Transducer along with wiring between Current Transformer & Transducer up to the terminal block shall be provided by the Plumbing and Firefighting contractor. All transducers shall be supplied by BAS contractor.
- The low voltage BAS Cables shall be brought up to the electric panel by BAS contractor and all terminations into the electrical panels shall be made by Plumbing and Firefighting contractor after satisfying himself of the wiring system. It is to be clearly understood that the final responsibility for the sufficiency, adequacy and conformity to the contract requirements, of the Plumbing and Firefighting system, lies solely with the contractor.
- All necessary Hardware/ Software shall be made available by the Plumbing and Firefighting Contractor on the Microprocessor based panel for the integration of such panel to Building Automation System for remote monitoring / controlling of marking / equipment thru BAS.

10. TESTING, ADJUSTING AND BALANCING

Balancing of all water systems and all tests as called for the Specifications shall be carried out by the contractor through a specialist group, in accordance with the Specifications and ASPE / ASHRAE Guide lines and Standards. Performance test shall consist of three days of 10 hour each operation of system for each season. Cost of performance witness test of major equipment such as pumps, equipment, panels etc. at factory with two personnel from Owners / Consultant shall be included.

The installation shall be tested again after removal of defects and shall be commissioned only after approval by the Owner's site representative. All tests shall be carried out in the presence of the representatives of the Architect / Consultant and Owner's site representative.

11. COMPLETION CERTIFICATE

On completion of the installation, a certificate shall be furnished by the contractor, counter signed by the licensed supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local authority.

The contractor shall be responsible for getting the entire installation duly approved by the local authorities concerned, and shall bear expenses if any, in connection with the same.

12. AS-BUILT DRAWINGS

Contractor shall submit following as-built drawings as and when work is completed:

- Six set of hard copies of all as-built drawings duly corrected and incorporating any modifications during execution.
- Two set of pen drive containing the drawings.
- Position of all sanitary fixtures.
- Runs of all water lines with diameters on all floors and vertical risers / drops.
- Runs of all soil, waste, vent & rain water piping with diameters on all floors and vertical stacks.
- Position and sizes of all type of control valves and all other plant and equipment.
- Position of cleaning eye / access doors and opening panels in soil/waste disposal system.
- Original installation and Maintenance manual of all types of equipment.
- Location of all mechanical equipment with layout and piping connections.

13. MAINTENANCE MANUAL

Upon completion and commissioning of works, the contractor shall submit a draft copy of comprehensive operating instructions, maintenance schedule and log sheets for all systems and equipment included in this contract. This shall be

supplementary to manufacturer's operating and maintenance manuals. Upon approval of the draft, the contractor shall submit four (4) complete bound sets of typewritten operating instructions and maintenance manuals; one each for retention by Consultant and Client's site representative and two for Clients Operating Personnel. These manuals shall also include basis of design, detailed technical data for each piece of equipment as installed, spare parts manual and recommended spares for 4 year period of maintenance of each equipment. The manuals shall include:

- Description of the work carried out / installed.
- Operating instructions.
- Maintenance instructions including procedures for preventive maintenance.
- Manufacturers catalogues.
- Spare parts list.
- Trouble shooting charts.
- Drawings
- Type and routine test certificates of major items.

Details of the entire bought out item should be part of this maintenance manual.

14.ON SITE TRAINING

Upon completion of all work and all tests, the Contractor shall furnish necessary operators, labor and helpers for operating the entire installation for such periods so as to enable the Client's staff to get acquainted with the operation of the system. During this period, the contractor shall train the Client's personnel in the operation, adjustment and maintenance of all equipment installed.

15.DEFECTS LIABILITY PERIOD

Complaints

The Contractor shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 10 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.

Repairs

All equipment that requires repairing shall be immediately serviced and repaired. Since the period of Mechanical Maintenance runs concurrently with the defects liability period, all replacement parts and labour shall be supplied promptly free- of-charge to the Client.

16.UPTIME GUARANTEE

The contractor shall guarantee for the installed system an uptime of 98%. In case of shortfall in any month during the defects liability period, the Defects Liability period shall get extended by a month for every month having shortfall and no reimbursement shall be made for the extended period.

17.OPERATION & MAINTENACE CONTRACT

Contractor may be required to carry out the operation of the installation during and after the defects liability period. Further, it may also be required to carry out all-

inclusive maintenance of the entire system for a period of four years beyond the defects liability period.

Operation Contract:

It will involve round the clock operation for 24 hours a day wherein work will include but not limited to operation of installation, maintaining log books, complain register and summary of operation.

The terms of payment shall be monthly at the end of each month on pro-rata basis.

All Inclusive Maintenance Contract:

The work will involve routine preventive maintenance with monthly status report. Entire installation shall be painted every two years. 98% uptime of all systems is expected under this contract wherein up time shall be assessed every month and in case of shortfall during any month the contract shall be extended by a month. No reimbursement shall be payable for the extended period.

Adequate number of persons to the satisfaction of the Client representative shall be provided including relievers wherein statutory compliances such as of EPF, ESIC and other applicable labour legislations shall be to contractor account. No overtime shall be payable. Routine shut downs shall be permitted with prior permission of the Owner.

Payment shall be Quarterly at the beginning of each quarter on pro-rata basis.

ANNEXURE – I
List of Makes

DESCRIPTION	MANUFACTURER'S NAME
Manhole covers and frames as per IS:1729	NECO / or Approved equivalent
D.I. Manhole Covers & Frames	NECO / or Approved equivalent
G.I. Pipes - IS: Az{1239	Tata Steel / Prakash Surya / Jindal Hissar
PVC Pipe	Astral / Prince / Ashirwad / HIL
PVC Valves – Butterfly Valves / Ball Valves	Automate / Astral / Cepex
G.I. Fittings - IS: 1239	UNCO / R Brand / Unik / DRP /Zoloto 'M'
G. I. Pipe Sealant	Henkel - Loctite 55 / or Approved equivalent
SS Pipe & Fitting	Viega / Remi / Jindal / VHS
Pipe clamp & supports	Hira Walraven / Mupro / Hilti
GM / Forged Brass Valves / Air Release Valve	Zoloto / Advance / Audco / Honeywell / SKS
Sluice / Butterfly / Non-Return Valves / Strainers	Zoloto / Advance / Audco / Honeywell / SKS
Pressure Reducing Valve	Zoloto / Advance / Audco / Honeywell / SKS
Motorized Butterfly Valves	Zoloto / Advance / Audco / Honeywell / SKS
Solenoid Valve	U Flow / Avcon/ Aira
Foot Valve	Kirloskar / Leader / Sant / CIM
Float Valve	Leader / Sant / SKS
Multiport Valve	Midas/ Pentair / Initiative
Y- Strainer	Advance / Zoloto / KSB
Magnetic Flow Meter / Electromagnetic Type Flow Meter	Aster / Forbes Marshall / Magfield / EE
Digital Turbine Type Flow Meter	Aster / UKL Ztech
Water Meter	Kranti / Cirrus / Kaycee / Kent
pH Meter / DO meter	Aster / Electronet / Hach/Eutech / Endress Hauser/ Hanna
TDS Meter	Aster / Electronet / Hach / Eutech / Endress Hauser
Air Rotameter	Eureka / Vekseller / Flowstar
Water Level Indicator / Level Controller	Patson / Nivo Control / Advanced / Tecnika / LIFA/ Auto Pump/ Minilec/Chasten
Submersible Drainage Pumps	Wilo / Grundfos / Lubi / Xylem
Hydropneumatics System / Submersible Pump /	Wilo / Grundfos / Lubi / Xylem / Ebara
Transfer Pumps for Water Supply	Wilo / Grundfos / Lubi / Xylem / Ebara
Submersible Pump / Self Priming Pump (all pumps)	Wilo / Grundfos / Lubi / Xylem / Ebara
Dosing pump	Asia LMI/ SEE S&T/ Grundfos
Screw Pumps	Roto / Techno / SEE S&T / UT Pump
VFD	ABB / Danfoss / Siemens / Delta

DAF Unit	Krofta / Daftech / Wastech
Diffusers	Rehau-Germany / OTT / Titan/Scogen
Side Channel Air Blowers	Everest / Scogen
Twin Lobe Air Blowers	Everest / Ingersol Rand / KAY / Aakash
Air ejector	Norgen / Equivalent
MBBR Media / Tube Settling Media	MM Aqua/ Cooldeck / PFC
Pressure Vessel	Wellmate / Zilmet / Global / Waterino
Pressure Switches	Switzer / Danfoss
Bar Screens	Vendor Fabricated
Oil Skimmer	Micro / Premiartech / Euroteck / Astavans / Hydroluft
Semi-Automatic Rotary Drum Fine Screen	Huber / Toro Spain / KSP Hydro / Jash
Agitator Gear Box & Gear Motor	Rotomotive / Motorvario / Elecon
Manual Bar Screens [Coarse & Fine]	Vendor Fabricated
Hydrostatic Level Transmitter	Electronet / Pune Techtrol / Minilec
DO sensor	Electronet / Wastech / Hach / Hanna / Aster
Anti-Vibration Mounting & Flexible Connection	Dunlop / Kanwal Industrial Corporation / Resistoflex
Pressure Gauge	Forbes Marshall / Fiebig / Emerald / H Guru
Fastener	Fisher / Hilti
Paints	Asian Paints / Berger
MH / Water Tank Plastic Steps	KGM / Supreme / Pranali Industries
Micron Cartridge Housing & Filters	Cuno / Parker
Softener Resin	Dupont / Ion Exchange / Purolite
RO Plant Supplier	Thermax / KSP Hydro / Bharat Engineering
SS Tanks	Neropure / Reno / H2O / PFC
Skid Mounted UF System (Complete Factory Fitted System)	KOCH / Dupont / SUEZ / KSP Hydro / Toray / Ecolab
UF Membrane	KOCH / GE / Toray
M.S. Filters / Softeners	Vendor Fabricated
UV	Alfa UV / Sukrut / Pentair
Level Switch	Chaston / Techtral / Technika / Minilec
Level Indicator (Water)	Minilec / Advance
Puddle Flanges	Vendor Specific
Plastic Tanks	Sintex / Vectus / Polycon
Dosing tank (chemical grade)	Vectus / Polycon / Sintex
Screw Press	Euroteck / Huber / PFC
Submersible Mixer	Xylem / Aqua & Co. (Italy)/ Wilo / Grundfos
Gear Agitator (Gear Box & Motor)	Motovario / Rotomotive
PLC System with HMI & SCADA	Allen Bradely / Siemens / Delta / Omron
Online Monitoring System (Water Parameters)	KSP Hydro / Hach / Xylem / E&H
MS Tanks	Vendor Specific

Electric Control Panel	CPRI Approved Enclosure with all makes of components as per LAM + Pre Approval of all drawings from consultant before manufacturing
Switchgears	ABB / L & T / Seimens / Scheineder / BCH

ANNEXURE – II**PART LIST OF CODES & STANDARDS*****LIST OF BUREAU OF INDIAN STANDARDS AND OTHER INTERNATIONAL CODES***

All equipment, supply, erection, testing and commissioning shall comply with the requirements of Indian Standards and code of practices given below. All equipment and material being supplied by the contractor shall meet the requirements of IS and other specified.

Tariff advisory committee's regulation (fire insurance), electrical inspectorate and Indian Electricity rules and other Codes / Publications as given below:

<u>Pipes and Fittings</u>	
IS : 458	Specification for precast concrete pipes (with and without reinforcement)
IS : 651	Salat glazed stone ware pipes and fittings.
IS : 1239 (Part 1)	Mild steel, tubes, tubulars and other wrought steel fittings: Part 1 Mild Steel tubes.
IS : 1239 (Part 2)	Mild Steel tubes, tubulars and other wrought steel fittings: Part 2 Mild Steel tubulars and other wrought steel pipe fittings.
IS : 1536	Centrifugally cast (spun) iron pressure pipes for water, gas and sewage.
IS : 1537	Vertically cast iron pressure pipes for water, gas and sewage.
IS : 1538	Cast Iron fittings for pressure pipes for water, gas and sewage.
IS : 1729	Sand Cast iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.
IS : 1879	Malleable cast iron pipe fittings.
IS : 1978	Line pipe
IS : 1979	High test line pipe.
IS : 2501	Copper tubes for general engineering purposes
IS : 2643 (Part 1)	Dimensions for pipe threads for fasterning purposes: Part 1 Basic profile and dimensions.

IS : 2643 (Part 2)	Dimensions for pipe threads for fastening purposes: Part 2 Tolerances.
IS : 2643 (Part 3)	Dimensions for pipe threads for fastening purposes: Part 3 Limits of sizes.
IS : 3468	Pipe nuts.
IS : 3589	Seamless or electrically welded steel pipes for water, gas and sewage (168.3 mm to 2032 mm outside diameter).
IS : 3989	Centrifugally cast (sun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.
IS : 4346	Specifications for washers for use with fittings for water services.
IS : 4711	Methods for sampling steel pipes, tubes and fittings.
IS : 6392	Steel pipe flanges
IS : 6418	Cast iron and malleable cast iron flanges for general engineering purposes.
IS : 7181	Specification for horizontally cast iron double flanged pipe for water, gas and sewage.
IS:782	Specification for caulking lead (3 rd rev.)
IS:6163	Cast Iron Low Pressure Pipes
IS:13592	PVC Pipes
IS:4989	HDPE Pipes for Potable water supply, Sewage and Ind. Effluent
I.S:985	UPVC Pipes for Potable water supply
IS:110221	Code of Practice for coating and wrapping of U.G M.S Pipelines
IS:3114	Code of Practice for laying C.I Pipes (2 nd rev.) (Amendment 2)
<u>Valves</u>	
IS : 778	Specification for copper alloy gage, 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 2 Multi 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 : Design
IS : 13095	Butterfly valves for general purposes.
<u>Water Quality Tolerance</u>	
IS : 3025 (Parts 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
<u>Pumps & Vessels</u>	
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 : 4648 (Part 1)	Code of practice for lining of vessels and equipment for chemical processes Part 1: Rubber lining.
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.
<u>General</u>	
National Building Code of India 2005 Part IV and Part IX	
Uniform Plumbing Code of India 2008	
SP : 6 (1)	Structural Steel Sections

IS : 325	Three Phase Induction Motors
IS: 456	Code of practice for plain and reinforced concrete (3 rd rev.) (Amendment 2)
IS : 554	Dimensions for pipe threads where pressure tight joints are required on the threads.
IS : 694	PVC insulated cables for working voltages up to & including 1100 V.
IS : 779	Specification for water meters (domestic type).
IS : 782	Specification for caulking load.
IS : 800	Code of practice for general construction in steel
IS : 1068	Electroplated coatings of nickel plus chromium and copper plus nickel plus chromium.
IS : 1172	Code of Basic requirements for water supply drainage and sanitation
IS : 1367 (Part 1)	Technical supply conditions for threaded steel fasteners: Part 1 introduction and general information.
IS : 1367 (Part 2)	Technical supply conditions for threaded steel fasteners: Part 2 product grades and tolerances.
IS : 1554 (Part 1)	PVC insulated (heavy duty) electric cables : Part 1 for working voltages upto and including 1100 V.
IS : 1554 (Part 2)	PVC insulated (heavy duty) electric cables: Part 2 for working voltages from 3.3 KV upto and including 11 KV.
IS : 1726	Specification for cast iron manhole covers and frames.
IS : 1742	Code of practice for building drainage.
IS : 2064	Selection, installation and maintenance of sanitary appliance code of practice.
IS : 2065	Code of practice for water supply in buildings.
IS : 2104	Specification for water meter for boxes (domestic type)
IS : 2373	Specification for eater meter (bulk type)
IS : 2379	Color code for identification of pipe lines.
IS : 2527	Code of practice for fixing rainwater gutters and down pipes for roof drainage.
IS : 2629	Recommended practice for hot dip galvanizing on iron and Steel.

IS : 3114	Code of practice for laying of cast iron pipes
IS : 4111 (Part 1)	Code of practice for ancillary structures in sewerage system: Part 1 manholes.
IS : 4127	Code of practice for laying glazed stoneware pipes.
IS : 4853	Recommended practice for radiographic inspection of fusion welded butt joints in steel pipes.
IS : 5329	Code of practice for sanitary pipe work above ground for buildings.
IS : 5455	Cast iron steps for manholes.
IS : 6159	Recommended practice for design and fabrication of material, prior to galvanizing.
IS : 7558	Code of practice for domestic hot water installations.
IS : 8321	Glossary of terms applicable to plumbing work.
IS : 8419 (Part 1)	Requirements for water filtration equipment: Part 1 Filtration medium sand and gravel.
IS : 8419 (Part 2)	Requirements for water filtration equipment: Part 2 under drainage system.
IS : 9668	Code of practice for provision and maintenance of water supplies and firefighting.
IS : 9842	Preformed fibrous pipe insulation.
IS : 9912	Coal tar based coating materials and suitable primers for protecting iron and steel pipe lines.
IS : 10221	Code of practice for coating and wrapping of underground mild steel pipelines.
IS : 10446	Glossary of terms relating to water supply and sanitation.
IS : 11149	Rubber Gaskets
IS : 11790	Code of practice for preparation of butt-welding ends for pipes, valves, flanges and fittings.
IS : 12183 (Part 1)	Code of practice for plumbing in multistoried buildings: Part 1 water supply.
IS : 12251	Code of practice for drainage of building basements.
IS : 5572	Code of practice for sanitary pipe work.

BS : 6700	Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their cartilages.
BS : 8301	Code of practice for building drainage.
BSEN : 274	Sanitary tap were, waste fittings for basins, bidets and baths. General technical specifications.

General for STP & WTP System	
Manual on Sewage & Sewage Treatment	CPH EEO; Govt. of India.
SP : 6 (1)	Structural Steel Sections
IS : 325	Three Phase Induction Motors
IS : 554	Dimensions for pipe threads where pressure tight joints are required on the threads.
IS : 694	PVC insulated cables for working voltages up to & including 1100 V.
IS : 779	Specification for water meters (domestic type).
IS : 782	Specification for caulking load.
IS : 800	Code of practice for general construction in steel
IS : 1726	Specification for cast iron manhole covers and frames.
IS : 2379	Color code for identification of pipe lines.
IS : 2629	Recommended practice for hot dip galvanizing on iron and Steel.
IS : 3114	Code of practice for laying of cast iron pipes
IS : 4111 (Part 1)	Code of practice for ancillary structures in sewerage system : Part 1 manholes.
IS : 5329	Code of practice for sanitary pipe work above ground for buildings.
IS : 5455	Cast iron steps for manholes.
IS : 6159	Recommended practice for design and fabrication of material, prior to galvanizing.
IS : 8321	Glossary of terms applicable to plumbing work.
IS : 8419 (Part 1)	Requirements for water filtration equipment : Part 1 Filtration medium sand and gravel.
IS : 8419 (Part 2)	Requirements for water filtration equipment : Part 2 under drainage system.
IS : 10221	Code of practice for coating and wrapping of underground mild steel pipelines.
IS : 10446	Glossary of terms relating to water supply and sanitation.
IS : 11149	Rubber Gaskets

Pipes and Fittings	
IS : 1239 (Part 1)	Mild steel, tubes, tubulars and other wrought steel fittings : Part 1 Mild Steel tubes.
IS : 1239 (Part 2)	Mild Steel tubes, tubulars and other wrought steel fittings : Part 2 Mild Steel tubulars and other wrought steel pipe fittings.
IS : 1536	Centrifugally cast (spun) iron pressure pipes for water, gas and Sewage.
IS : 1537	Vertically cast iron pressure pipes for water, gas and Sewage.
IS : 1538	Cast Iron fittings for pressure pipes for water, gas and Sewage.
IS : 1729	Sand Cast iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.
IS : 1879	Malleable cast iron pipe fittings.
IS : 2643 (Part 1)	Dimensions for pipe threads for fastening purposes : Part 1 Basic profile and dimensions.
IS : 2643 (Part 2)	Dimensions for pipe threads for fastening purposes : Part 2 Tolerances.
IS : 2643 (Part 3)	Dimensions for pipe threads for fastening purposes : Part 3 Limits of sizes.
IS : 3468	Pipe nuts.
IS : 3589	Seamless or electrically welded steel pipes for water, gas and Sewage (168.3 mm to 2032 mm outside diameter).
IS : 3989	Centrifugally cast (sun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.
IS : 4346	Specifications for washers for use with fittings for water services.
IS : 4711	Methods for sampling steel pipes, tubes and fittings.
IS : 6392	Steel pipe flanges
IS : 6418	Cast iron and malleable cast iron flanges for general engineering purposes.
IS : 7181	Specification for horizontally cast iron double flanged pipe for water, gas and Sewage.

TECHNICAL SPECIFICATIONS TECHNICAL SPECIFICATIONS FOR PLUMBING WORKS

Sewage Treatment Plant

- Screen chambers with SS Screen & Grease Trap
- Grease trap for Kitchen waste
- Sewage Equalization Tank
- Tube settler
- Anoxic & MBBR Tank, Sludge Tank
- Tertiary Treatment Plant
- UF & UV Unit
- Electro Mechanical Equipment's.
- Electrical Cabling & Panel etc.
- Flushing / Irrigation Water Storage Tank
- Screw Press
- Other Miscellaneous Items.
- Approval from Local Authorities
- Cutting holes, chases & like through all types of walls /floors and finishing for all services crossings, including sealing, cover plates, making good structure and finishes to an approved standard.
- Balancing, testing & commissioning of the entire STP.
- One time lab testing during commissioning, list of recommended spares, as-installed drawings, operation & maintenance manual for the entire STP contract.
- Training of Client's staff.

Effluent Treatment Plant

- Screen chambers with SS Screen & Grease Trap
- Grease trap for Kitchen waste
- Sewage Equalization Tank
- Coagulation Tank
- Flocculation Tank
- Tube settler
- Treated Water Storage Tank
- Sludge Holding Tank (common with STP)

Water Treatment Plant & RO Plant

- Filtration System
- Hydro Pneumatic Pumps
- Sump Pump
- Control panel
- Interconnected piping and valves etc.

Besides above, contractor shall also be required to undertake following:

GUARANTEE PROFORMA GUARANTEE FOR WTP & STP

INSTALLATION

Building : _____

Location : _____

Owner : _____

For a period of _____**months** from the date of acceptance of the total installation, WE AGREE TO repair or replace to the satisfaction of the Owner, any or all such work that may prove defective in workmanship, equipment or materials within that period, ordinary wear and tear and unusual abuse or neglect excluded, together with any other work, which may be damaged or displaced in so doing. In the event of our failure to comply with the above mentioned conditions within a reasonable time, after being notified in writing, we collectively and separately, do hereby authorise the Owner to proceed to have the defects repaired and made good at our expense, and we shall pay the cost and charges thereof, immediately upon demand.

We also undertake to test the entire installation in accordance to Pollution Control Board requirement / standard, to check and do everything necessary to ensure that the specified design conditions and functional requirement are met, that all systems are properly balanced, that all controls are calibrated accurately, and that all units are functioning satisfactorily.

SIGNATURE OF CONTRACTOR
for STP INSTALATION

DATE

SEAL

A) SEWAGE TREATMENT PLANT**1.0 BASIS OF DESIGN**

1. The capacity/ rating of pumps and equipment etc. shall hold good for the capacity of 150 KLD (75 KLD X 2) and shall be good for meeting the treated parameters requirement as follows:

- 1.1 Permissible limit as prescribed in IS:2490 (Part-I) – 1974 and environment (Protection) Rules 1986.
- 1.2 Water (Prevention and Control of Pollution) Act, 1977 & 1978.
- 1.3 Environment (Protection) Act, 1986.
- 1.4 Environment (Protection) Rules, 1986.
- 1.5 Hazardous Wastes (Management & Handling) Rules, 1989.
- 1.6 Manufacturer, Storage and Import of Hazardous Chemicals Rules, 1989.
- 1.7 Manufacturer, use import and storage and hazardous Micro-Organizers, Genetically Engineered organizations or Cell Rules, 1989.
- 1.8 Manual on sewage & sewage treatment - CHEEPO
- 1.9 The Public Liability Insurance Act, 1991.
- 1.10 All standards as laid down by Central Pollution Control Board and any other relevant statutory authority.
- 1.11 All standards as laid down by local Municipal Authority.
- 1.12 Recycle of waste water to meet 100% requirement and remove of sludge with no untreated waste water to be discharged outside the premises.

2.0 SEWAGE TREATMENT PLANT (DESIGN)

1. GENERAL:

The sewage treatment plant (STP) system outlined in this section specifies the system design, manufacture, supply and installation Testing & Commissioning of a standard MBBR based system.

The Contractor may propose alternatives to this type of system, but these must be to a standard acceptable to Water and Sanitation Authority Requirement, Local Pollution Control Board Norms, World Health Organization Guidelines, the local Environmental and Pollution Control Authorities and subject to the approval of the Project Manager.

The work shall be carried out in a manner consistent with good practice in the local market. The Contractor shall take into account all site conditions in designing the system and selecting the equipment.

The Contractor shall be responsible for engaging a STP specialist to perform the system design and obtain approval from relevant Authorities. A qualified and experienced Engineer shall be engaged for the system design, preparation of system proposal submission, obtaining approval and site supervision.

The Contractor shall perform the system design based on the criteria/data and component technical requirements specified in this section/drawings and the local Authorities' regulation/requirement.

The Contractor shall furnish system which comprises products of manufacturers who have designed and made these associated products for a period of at least five years.

The Contractor shall submit complete catalogue information, design calculation and samples complete with full technical data and shop drawings for the entire system, test certificates, etc. for acceptance prior to commencement of installation.

The Contractor shall submit analytical test reports of effluent water samples after the commissioning or after the system is put into operation or as required by the Project Manager :

(a) One time lab testing during commissioning

The report shall contain analysis of all data related to those requirements laid down by the local Authorities.

As a minimum the following items shall be measured and analysed as indicated under clause 2.1 following.

2. DESIGN CRITERIA:

2.1 It shall be the Contractor’s responsibility to ensure the quality of the treated effluent to comply with the local Authorities requirement and the following characteristics, whichever is stringent.

S. No.	Item of Analysis	Units in Milligram per litre or otherwise stated
1.	pH value	5.5 – 9.0
2.	BOD (5 day at 20°C)	Less than 10 Mg/L
3.	COD	Less than 50 Mg/L
4.	Total Suspended Solids	Less than 20 Mg/L
5.	Grease and Oil	BDL

The effluent from the Sewage Treatment Plant shall be suitably treated and the effluent water recovered shall be used for flushing, irrigation and soft water.

2.2 Description of Process:

The treatment process shall comprise the following stages:

a. For MBBR System

- Physical treatment: Coarse& Fine bar-screening
- Primary treatment: Oil & Grease Trap & Grit Chamber
- Equalization tank: Flow equalization with air mixing
- Denitrification In Anoxic Tank
- Biological treatment: Aeration With MBBR
- Disinfection With chlorination system
- Digester: Aerobic digestion with diffused air system
- Secondary Treatment With ACF, MGF
- Ultra Filtration
- Sludge disposal: Sludge chemical conditioning and dewatering

The biodegradable detergent from laundry plant will be discharged into the Sewage Treatment Plant. The Contractor shall provide the special equipment, etc. and defoaming agent for the treatment of the detergent such as providing the froth pump to remote the foam and FeCl₃ for phosphate removal.

2.3 Performance Criteria of the Plant:

Raw sewage will be brought into the Sewage Treatment Plant by others. The Contractor shall receive sewage from this point to the treatment plant for treatment process.

The treatment plant shall be designed to treat the following basic characteristic expected in the raw sewage.

<u>Description</u>	<u>APT</u>
<ul style="list-style-type: none"> • Estimated daily flow X 2) 	150 m ³ / day (75 m3/day)
<ul style="list-style-type: none"> • Minimum Influent BOD₅ concentration 	300-350 ppm
<ul style="list-style-type: none"> • Minimum Influent chemical oxygen demand 	400-500 ppm
<ul style="list-style-type: none"> • Minimum Influent suspended solids 	200-250 ppm
<ul style="list-style-type: none"> • Oil & Grease 	less than 50 ppm

However, as a specialist in the field, contractor may envisage the raw sewage characteristic for a building/ complex. Contractor to submit his confirmation on the treatment parameter considered as an Annexure. The plant shall be capable of treating effluent to the following standards:

<u>Effluent from STP</u>	<u>APT</u>
<ul style="list-style-type: none"> • Suspended solid 	≤ 20 ppm for discharge
<ul style="list-style-type: none"> • BOD₅ concentration 	≤ 10 ppm to the external drainage system
<ul style="list-style-type: none"> • COD concentration 	≤ 50 ppm

Treated effluent shall be connected to a tertiary filtration / treatment and shall be treated for use for irrigation and cooling tower make-up purpose. The Contractor shall carefully consider the operation loading for the Sewage Treatment Plant.

2.4 Process Description:

It is proposed to install a MBBR Technology Sewage Treatment Plant Cap. 150 KLD in the complex which will receive raw sewage from domestic consumption points and the recycled water is proposed to be used for horticulture and flushing purposes.

The sewage from the toilets, pantry & kitchen shall be initially passed through a Bar Screen Chamber & an Oil & Grease Chamber where any extraneous / floating matter would get trapped. The sewage would then be collected in a Receiving Sump where the variations in flow and characteristics shall be dampened. Here the sewage and treated effluent shall be kept in mixed condition by means of coarse air bubble diffusion.

The equalized influent shall be then pumped to the Moving bed bio reactor (MBBR) where BOD/COD reduction will be achieved by virtue of aerobic microbial activities. The MBBR reactors would be running in series. The oxygen required will be supplied through coarse air bubble diffusers.

The excess bio-solids formed in the biological process will be separated in the downstream Tube Settler Tank (Sewage). The clear supernatant after shall be sent to the tertiary polishing section comprising of a Dual Media Filter, Activated Carbon Filter etc. The treated water would thereafter be used for horticulture, AC cooling tower make-up and flushing.

The biological sludge generated from the MBBR (which is settled in the Tube Settler) will be drained to the Sludge Holding Tank. Thereafter, the sludge shall be pumped through the Filter Press for de-watering. The filtrate shall flow back to the receiving sump and the de watered sludge shall be suitably disposed off.

The treatment process is proposed to be carried out in following stages:

- a. First stage of segregation shall be through coarse bar-screening. Primary treatment will be through coarse bar-screen and grinder. Raw sewage shall flow into the inlet screen chamber by gravity. Large solids particles shall be intercepted by a fine step screen. A manual screen shall be installed in parallel as a standby screen when the step screen is under maintenance. A suitable capacity Oil and Grease interceptor shall ensure segregation of Oil & Grease from the waste water before discharging into equalization tank.
- b. Biological treatment shall be carried out through aeration with floating media. Sewage shall be retained in the aeration tank and subjected to biochemical oxidation by fine bubbles aeration.
- c. The sewage after bio-oxidation shall enter the rectangular flat bottom sedimentation tank where the sludge will effectively settle to the tank bottom. The clear effluent shall weir into the chlorination chamber. The activated sludge collected in the sludge tank shall be returned to the aeration tank for further oxidation of the incoming organic matter by means of automatic siphoning / pumping. Excessive sludge shall be wasted in the sludge holding tank. Any scum formed on the surface of the clarifier tanks shall be returned to the aeration tank by automatic siphoning / pumping.
- d. As part of tertiary treatment, the treated water shall be passed through Multi-Grade sand filter and Activated carbon filter to further remove the suspended solids and odour respectively. The advanced filtration system i.e Ultrafiltration System shall also be a part of the system to purify the water for flushing system.
- e. U.V sterilizer shall be in-line unit installed after tertiary filters. Quartz based U.V. Sterilizer shall be designed to provide a UV Dose of 600 J/m² at UVT of 65% and TSS less than 10 mg/L. System should deliver a 4 log reduction of total coliforms. The electrical control system should utilize high frequency electronic ballasts and provide efficiency of more than 90%. The reactor vessel shall utilize internal baffles to ensure turbulent and plug flow. The sensor shall be of dry type and removable without system shutdown.
- f. Excessive sludge shall be stored in the sludge holding tank for final dewatering and disposal. Sludge shall be disposed manually in the form of manure after drying.
- g. Flow measurement shall be carried out through a flow meter.

3.0 Equipment Specifications:

Specifications for major items are given below for contractor guidance. These are minimum required and contractor is free to propose a change best suited to their system and subject to Consultant/Owner approval.

Equalization Tank:

The tank shall be sized to store minimum 6 hours of sewerage during peak flow rate. Two no. non-clog type submersible pumps (including one standby) shall be provided.

Their operation of pumps shall be automatic controlled based on level in tanks. Continuous aeration shall be provided with floating media.

3.1 Bar Screen:

Bar screen shall be of SS 304 construction with drip tray of same material which will be large enough to capture the drainage. An additional manual by-pass screen of SS 304 along with drip tray of same material shall also be provided. Isolation valves shall be provided to divert flow between main screen and standby screen as per requirement.

3.2 Blowers:

Centrifugal or Positive displacement air blowers shall be provided in N+1 (including standby) configuration. Accessories like filter at inlet alongwith status indication, silencer at inlet & outlet, vibration damping arrangement, flexible coupling, non-return valve, pressure relief valve etc shall be included. The motor will be 1440 RPM, 3 phase 415 \pm 10% volts and either belt driven or direct drive. The casing rotor shall be of cast iron construction. The blower shall deliver air flow rate varying between 0.5 lts/sec to 1 lts /sec for each diffuser depending on requirement and maintain minimum 2.0 mg/l dissolved oxygen in the aeration tanks.

3.3 Diffusers

Self cleaning & non-clog type qir diffusers shall be provided in the holding tanks to ensure proper aeration through a uniform distribution of bubbles in each part of tank. The material of construction of air diffusers shall be either elastomeric rubber membrane or crystalline fused aluminum oxide with endurance exceeding 1,80,000 expansion/contraction cycles. Oxygen transfer efficiency shall be maintained @ 20% at 3.5 m submergence in clear water. Diffusers shall be held in place through a support mechanism and openings sealed using a neoprene gasket conforming to ASTM D- 2000. Entire assembly shall be able to withstand thermal stress with temperature up to 100°C.

3.4 Sludge Collection:

The sludge collectors shall be installed to scrape the settled sludge to the sludge pump pit with a skimmer to collect the scum. The material of construction for submerged components shall be hard nylon or any other suitable non-metallic material.

3.5 Pumps:

All the pumps in the STP shall be submersible non-clog type and installed in N+1 (including standby) configuration. Elaborate servicing mechanism using chain pulley arrangement shall be provided. The Pump casing shall be of cast iron and both impeller & shaft of stainless steel (SS 304) construction.

3.6 Settling Tank:

Sludge withdrawal in settling tank shall be through rotating sludge collectors. The mechanism shall comprise of four submersible sludge pumps installed in the hopper bottom at inlet side of the settling tank for periodic sludge removal. Settling tanks shall include baffles to prevent short circuiting.

3.7 Tertiary Treatment:

Tertiary treatment comprising of pressure sand filter and activated carbon filter shall be provided followed by Ultra filtration in line for flushing.

3.8 Sterilization:

U.V. Sterilization shall be provided at the outlet of filters before the treated water enters the treated water tank.

3.10 Control Panel:

PLC based control panel shall be provided for automatic operation of STP. The CPU of PLC shall have 2 MB RAM with Ethernet, RS-485 port and a USB port. Dual redundant 24V DC power supplies shall be installed. The communication network shall be Modbus TCP/IP. A minimum 12 “ LCD screen shall be installed for programming and display. The controller shall be housed in lockable and IP 55 Housing constructed out of 14 SWG CRCA sheet with neoprene gasket.

The control panel shall facilitate automatic operation of raw sewage pump, filter feed pump and duty cycling of standby equipment alongwith timer based operation of blowers.

Piping &Accessories:

The material of submerged and suspended piping shall be as follows:

UPVC Piping Schedule 40 : Suction & Discharge headers of surface pumps & submersible pumps, submerged and non submerged air & water piping & other interconnecting pipeworks.

MS C Class : Non Submerged air piping, frontal piping of softener PVC

Flexible / Braided : Submersible water risers / droppings PVC 6 Kg/cm2:

Tanks overflow & drain

All valves used in STP system shall be minimum PN 16 rated unless otherwise specified in BOQ. All valves shall be full line size. Valves shall be located at convenient positions of operation from the floor with upright stems.

Pipe work and fittings shall be supported by hangers or brackets so as to permit free expansion and contraction. Risers shall be supported at each floor with Galvanised steel clamps. To permit free movement of common piping support shall be from a common hanger bar fabricated from Galvanised steel sections. Piping shall be supported from the building structure, which shall support the sum of the load of a water-filled pipe and a minimum of 120 kg applied at the point of hanging. Vertical pipework shall be supported at intervals of at least one per floor level. Horizontal pipework shall be supported by adjustable flat iron or clevis type hangers hung by hot rolled threaded steel rods of the following diameters and spacing.

Nominal Pipe Size	Distance between Supports	Diameter of Rod
25 mm	1.8 m	10
32 mm	2.4 m	10
40 mm	2.7 m	10
50 mm	2.7 mm	10
65-80 mm	3.0 m	12
100 mm	3.0 m	16
150-200 mm	3.6 m	18

Hangers shall be supported by means of approved fasteners. Power fixings may be used for pipework of diameter less than 50 mm. Expansion fasteners may be used for vertical pipework under 100 mm diameter. Requirement of Cut-outs in the structural slab or wall for installing the various pipes shall be clearly identified in the detailed shop drawing to be prepared by the STP contractor. Pipe sleeves, larger diameter than pipes, shall be provided wherever pipes pass through walls and slab and annular space filled with fire sealant and finished with retainer rings.

Automatic air valves shall be provided at all high points in the piping system for venting. All valves shall be of 15 mm pipe size and shall be associated with an equal size gate valves. Discharge from the air valves shall be piped through a pipe to the nearest drain or sump. All pipes shall be pitched towards drain points.

Pressure gauges shall be provided as indicated in BOQ/drawings.

All buried pipes shall be cleaned and then coated with two coats of zinc chromate primer. Thereafter bitumen paint shall be applied and three layers of fibre glass tissue shall be applied with each layer laid in bitumen and placed on concrete blocks with PUF saddles dipped in bitumen at every 2 meters. Protective sand or PCC encasing shall be provided for mechanical protection.

5.0 Installation:

Permanent work platform and catwalk shall be designed by the Contractor and provided by the Contractor for access to elevated equipment. The catwalk and platform for access shall allow a minimum width of 750 mm. Catwalk and maintenance platform shall be provided with hand railings and guards for safe movement of personnel. Permanent I-beams, lifting eyes, etc. shall be provided by the Contractor for major equipment which require lifting for overhaul and maintenance. All the above details shall be incorporated in shop drawings submitted for approval prior to start of work at site.

Waterproof power sockets required for servicing shall be provided by the Contractor. The number and locations shall be proposed by the Contractor in the shop drawings. Power supply to these sockets shall be taken from control panel of the sewage treatment system.

The machinery shall be mounted on flat steel packing pieces of thickness suitable to take up variations in level of the concrete foundations. The machinery shall be aligned and levelled and the nuts of the holding down bolts. The base plates shall be packed with grout after the machinery has been run and checked for stability and vibration. Installation shall include the provision and fixing of all necessary holding down bolts, washers, nuts etc.

6.0 Testing & Handing Over

All motors and/or revolving parts shall be truly balanced both statically and dynamically so that when running at normal speeds and any load up to the maximum there shall be no significant vibration due to lack of balance.

As part of testing regime, hourly samples of the raw sewage and final effluent shall be collected over a twelve hour period. The sample shall then be combined and a 5- day BOD shall be run.

Training shall be provided to operation staff on all aspects of the design, day-to-day operation, breakdown, preventive maintenance and fault diagnosis of all systems. Training shall be held both at the manufacturer's premises and on site.

Contractor shall submit as-built drawings and Operation/maintenance manuals describing list of recommended spares and contact details of suppliers.

After satisfactory demonstration of specified output parameters, validation of capacity, training and submission of as-built drawings/operation manuals, the system shall be offered by the contractor to Owner for acceptance.

7.0 Water Treatment System & Accessories

7.1 Filtration Unit

The scope of this section comprises the supply, installation and commissioning of filtration unit to meet following requirements:

Type	:	Vertical with sand & gravel media.
Flow Capacity	:	As specified in Bill of Quantity
Operation standby.	:	Two column operated, one column standby.
Operation System valve and stager control.	:	Automatic by hydraulic diaphragm
Initiation of Regeneration Cycle	:	By reset water meter and clock timer.

The filter media shall comprise of gravel / silica of various grade in varying thickness. The cut-section of the filter along with filter media detail shall be submitted for approval prior to supplying at site.

Specifications for each item of the unit is mentioned below.

7.2 MS Vessel

The shell of the filter shall be constructed out of minimum 6 mm thick MS sheet with 8 mm thick dish ends. The manhole size shall be minimum 600 mm and vessel shall be designed to withstand working pressure of 4 kg/sq cm. The filter shall be complete with manhole cover, hand hole, flanged outlet for piping / valve connection and integrated tripod with self-supporting structure. The filter shall also be provided with vacuums breaking connection / accessories to prevent collapse of internal lining. For easy installation dn service at site, lifting lugs shall be provided. Minimum filter bed depth shall be 1500 mm and actual depth may be decided as per manufacturer recommendation.

7.3 Sand Filter

The sand filter shall be provided to filter raw water and will also be provided with automatic backwash system. The pressure sand filter alongwith MS vessel filter shall form a complete water filtering package which will include necessary accessories and interconnecting piping as shown on the drawings including first charge of filtration media viz. sand and gravel.

7.4 Softener

Water softener unit shall comprise of a closed cylindrical steel tank, containing a bed of cationic exchange resin for arresting calcium and magnesium. The water from the top of the tank shall percolate downward through the resin bed and shall be drawn off through the collector system at the bottom. When a certain volume of water has been treated, the softener will be regenerated by sodium chloride.

The technical specifications of the water softener is as follows:-

Number of Tanks	:	As indicated on the drawing/BOQ
Flow Rate Capacity (Each)	:	As indicated on the drawing/BOQ
Type	:	Vertical column
Process Fluid	:	Water
Design Pressure	:	3.0 to 3.5 kg/cm ²
Tank Material & Finish	:	Mild Steel coated with a layer of zinc-rich primer. Sand blasted finish shall be provided on the outside and three layers of epoxy coating on the inside.
Accessories	:	Legs, nozzles, water inlet, multiport valve, isolation valve for each port, sampling clock, sight-glass, pressure gauges, water meter and flow meter.

7.5 Brine Tank

The technical specifications of the brine tank are as follows:-

Number of Tanks	:	As specified in BOQ/drawings
Volume (Each)	:	As specified in BOQ/drawings
Process Fluid	:	NaCl
Tank Material	:	HDPE / LLDPE
Accessories	:	Level indicators and tank cover

7.6 Face Piping

Filtration plant shall be provided with interconnecting face piping comprising of inlet, outlet, and backwash complete with valves.

7.7 Accessories

Each filter shall be provided with following accessories :-

- a. Air release valve with connecting piping.
- b. 100 mm dia dial burden type Stainless Steel construction pressure gauges with brass isolation ball valve and connection piping on inlet and outlet.
- c. Sampling valves (ball valves) on raw water inlet and filtered water outlet.
- d. Individual drain connection with brass full-way ball valve for each filter.

7.8 Piping

The pipes and fittings in the domestic Water Treatment plant room shall be GI class 'C' (heavy class) conforming to IS: 1239 (Part-I) for pipes and IS:1879 (Part 1 to 10) for malleable cast iron fittings.

7.9 Dosing Pumps

All dosers shall be of the electronic metering plunger type conforming to the requirements specified in the Bill of Quantities. They shall be complete with low level switch, low level alarm, tank and interconnecting piping.

7.10 Nozzles

Nozzles shall be constructed of unalterable UV resistant ABS plastic & shall be designed for low noise and smooth flow at desired rate. The nozzle shall be suitable for three adjustable set positions and shall be connected through ferrule / saddle connection to CILA pipe equidistant positioned on the swimming pool floor.

7.11 Suction Sweeper

Suction sweeper shall consists of centrifugal pump directly coupled through flexible coupling to 400/440 volts, 3 phase 50 cycles motor and both units mounted on a trolley complete with suitable starter, 30 meters (appx.) of cable terminating with a three pin plug with 600 mm wide suction sweeper head with wheels, spring loaded brush and towing rope, 20 meters length of internally armoured hose with necessary coupling and floats. Contractor to submit the technical detail and catalogue of the suction sweeper model along with the bid for the review & approval of the Owner /Consultant.

7.12 Water Quality & Testing

The contractor shall ensure recycle water of re-use water standard after the treatment system. The acceptable standard of re-use water shall be in accordance to SP : 35 S & T : 1987 as per acceptable limits.

The bacteriological / Microbiological Test Parameter shall be for MPN Coliform Organism, Coliform Bacteria, E. Coli (Typical Faecal Organism).

The above tests shall be carried out by the contractor prior to submitting the technical submittal of the water treatment plant equipment. Contractor shall also submit the test report of raw water & treated water after the commissioning of the plant. The cost of the tests (one pre equipment & two post equipment installation / commissioning) is deemed to be included in the quote.

8.0 Pumps

The scope of work shall comprise of Supply, installation, testing & commissioning of water application pumps of the capacity & type indicated on drawings as well as Bill of Quantity. The contractor shall submit Pump performance curves and power consumption with operating points clearly indicated in the technical submittal prior to supplying equipment to site.

The pump shall be either Monoblock /split casing or horizontal/vertical type depending on application and as specified in Bill of Quantity/drawings. The Pump casing shall be cast iron and suitable for 16 bar working pressure and hydrostatically tested to 150% maximum working pressure. The casing shall

be provided with NPT threaded companion flanges with gaskets and hardware. Back pull out end suction pumps may be used up to 1000 USGPM flow rate or 15 HP motor rating or suction pressure not exceeding 8 Kg/cm². Double suction split casing pumps shall be used for ratings beyond above.

Impeller rings shall be secured from relative movement by tongue and groove fittings. Shaft shall be grease lubricated and supported on ball /journal bearings in easily removable housing.

The Motor shall be energy efficient type (IE-2) with minimum 90% efficiency, totally enclosed, fan-cooled, Class-F insulation, RPM not exceeding 1440 and suitable for 415 ± 10% volts, 3 phase, 50 hertz AC power supply. Motor rating shall have minimum of 10% margin on rated power or sufficient to meet the input power requirement at duty point. Motor to pump connection shall be of the flexible coupling type.

Mechanical Seal shall be provided on pumps which will be with stainless steel spring, EPDM elastomer and facilitate easy replacement. Factory installed seal vent line piped from the seal area to the pump suction connection shall also be provided.

The base shall extend over entire length covering pump, motor & shaft and constructed from cast iron or welded steel. Flexible/spacer type coupling shall be protected by a wire-mesh guard mounted on the base.

In split casing pumps, the casing shall be split radially to allow removal of the rotating element without disturbing the pipe connections. Impeller shall be double suction, enclosed type and hydraulically balanced. Pumps shall be fitted with mechanical seals, an air valve, two grease lubricators, drain plug and water seal drain connections.

The pumps shall be installed over a MS/SS structure or cement-concrete foundation. Manufacturer shall include necessary vibration isolation mechanism to ensure there is no transmission of vibration to adjacent floors. Anchor bolts and sleeves and necessary vibration isolation pads shall be included. Upon installation of the complete system and before testing, the pump shall be lubricated in accordance with the manufacturer's instructions. Split casing pumps shall be aligned with a dial indicator within 0.05 mm tolerance prior to testing.

After commissioning, the pumps shall be finished with final coat of spray paint. Paint that have scratched/damaged during shipment or erection shall be cleaned, wire brushed, spot primed and then coated with spray paint.

Prior to handover, pump performance and power consumption will be tested using filed devices and verified against submittal made during technical document approval. All pumps shall be tested at factory as per relevant BIS codes or equivalent codes .

8.1 Automatic Control Of Duty / Standby Pumps

Operation of the duty and standby pumps shall be carried out by the following method:

- a Automatically by means of pressure sensor (i.e. pressure switches);
- b Manually by means of a local start/stop push buttons on pump local motor control panel and emergency stop switch.

The pressure switch shall be installed next to the manual release valve. When the level drops to the pre-determined level, a signal will be sent to the pump local motor control panel to start the pump.

Automatic controls shall be operated by electronic, float less type level switches

8.2 Pump Indicator

The following audible and visible indication shall be provided at the pump local control panels as applicable:

- a Red "overflow level" indicator with buzzer for the associated water tanks;
- b Amber "extra high water level" indicator for the associated water tank;
- c Amber "high water level" indicator;
- d Amber "low water level" indicator;
- e Red "pump trip" indicator for each pump;
- f Green "pump on" indicator for each pump;
- g "Pump electrical supply healthy" indicator for each pump;
- h Amber "remote/local" status indicator.

9.0 MEDIUM VOLTAGE 1.1 KV GRADE XLPE / PVC CABLES

General

The MV cables shall be supplied, inspected, laid, tested and commissioned in accordance with drawings, Specifications, relevant Standard Specifications and cable manufacturer's instruction.

Material

The MV cables shall be cross linked polyethylene (XLPE) insulated PVC inner sheathed and HR PVC / FRLS PVC outer sheath of 1100 volts grade as asked for in the schedule of quantities. Cables up to 16 sq.mm shall be with copper conductor and 25 sq.mm and above shall be with aluminum conductor.

The MV cables 25 sq. mm & above shall be cross linked polyethylene (XLPE) insulated PVC inner sheathed and FRLS PVC outer sheath of 1100 volts grade. Cables below 16 sq.mm shall be with copper conductor, with HR PVC core insulation and sheathing.

Specifications of PVC insulated copper cable shall be as follows:

- Conductor: Stranded compacted circular conductor shall be of electrical grade high conductivity copper below 16 sq.mm as per IS 8130 / 84
- Insulation: The insulation shall be PVC, application shall be by extrusion process insulation confirming to IS 5831-1984. The thickness of insulation will be as per the relevant codes.
- Laying-up: Insulated conductors of multi core cables shall be with thermoplastic fillers in the interstices. The phase identification of cores shall be by coloured strips.
- Inner Sheath: Cores shall be surrounded either by a wrapped or an extruded PVC sheath. The thickness of the inner – sheath shall be as per relevant codes.

- Armouring: The armouring shall be provided over the inner sheath. Single core cable shall have dia -magnetic armouring. Multi core cables shall have either galvanized round steel wires or flat steel strip armouring. Steel wires and strips for armouring confirm to IS:3975. The direction of lay of armouring shall be opposite to that of cores.
- Outer Sheath: Single and multi-core cables are provided with an extruded FRLS grade PVC outer-sheath. The thickness of the sheath shall be as per IS:1554-1988. The PVC compound for the outer-sheath shall confirm to Type ST1 of IS 5831. The color of the outer sheath shall be black with marking at every meter.

Specifications for XLPE aluminum / copper cable shall be as follows:

Conductor: Stranded compacted circular conductor shall be of electrical grade high conductivity aluminium per IS 8130/84

Insulation: The insulation shall be of natural unfilled chemically cross linked polyethylene conforming to IS 7098. The thickness of insulation shall be as per the relevant codes.

Laying-up: Insulated conductors of multi core cables shall be with plastic fibre in the interstices. The phase identification of cores shall be by coloured strips.

Inner Sheath: The cores shall be surrounded by either a wrapped or by an extruded PVC sheath. The thickness of the inner sheath shall be as indicated in the relevant codes.

Armouring: The armouring shall be provided over the inner sheath. Single core cable shall have non-magnetic armouring. Multi core cables shall have either galvanized round steel wires or flat steel strip. Steel wires and strips for armouring confirm to IS:3975. The direction of lay of armouring shall be opposite to that of cores.

Outer Sheath: Single and multi-core cables are provided with an extruded FRLS grade PVC outer-sheath. The thickness of the sheath shall be as per IS:1554-1988. The PVC compound for the outer-sheath shall confirm to Type ST2 of IS 5831. The colour of the outer sheath shall be black with marking at every meter.

Current ratings of the cables shall be as per IS : 3961. The Conductor shall be stranded Aluminum/Copper circular/ sector shaped and compacted. In multi core cables the core shall be identified by red, yellow, blue and black coloring of insulation.

Repaired cables shall not be used.

The cables shall be suitable for laying in racks, ducts, trenches, conduits and underground buried installation with uncontrolled back fill and chances of flooding by water. Progressive automatic in line sequential marking of the length of cables in meters at every one meter shall be provided on the outer sheath of all cables.

Cables shall be supplied in non-returnable wooden drums as per IS : 10418. Both ends of the cables shall be properly sealed with PVC/Rubber caps so as to eliminate ingress of water during transportation, storage and erection. The product should be coded as per IS :- 7098 Part-I.

Inspection

All cables shall be inspected by the contractor upon receipt at site and checked for any damage during transit.

Joints in Cables

The Contractor shall take care to see that all the cables received at site are apportioned to various locations in such a manner as to ensure maximum utilization and avoid cable jointing. This apportioning shall be got approved by the Owner's site representative before the cables are cut to lengths. Where joints are unavoidable heat shrinkable type joints shall be made. The location of such joints shall be got approved from the Owner's site representative and shall be identified through a marker.

Jointing Boxes for Cables

Cable joint boxes shall be installed with heat shrinkable sleeve and of appropriate size, suitable for XLPE armoured cables of particular voltage rating.

Jointing of Cables

All cable joints shall be made in suitable, approved cable joint boxes and the filling in of compound shall be done in accordance with manufactures' instructions and in an approved manner. All straight through joints shall be done in epoxy mould boxes with epoxy resin. All cables shall be joined color to color and tested for continuity and insulation resistance before jointing commence. The seals of cables must not be removed until preparations for jointing are completed. Joints shall be finished on the same day as commenced and sufficient protection from the weather shall be arranged. The conductors shall be efficiently insulated with high voltage insulating tape and by using of spreaders of approved size and pattern. The joints shall be completely topped up with epoxy compound so as to ensure that the box is properly filled.

Cable End Terminations

Cable end termination shall be done in cable terminal box using crimping sockets and proper size of glands of double compression type

Bonding of Cables

Where a cable enters any piece of apparatus, it shall be connected to the casing by means of an approved type of armour clamp and gland. The clamps must grip the armouring firmly to the gland or casing, so that no undue stress is passed on to the cable conductors.

Cable Installation

Cables shall be laid by skilled and experienced workmen using adequate rollers to minimize stretching of the cable. The cable drums shall be placed on jacks before unwinding the cable. Great care shall be exercised in laying cables to avoid forming kinks.

Laying of Cables on Cable Trays

The relative position of the cables, laid on the cable tray shall be preserved and the cables shall not cross each other. At all changes in direction in horizontal and vertical planes, the cable shall be bent smooth with a radius as recommended by the manufacturers. All cables shall be laid with minimum one diameter gap and shall be clamped at every meter to the cable tray. Cables shall be tagged for identification with aluminum tag and clamped properly at every 20M. Tags shall be provided at both ends and all changes in directions both sides of wall and floor crossings. All cable shall be identified by embossing on the tag the size of the cable, place of origin and termination.

All cables passing through holes in floor or walls shall be sealed with fire retardant Sealant and shall be painted with fire retardant paint upto one meter on all joints, terminations and both sides of the wall crossings

Cables inside Building

Cables inside buildings shall be laid on the cable trays. All cables passing through walls shall run through GI Pipes sleeves of adequate diameter 50 mm apart maintaining the relative position over the entire length.

Cable Trays

Perforated type Cable Trays shall be of pre Galvanized bolted type and factory fabricated out of CRCA sheet with standard accessories like tee, bends, couplers etc. for different loads and number and size of cables as given below

:

- i. 300 x 40 x 40 x 1.6 mm thick
- ii. 200 x 40 x 40 x 1.6 mm thick
- iii. 150 x 40 x 40 x 1.6 mm thick
- iv. 100 x 40 x 40 x 1.6 mm thick
- v. 50 x 40 x 40 x 1.6 mm thick

Note: Suitable length of 10 mm dia GI rod suspenders at 1800 mm interval shall be included in the item for perforated type cable tray.

EARTHING

Earthing shall be provided in accordance with relevant BIS Codes and shall be copper strips /wires .The main panel shall be connected to main earthing system of the power supply. All single phase metal clad switches and control panels be earthed with minimum 3 mm diameter copper conductor wire. All 3 phase motors and equipment shall be earthed with 2 numbers distinct and independent copper wires / GI tapes of minimum sizes as follows:

- i. Motor upto and including 10 HP rating. 2 Nos. 3 mm dia copper wires.
- ii. Motor 12.5 HP to 40 HP capacity 2 Nos. 4 mm dia copper wires
- iii. Motor 50 to 75 HP capacity. 2 Nos. 6 mm dia copper
- iv. Motor above 75 HP. 2 Nos. 25 mm x 3 mm copper tapes.

Above sizes are the minimum sizes to be provided. The contractor shall do a check for expected fault current at the motor end and shall provide a higher size conductor if necessary in order to withstand the fault current for 1sec.

All switches shall be earthed with two numbers distinct and independent copper wires' tapes as follows:

i.	3 phase switches and control panels upto 60 amps rating.	2 Nos. 3 mm dia copper wires.
ii.	3 phase switches, and control panels 63 amps to 100 amps rating.	2 Nos. 4 mm dia copper wires.
iii.	3 phase switches and control panels 125 amps to 200 amps rating.	2 Nos. 6 mm dia copper wires.
iv.	3 phase switches, control panels, bus ducts, above 200 amps rating.	2 Nos. 3 mm x 25 mm copper tapes.

The earthing connections shall be tapped off from the main earthing of electrical installation. The overlapping in earthing strips at joints where required shall be minimum 75 mm. These straight joints shall be riveted with brass rivets & brazed in approved manner. Sweated lugs of adequate capacity and size shall be used for all termination of wires. Lugs shall be bolted to the equipment body to be earthed after the metal body is cleaned of paint and other oily substance, and properly tinned.

Fire retardant Cable Paint & Fire Barrier

The fire retardant paint / barrier shall be listed by independent test agencies such as UL, FM or OPL and be tested to, and pass the criteria of ASTM E 814 (UL1479) standard test method for fire test through- penetration fire stops and ASTM E 1996 (UL 2079) standard test method for fire resistive joint system.

Fire retardant cable Paint

The Fire resistant cable coating / painting shall be intumescent / ablative, water based compound, The coating shall expand up to 10 times, supplied in a manufacturer seal container indicating manufacturing and expiry dates. The coating material shall be non-toxic, asbestos free, & halogen free and shall have good mechanical strength. The colour of paint shall be white and density of coating shall be 1.3kg/ltr , coating shall have a snap time of 30 minutes, the expansion shall begin at 230 deg.C and it shall have a oxygen index of 41%.

Coating shall be applied by ordinary paint brush after cleaning the cables of dust and oil deposition. A minimum textured finish of 3 mm wet film thickness shall be achieved by applying the material in 2-3 layers leaving intervals of 2 to 8 hours depending upon the moisture and thickness, moisture and temperature hours between each coat.

Fire Barrier sheet for floor and wall sealing

The framing & fixing part of fire barrier sheet shall be very simple & directly fixed around walls & floors by help of anchored bolts & washer. For 2 hour fire rating the fire barrier sheet shall be minimum 7.62 mm thick and shall be cut as per the profile of penetration and opening. The small gap left around the penetration shall be closed with fire rated soft & mouldable putty. Fire barrier must be design on the intumescent technology to seal larger penetration through the fire rated walls & floors. Fire barrier must be a composite construction with the quality incorporated with organic/ inorganic fire resistive elastomeric sheet with specific gravity of 1.6 gm/ cubic centimeter.

Testing of Cables

Cables shall be tested at works for all routine tests as per IS including the following tests before being dispatched to site by the project team.

- a) Insulation Resistance Test.
- b) Continuity test.
- c) Sheathing continuity test
- d) Earth test.(in armoured cables)
- e) Hi Pot Test.

Test shall also be conducted at site for insulation between phases and between phase and earth for each length of cable, before and after jointing. On completion of cable laying work, the following tests shall be conducted in the presence of the Owner's site representative.

- f) Insulation Resistance Test(Sectional and overall)
- g) Continuity test.
- h) Sheathing continuity test
- i) Earth test.

All tests shall be carried out in accordance with relevant Standard Code of Practice and Electricity Rules. The Contractor shall provide necessary instruments, equipment and labour for conducting the above tests and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Owner's site representative, results will be noted and signed by all present and record be maintained.

10.0 DISTRIBUTION PANELS/BOARDS

Main Distribution Panels, Sub-Distribution Panels and Final Distribution shall be covered under this section. Panels/Boards shall be suitable for operation on 3 Phase/single phase, 415/240 volts, 50 cycles, 4 wire system with neutral grounded at transformer. All Distribution panels shall be CPRI tested design and manufactured by approved manufacturer. **CPRI certificate shall be made available.**

Distribution panels shall comply with the latest Relevant Indian Standards and Electricity Rules and Regulations and shall be as per latest edition of IS- 8623. Panels for outdoor equipment shall be suitable for outdoor duty application.

Construction Features

Distribution panels shall be 2 mm thick sheet steel cabinet for indoor installation, dead front, floor mounting/wall mounting type and shall be form 3b construction. The Distribution panels shall be totally enclosed, completely dust and vermin proof and shall be with hinged doors and folded covers, Neoprene gasket, padlocking arrangement and bolted back. All removable/hinged doors and covers shall be grounded by flexible standard connectors. Distribution panel shall be suitable for the climatic conditions as specified in Special Conditions. Steel sheets used in the construction of Distribution panels shall be 2 mm thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet metal shall be seam welded, all welding, slag shall be rounded off and welding pits wiped smooth with plumber metal. The general construction shall conform to IS-8623-1977 (Part-1) for factory built assembled switchgear & control gear for voltage up to and including 1100 V AC.

All panels and covers shall be properly fitted and square with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with wing nuts. Self threading screws shall not be used in the construction of Distribution panels. A base channel of 75 mm x 40 mm x 5 mm thick shall be provided at the bottom for floor mounted panels. Minimum **operating** clearance of 275 mm shall be provided between the floor of Distribution panels and the lowest operating height.

Distribution panels shall be of adequate size with a provision of spare switchgear as indicated on the Single Line Diagram. Feeders shall be arranged in multi-tier. Knockout holes of appropriate size and number shall be provided in the Distribution panels in conformity with the location of cable/conduit connections. Removable sheet steel plates shall be provided at the top to make holes for additional cable entry at site if required.

Every cabinet shall be provided with Trifoliate or engraved metal name plates. All panels shall be provided with circuit diagram engraved on PVC sheet. All live accessible connections shall be shrouded and shall be finger touch proof and minimum clearance between phase and earth shall be 20 mm and phase to phase shall be 25 mm. Panels with ACB shall necessarily have front and rear access as per requirement whereas panels with all MCCB breaker may be provided with only front access with sufficient clearance.

Bus Bar Connections

Bus bar and interconnections shall be of high conductivity electrolytic grade aluminium / copper as indicated in the bill of quantities complying with requirement of IS : 5082 – 1981 and of rectangular cross section suitable for carrying the rated full load current and short circuit current and shall be extendable on either side. Bus bars and interconnections shall be insulated with heat shrinkable sleeve of 1.1 KV grade and shall be colour coded. Bus bars shall be supported on glass fiber reinforced thermosetting plastic insulated supports at regular intervals to withstand the force arising from in case of short circuit in the system. All bus bars shall be provided in a separate chamber and all connections shall be done by bolting. Additional cross sectional area to be added to the bus bar to compensate for the holes. All connections between bus bars and breakers shall be through solid copper / aluminium strips of proper size to carry full rated current and insulated with insulating sleeves. Maximum current density for the bus bars shall be 0.8 A/sq.mm for aluminium and 1.4A/sq.mm for copper bus bars.

Maximum allowable temperature for the Bus bar to be restricted To 85 deg C

Temperature - Rise Limit

Unless otherwise specified, in the case of external surface of enclosures of bus bar compartment which shall be accessible but do not need to be touched during normal operation, maximum temperature rise limits of 25° C above ambient temperature shall be permissible for metal surface and of 15° C above ambient temperature for insulating surfaces.

All main distribution panels and sub distribution panels shall be provided with MCCB of appropriate capacity as per Single Line Diagram. All final Distribution boards shall be provided with Miniature Circuit Breakers. Final Single Phase Distribution boards shall be connected to the incoming supply through double pole MCB units & earth leakage circuit breakers. All wiring for final distribution boards shall be concealed behind 5 mm thick Bakelite sheet or M S sheet cover. All Distribution boards shall be completely factory wired, ready for connection. All the terminals shall be of proper current rating and sized to suit individual feeder requirements. Each circuit shall be clearly numbered from left to right to correspond with wiring diagram. All the switches and circuits shall be distinctly marked with a small description of the service installed.

Continuous earth bus sized for prospective fault current shall be provided with arrangement for connecting to station earth at two points. Hinged doors/ frames shall be connected to earth through adequately sized flexible braids.

Cable Compartments

Cable compartment of adequate size shall be provided in the Distribution panels for easy clamping of all incoming and outgoing cables entering from the top/bottom. Adequate supports shall be provided in cable compartment to support cables.

Moulded Case Circuit Breaker (MCCB)

The MCCB should be current limiting type with trip time of less than 10 msec under short circuit conditions. The MCCB should be either 3 or 4 poles as specified in BOQ. MCCB shall comply with the requirements of the relevant standards IS13947 – Part 2/IEC 60947-2 and should have test certificates for Breaking capacities from independent test authorities CPRI / ERDA or any accredited international lab.

MCCB shall comprise of Quick Make -break switching mechanism, arc extinguishing device and the tripping unit shall be contained in a compact, high strength, heat resistant, flame retardant, insulating moulded case with high withstand capability against thermal and mechanical stresses

The breaking capacity of MCCB shall be as specified in the schedule of quantities. The rated service breaking capacity (Ics) should be equal to rated ultimate breaking capacities (Icu). MCCBs for motor application should be selected in line with Type- 2 Co-ordination as per IEC-60947-2, 1989/IS 13947-2. The breaker as supplied with ROM should meet IP54 degree of protection.

Current Limiting & Coordination

The MCCB shall employ maintenance free minimum let-through energies and capable of achieving discrimination up to the full short circuit capacity of the downstream MCCB. **The manufacturer shall provide both the discrimination tables and let-through energy curves for all.**

Protection Functions:

- MCCBs with ratings up to 200 A shall be equipped with Thermal-magnetic (adjustable thermal for overload and fixed magnetic for short-circuit protection) trip units
- Microprocessor MCCBs with ratings 250A and above shall be equipped with microprocessor based trip units.
- Microprocessor and thermal-magnetic trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorized access to the settings
- Microprocessor trip units shall comply with appendix F of IEC 60947-2 standard (measurement of rms current values, electromagnetic compatibility, etc.)
- Protection settings shall apply to all poles of circuit breaker.
- All Microprocessor components shall withstand temperatures up to 125 °C
- Testing
- Original test certificate of the MCCB as per IEC 60947-1 &2 or IS13947 shall be furnished.
- Pre-commissioning tests on the switch board panel incorporating the MCCB shall be done as per standard specifications.
- Interlocking Moulded, case circuit breakers shall be provided with the following interlocking devices for interlocking the door of a switch board.
- Handle interlock to prevent unnecessary manipulations of the breaker.
- Door interlock to prevent the door being opened when the breaker is in ON position.
- Defeat-interlocking device to open the door even if the breaker is in ON position.
- The MCCB shall be current limiting type and comprise of quick make – Break switching mechanism. MCCBs shall be capable of defined variable overload adjustment. All MCCBs rated 200 Amps and above shall have adjustable over load & short circuit pick-up both in Thermal magnetic and Microprocessor Trip Units.
- All MCCB with microprocessor based release unit, the protection shall be adjustable Overload, Short circuit and earth fault protection with time delay.
- The trip command shall override all other commands.

Motor Protection Circuit Breaker (MPCB)

Motor circuit breakers shall conform to the general recommendations of standard IEC 947 -1,2 and 4 (VDE 660, 0113 NF EN 60 947-1-2-4, BS 4752) and to standards UL 508 and CSA C22-2 N°14.

The devices shall be in utilization category A, conforming to IEC 947-2 and AC3 conforming to IEC 947-4. MPCB shall have a rated operational and insulation voltage of 690V AC (50 Hz) and MPCB shall be suitable for isolation conforming to standard IEC 60947-2 and shall have a rated impulse withstand voltage (U_{imp}) of 6 kV. The motor circuit breakers shall be designed to be mounted vertically or horizontally without derating. Power supply shall be from the top or from the bottom. In order to ensure maximum safety, the contacts shall be isolated from other functions such as the operating mechanism, casing, releases, auxiliaries, etc, by high performance thermoplastic chambers. The operating mechanism of the motor circuit breakers must have snap action opening and closing with free tripping of the control devices. All the poles shall close, open, and trip simultaneously. The motor circuit breakers shall accept a padlocking device in the “isolated” position.

The motor circuit breakers shall be equipped with a “PUSH TO TRIP” device on the front enabling the correct operation of the mechanism and poles opening to be checked. The auxiliary contacts shall be front or side mounting, and both arrangements shall be possible. The front-mounting attachments shall not change the breaker surface area. Depending on its mounting direction the single pole contact block could be NO or NC. All the electrical auxiliaries and accessories shall be

equipped with terminal blocks and shall be plug-in type. The motor circuit breakers shall have a combination with the downstream contactor enabling the provision of a perfectly co-ordinated motor-starter. This combination shall enable type 1 or type 2 co-ordination of the protective devices conforming to IEC 60947-4-1. Type 2 co-ordination shall be guaranteed by tables tested and certified by an official laboratory: LOVAG (or other official laboratory). The motor circuit breakers, depending on the type, could be equipped with a door-mounted operator which shall allow the device setting. The motor circuit breakers shall be equipped with releases comprising a thermal element assuring overload protection and a magnetic element for short-circuit protection. In order to ensure safety and avoid unwanted tripping, the magnetic trip threshold (fixed) shall be factory set to an average value of 12 Ir.

All the elements of the motor circuit breakers shall be designated to enable operation at an ambient temperature of 60°C without derating. The thermal trips shall be adjustable on the front by a rotary selector. The adjustment of the protection shall be simultaneous for all poles. Phase unbalance and phase loss detection shall be available. Temperature compensation (-20°C to +60°C)

Miniature Circuit Breaker (MCB)

Miniature Circuit Breaker shall comply with IS-8828-1996/IEC898-1995. Miniature circuit breakers shall be quick make and break type for 240/415 VAC 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 KA at 415 VAC. MCBs shall be DIN mounted. The MCB shall be Current Limiting type (Class-3). MCBs shall be classified (B, C, D ref IS standard) as per their Tripping Characteristic curves defined by the manufacturer. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values. MCB shall ensure complete electrical isolation & downstream circuit or equipment when the MCB is switched OFF.

The housing shall be heat resistant and having a high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 Pole miniature circuit breakers shall have a common trip bar independent to the external operating handle.

Coordination Study in LV Network

LV Switchgear Manufacturer shall submit coordinated & Discriminated solution for LV Network protection devices i.e. **ACB, MCCB, MPCB & MCB** for all Incoming and outgoing devices for all Panels/ DB's as per BOQ with the help of published discrimination tables. Total discrimination shall be provided up to the short circuit breaking capacity of most downstream circuit Breakers

All MCB's used for protection of resistive and lightly inductive load shall be type "B" characteristic. Inductive (motor) load shall be of type "C" characteristic and discharge lamps and UPS etc. shall be of type D characteristic

Earthing: Earthing shall be provided as per IS:3043-1987.

Painting: All sheet steel work shall undergo a process of degreasing, pickling in acid, cold rinsing, phosphating, passivating (seven tank processing) and then painted with electrostatic paint (Powder coating). The shade of colour of panel inside/outside shall be as per BOQ confirming to IS Code No.5.

Labels: Engraved PVC labels shall be provided on all incoming and outgoing feeder. Circuit diagram showing the arrangements of the circuit inside the distribution panels shall be pasted on inside of the panel door and covered with transparent plastic sheet.

Meters

All voltmeters and indicating lamps shall be through MCB's Meters and indicating instruments shall be flush type.

All CT's connection for meters shall be through Test Terminal Block (TTB). CT ratio and burdens shall be as specified on the Single line diagram.

Current Transformers

Current transformers shall be provided for Distribution panels carrying current in excess of 60 amps. All phase shall be provided with current transformers of suitable VA burden with 5 amps secondary for operation of associated metering.

The CTs shall conform to relevant Indian Standards. The design and construction shall be dry type, epoxy resin cast/ **Flame Retardant resin filled Nylon type** robust to withstand thermal and dynamic stresses during short circuits. Metering CTs, shall have inbuilt bus bar mounting arrangement. Secondary terminals of CTs shall be brought out suitable to a terminal block which shall be easily accessible for testing and terminal connections. The secondary terminal should be covered with insulation cap/cover so that there should not be any possibility of touching the live terminal. The protection CTs shall be of accuracy class 5P10 and measurement CTs shall be of accuracy class 1.

Potential Free Contacts

Potential free contacts shall be provided for connection to Building Automation System in panels indicated in Schedule of Quantities.

Indicating Panel

All meters and indicating instruments shall be in accordance with relevant Indian Standards. Meters shall be flush mounted type. Indicating lamps shall be of low burden, and shall be backed up with 2 amps MCB/MPCB as per relevant fault level and toggle switch.

Testing

Testing of panels shall be as per following codes:

- IS: 8623 (Part -I) 1977 for factory built assemblies of switch gear for voltages upto and including 1000 VAC.
- IS: 13947 : 1993 Degree of protection
- IS: 5578 & IS :11353, 1985 Arrangement of bus bars.

Wiring

In wiring a distribution panel it shall be insured that total load of various distribution panel and/or consuming devices is divided evenly between the phases and number of ways as per Consultants drawing.

Anti-Condensation Space Heaters

1 No. 100 W, 240 volts, single phase, 50 Hz AC Anti Condensation space heaters controlled by thermostat and protected by 6 amps MCB's or MPCB's as per fault level at the panel shall be provided in each vertical section of main LT panel and 1 No. 60 watt Anti Condensation space heater with thermostat shall be provided in each cable alley of main distribution boards and sub distribution boards.

Rubber Mat

Rubber mat shall be provided in front to cover the full length of all panels. Where back space is provided for working from the rear of the panel, rubber mat shall also be provided at the back of the panel also to cover the full length of panel on the rear also. Rubber mats provided shall be as per IS 15652-2006

Contactors

Contactors shall be built into a high strength thermoplastic body and shall be provided with an arc shield for quick arc extinguishing. Silver alloy tips shall be provided to ensure a high degree of reliability and endurance under continuous operation. The magnet system shall consist of laminated yoke and armature to ensure clean operation without hum or chatter.

Starters contactors shall have 3 main and 2 Nos. NO / NC auxiliary contacts and shall be air break type suitable for making and breaking contact at minimum power factor of 0.35. For design consideration of contactors the starting current of connected motor shall be assumed to be 6 times the full load current of the motor in case of direct-on- line starters and 3 times the full load current of the motor in case of Star Delta and Reduced Voltage Starters. The insulation for contactor coils shall be of Class "E".

Coil shall be tape wound vacuum impregnated and shall be housed in a thermostatic bobbin, suitable for tropical conditions and shall withstand voltage fluctuations. Coil shall be suitable for 220/415±10% volts AC, 50 cycles AC supply.

Thermal overload relay

Thermal over load relay shall have built in phase failure sensitive tripping mechanism to prevent against single phasing as well as on overloading. The relay shall operate on the differential system of protection to safeguard against three phase overload, single phasing and unbalanced voltage conditions.

Auto-manual conversion facility shall be provided to convert from auto-reset mode to manual-reset mode and vice-versa at site. Ambient temperature compensation shall be provided for variation in ambient temperature from -5° C to +55°C.

All overload relays shall be of three element, positive acting ambient temperature compensated time lagged thermal over load relays with adjustable setting. Relays shall be directly connected for motors up to 35 HP capacity. C.T. operated relays shall be provided for motors above 35 HP capacity. Heater circuit contactors may not be provided with overload relays.

Time delay relays

Time delay relays shall be adjustable type with time delay adjustment from 0-180 seconds and shall have one set of auxiliary contacts for indicating lamp connection.

Indicating lamp and metering

All meters and indicating lamps shall be in accordance with IS:1248 and IS-1258. The meters shall be flush mounted type. The indicating lamp shall be of low wattage. Each MCC and control panel shall be provided with voltmeter 0-500 volts with three way and off selector switch, CT operated ammeter of suitable range with three nos. CTS of suitable ratio with three way and off selector switch, phase indicating lamps, and other indicating lamps as called for. All phase indicating lamp shall be backed up with MCB.

Toggle Switch

Toggle switches, where called for in Schedule of Quantities, shall be in conformity with relevant IS Codes and shall be of 5 amps rating.

Push Button Stations

Push button stations shall be provided for manual starting and stopping of motors / equipment. Green and Red colour push buttons shall be provided for 'Starting' and 'Stopping' operations. 'Start' or 'Stop' indicating flaps shall be provided for push buttons. Push Buttons shall be suitable for panel mounting and accessible from front without opening door, Lock lever shall be provided for 'Stop' push buttons. The push button contacts shall be suitable for 6 amps current capacity.

11.0 SCHEDULE OF TECHNICAL DATA**A Pumps****I. Int. Sludge Transfer Pump****1 Pump**

- a Make
- b Type & Model
- c Discharge in LPS/ GPM
- d Head (Meters of WC)
- e Shut off head (Meters of WC)
- f Efficiency (%)
- g No. of stages
- h Suction end I.D.
- i Delivery end I.D.
- j Details of N.P.S.H.
- k Solid Handling size.
- l Vibration Isolation Detail

2 Skid Details

- a Operating Weight
- b Overall Dimension
- c Mechanical Seal Detail

3 MATERIAL

- a Body
- b Impeller
- c Shaft
- d Type of Impeller
- e Is it suitable for direct coupling

4 MOTOR

- a Make
- b Model
- c Power Requirement (HP/KW)
- d R.P.M.
- e Rating
- f Over Load Capacity
- g Class of Insulation
- h Details of additional protection in winding
- i Motor efficiency
- j If it suitable for direct coupling to pump ?
- k Type of rotary movement
- l Method of starting
- m Size and type of cable for connections

II. Raw Sewage Feed Pump**1 Pump**

- a Make
- b Type & Model
- c Discharge in LPS/ GPM
- d Head (Meters of WC)
- e Shut off head (Meters of WC)

- f Efficiency (%)
- g No. of stages
- h Suction end I.D.
- i Delivery end I.D.
- j Details of N.P.S.H.
- k Solid Handling size.
- l Vibration Isolation Detail

2 Skid Details

- a Operating Weight
- b Overall Dimension
- c Mechanical Seal Detail

3 Material

- a Body
- b Impeller
- c Shaft
- d Type of Impeller
- e Is it suitable for direct coupling

4 Motor

- a Make
- b Model
- c Power Requirement (HP/KW)
- d R.P.M.
- e Rating
- f Over Load Capacity
- g Class of Insulation
- h Details of additional protection in winding
- i Motor efficiency
- j If it suitable for direct coupling to pump ?
- k Type of rotary movement
- l Method of starting
- m Size and type of cable for connections

III. Sludge Recirculation Pump

1 Pump

- a Make
- b Type & Model
- c Discharge in LPS/ GPM
- d Head (Meters of WC)
- e Shut off head (Meters of WC)
- f Efficiency (%)
- g No. of stages
- h Suction end I.D.
- i Delivery end I.D.
- j Details of N.P.S.H.
- k Solid Handling size.
- l Vibration Isolation Detail

2 Skid Details

- a Operating Weight
- b Overall Dimension
- c Mechanical Seal Detail

3 MATERIAL

- a Body
- b Impeller
- c Shaft
- d Type of Impeller
- e Is it suitable for direct coupling

4 MOTOR

- a Make
- b Model
- c Power Requirement (HP/KW)
- d R.P.M.
- e Rating
- f Over Load Capacity
- g Class of Insulation
- h Details of additional protection in winding
- i Motor efficiency
- j If it suitable for direct coupling to pump ?
- k Type of rotary movement
- l Method of starting
- m Size and type of cable for connections

iv. Flushing Water HPN system**1 Pump**

- a Make
- b c Type & Model
- Discharge in LPS/ GPM
- d Head (Meters of WC)
- e f Shut off head (Meters of WC)
- Efficiency (%)
- g No. of stages
- h i Suction end I.D.
- Delivery end I.D.
- j Details of N.P.S.H.
- k Solid Handling size.
- l Vibration Isolation Detail

2 Skid Details

- a Operating Weight
- b Overall Dimension
- c Mechanical Seal Detail

3 MATERIAL

- a Body
- b Impeller

- c Shaft
 - d Type of Impeller
 - e Is it suitable for direct coupling
- 4 MOTOR**
- a Make
 - b Model
 - c Power Requirement (HP/KW)
 - d R.P.M.
 - e Rating
 - f Over Load Capacity
 - g Class of Insulation
 - h Details of additional protection in winding
 - i Motor efficiency
 - j If it suitable for direct coupling to pump ?
 - k Type of rotary movement
 - l Method of starting & Size and type of cable for connections

VI. Irrigation water Transfer Pump

1 Pump

- a Make
- b Type & Model
- c Discharge in LPS/ GPM
- d Head (Meters of WC)
- e f Shut off head (Meters of WC)
- Efficiency (%)
- g No. of stages
- h i Suction end I.D.
- Delivery end I.D.
- j Details of N.P.S.H.
- kl Solid Handling size.
- Vibration Isolation Detail

2 Skid Details

- a Operating Weight
- b Overall Dimension
- c Mechanical Seal Detail

3 MATERIAL

- a Body
- b Impeller
- c Shaft
- d Type of Impeller
- e Is it suitable for direct coupling

4 MOTOR

- a Make
- b Model
- c Power Requirement (HP/KW)
- d R.P.M.
- e Rating
- f Over Load Capacity
- g Class of Insulation
- h Details of additional protection in winding
- i Motor efficiency
- j If it suitable for direct coupling to pump ?

- k Type of rotary movement
- l Method of starting
- m Size and type of cable for connections

VII. Centrifuge Feed Pump

1 Pump

- a Make
- b Type & Model
- c Discharge in LPS/ GPM
- d Head (Meters of WC)
- e Shut off head (Meters of WC)
- f Efficiency (%)
- g No. of stages
- h Suction end I.D.
- i Delivery end I.D.
- j Details of N.P.S.H.
- k Solid Handling size.
- l Vibration Isolation Detail

2 Skid Details

- a Operating Weight
- b Overall Dimension
- c Mechanical Seal Detail

3 MATERIAL

- a Body
- b Impeller
- c Shaft
- d Type of Impeller
- e Is it suitable for direct coupling

4 MOTOR

- a Make
- b Model
- c Power Requirement (HP/KW)
- d R.P.M.
- e Rating
- f Over Load Capacity
- g Class of Insulation
- h Details of additional protection in winding
- i Motor efficiency
- j If it suitable for direct coupling to pump ?
- k Type of rotary movement
- l Method of starting
- m Size and type of cable for connections

VII. Basket Centrifuge

- a Make:
- b Type of Element:
- c Diameter of Basket, mm:
- d Diameter of Basket Mouth, mm:
- e Depth of Basket:
- f Rated Charge in Basket, Kg:
- g Wet Cake holding capacity, lit:
- h Filtration area of basket, m²:

- i Basket Speed, rpm:
- j Motor Power, hp:
- k Motor Speed, RPM:
- l Material of Construction
 - Outer Body:
 - Basket:
 - Bag:

IX. Prime Mover of Basket Centrifuge

- a Type of prime mover
- b Type of motor
- c Type of mounting
- d Motor capacity, kw/hp
- e Rotational speed, rpm
- f Make of Electrical motor

B FILTER (Submit separate data sheet for various types of filters):

1 Description:

- a Material of Construction
- b Diameter
- c Height on straight
- d Filtering media
- e Shell thickness
- f Dish end thickness
- g Service flow rate
- h Design pressure
- i Back wash duration
- j Back wash flow rate
- k Pressure drop across the filter
- l Maximum inlet turbidity (NTU)
- m Turbidity in filtered water

C CHEMICAL DOSING SYSTEM

i. Chlorine Dosing

1 PUMP:

- a Pump model
- b Pump Type
- c Make
- d Material of construction
- e Flow rate

2 TANK:

- a Capacity
- b Material of Construction

D AIR BLOWER:

i Air Blowers for EQT & SHT

- 1 Manufacturer
- 2 Model
- 3 Motor (KW)
- 4 Pressure (Kg.Sq.cm)

- 5 Piston Displacement (cfm)
- 6 Dimensions:
 - a Length (mm)
 - b Width (mm)
 - c Height (mm)

- 7 Weight (Kg.)
- 8 Speed Mean Temp.

ii Air Blowers for Bioreactor

- 1 Manufacturer
- 2 Model
- 3 Motor (KW)
- 4 Pressure (Kg.Sq.cm)
- 5 Piston Displacement (cfm)
- 6 Dimensions:
 - a Length (mm)
 - b Width (mm)
 - c Height (mm)
- 7 Weight (Kg.)
- 8 Speed Mean Temp.

E ULTRA FILTRATION MEMBRANE (AFTER MBBR):

- 1 Manufacturer
- 2 Model
- 3 Pressure drop across membrane (m)
- 4 Micron Size of Membrane
- 5 Dimensions
 - a Length (mm)
 - b Width (mm)
 - c Height (mm)
 - d Weight (Kg.)

F DETAILS OF INSTUMENTS

1. FLOW METER

- a. Make
- b. Type
- c. Range
- d. Manufacturer
- e. construction
- f. Liner Material
- g. Sensor Material
- h. Manifold Material
- i. Output Signal
- j. Accuracy
- k. Connection Type
- l. Type of Flow measuring element
- m. operating Voltage
- n. Degree of protection (IP)

G. ELECTRICAL ACCESSORIES:

Make of the following:

- a. Motor Control Centre (Electrical Panel)
- b. Vacuum circuit breaker
- c. Air circuit breaker

- d. MCCB
- e. MCB
- f. Rotary switch
- g. Soft Starter
- h. Auto-transformer Starter
- j. Automatic Star Delta Starter
- k. Direct on line Starter
- l. Contactor
- m. Current Transformer (cast resin type)
- n. Single phase preventor
- o. Push Button
- p. Change over switch
- q. Ammeter & Voltmeter
KWH meter
- r. Relay
- s. Indication lamp
- t. Cables
- u. Wires
- v. Variable frequency drive

Effluent Treatment Plant

ETP comprise of coagulation followed by flocculation and then settling.

In an effluent treatment plant (ETP), coagulation is a chemical process that neutralizes the negative charges on suspended particles in wastewater, causing them to clump together into larger particles called flocs. This is achieved by adding chemicals like aluminum sulfate or ferric sulfate, which have a positive charge, to the water. The resulting larger and heavier flocs can then be more easily removed through subsequent processes like sedimentation and filtration.

Flocculation in an ETP (Effluent Treatment Plant) is a process that follows coagulation, where a gentle mixing stage encourages the formation of larger, heavier clumps called "flocs" from smaller suspended particles. This process makes it easier to remove impurities like suspended solids, turbidity, and color through subsequent sedimentation or filtration, leading to cleaner water.

"Settling in ETP" refers to the crucial **sedimentation process in an Effluent Treatment Plant**, where solids naturally settle out of wastewater, often aided by flocculation, allowing clearer water (supernatant) to rise and be removed for further treatment, while concentrated sludge collects at the bottom for disposal. This separation, using tanks with inclined tubes (tube settlers) or sloped bottoms, is vital for removing suspended matter before biological treatment or discharge, improving overall water quality.

Water Treatment Plant

A pressure sand filter (PSF) is a water treatment device using a sealed vessel with layered sand and gravel to remove suspended solids, turbidity, dirt, and particulates from water under pressure, acting as a pre-treatment for systems like RO, with dirty water entering, passing through the media where contaminants get trapped, and clean water exiting, requiring periodic backwashing to clean the media.

Activated carbon filters are used for water purification (removing chlorine, bad taste, and odors) and air purification (removing VOCs, smoke, and harmful gases). They are also used in industrial applications such as wastewater treatment, gas storage, and as a carrier for catalysts in chemical processes.

Chlorine disinfection is a process that uses chlorine or its compounds to kill or inactivate harmful microorganisms in water, preventing waterborne diseases. It is the most common method for disinfecting public water supplies, as it effectively kills bacteria, viruses, and other pathogens. Beyond disinfection, chlorine also helps control taste and odor, and can remove substances like iron and manganese

RO SYSTEM - 19 KLD

Inlet TDS assumed for design : max up to 1500 mg/l Treated TDS :

Less than or equal to 100-200 mg/l Feed flow rate : 3.0 m³/hr

Permeate flow rate : 1.9 m³/hr Reject flow rate

: 1.1 m³/hr RO Recovery: 60-65%

Scope of supply:

- 1) Dosings – Antiscalant, SMBS, PH Correction
- 2) Cartridge filters
- 3) High Pressure Pumps
- 4) RO elements with RO housing and RO Skid
- 5) CIP system
- 6) Low pressure & high pressure piping
- 7) Instrumentation
- 8) Controller & cables
- 9) SS Storage tank for treated water

DRAWINGS

The contractor shall refer the tender drawings attached in this section.

Sr. No.	Drawing Title (GFCs)	Drawing No.
1	BASEMENT LAYOUT	AEON/AC/T-01

RACK LEGEND	
[Symbol]	CONDENSATION
[Symbol]	ALUMINUM TUBE
[Symbol]	GLASSING
[Symbol]	COOL EXPANSION
[Symbol]	PIPE
[Symbol]	AIR SEPARATOR
[Symbol]	PIPE
[Symbol]	PRESSURIZATION
[Symbol]	CONDENSED WATER
[Symbol]	SUPPLY/RETURN SIDE
[Symbol]	CHILLED WATER
[Symbol]	SUPPLY/RETURN SIDE

HVAC LEGEND	
[Symbol]	FRESH/SUPPLY AIR GRILL
[Symbol]	EXHAUST AIR GRILL
[Symbol]	FRESH AIR DUCT
[Symbol]	EXHAUST AIR DUCT
[Symbol]	PRESSURIZATION AIR DUCT
[Symbol]	STP EXHAUST AIR DUCT
[Symbol]	FRESH AIR/EXHAUST AIR
[Symbol]	DUCT FLOW FAN
[Symbol]	HVAC SHAFT
[Symbol]	HVAC WINDWAY TRENCH



GENERAL TECHNICAL NOTES TO BE FOLLOWED AT ALL WORKING PARTS

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE INDIAN STANDARDS INSTITUTION (ISI).
2. ALL WORK SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE INDIAN STANDARDS INSTITUTION (ISI).
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10. ALL WORK SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE INDIAN STANDARDS INSTITUTION (ISI).

GENERAL NOTE
 1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE LOCAL AUTHORITIES AND THE STATE GOVERNMENT.
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 5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE LOCAL AUTHORITIES AND THE STATE GOVERNMENT.

NO.	DATE	REVISIONS	BY
01	26.12.20	DWG REVISED AS PER NEW ARCHITECT	
02	14.08.21	DWG ISSUE FOR APPROVAL	

REVISIONS

NO. DATE REVISIONS BY

PROJECT MANAGER

ARCHITECT

PROJECT MANAGER

ARCHITECT

PROJECT MANAGER

ARCHITECT

PROJECT MANAGER

ARCHITECT

PROJECT MANAGER

ARCHITECT

PROJECT MANAGER

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PROJECT MANAGER

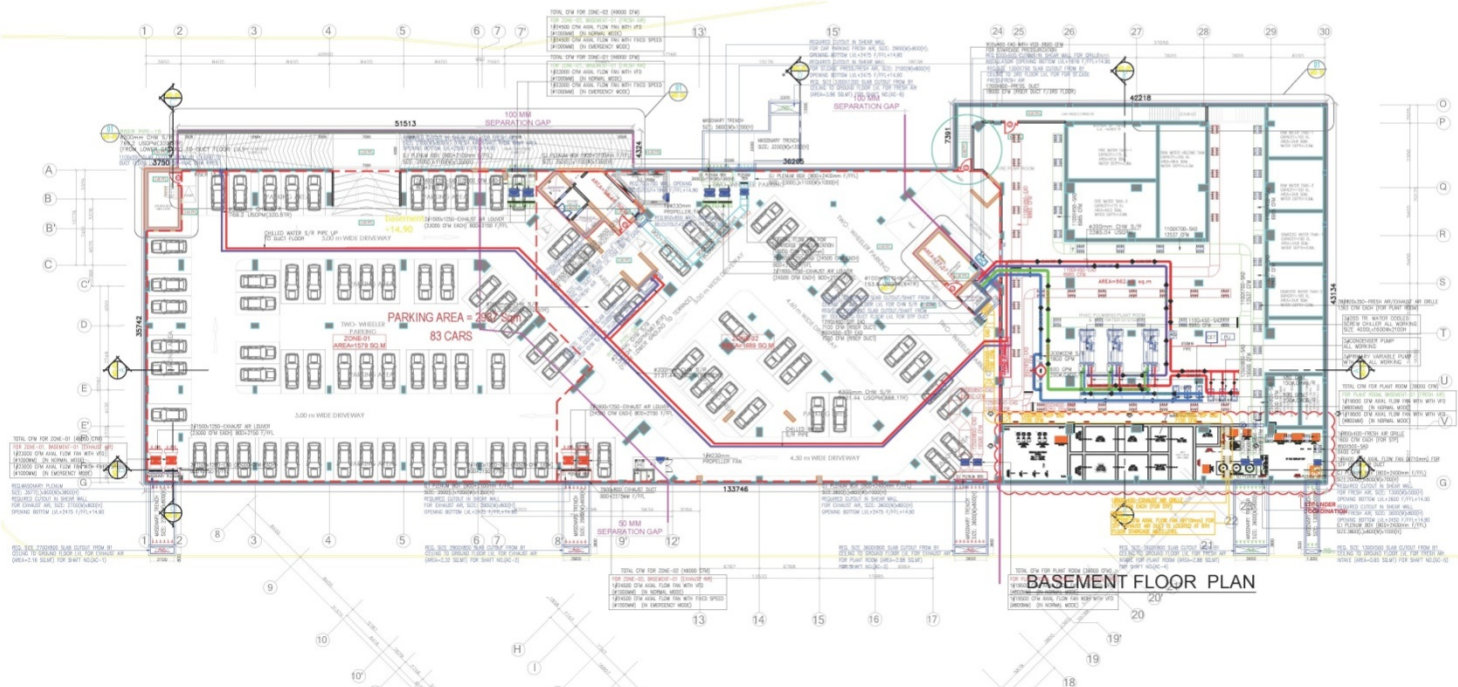
ARCHITECT

PROJECT MANAGER

ARCHITECT

PROJECT MANAGER

ARCHITECT



BASEMENT FLOOR PLAN

DRAWING DATA	
PROJECT NO.	24/2021
DATE OF FIRST ISSUE	30/06/2020
SCALE	AS SHOWN
CHECKED BY	EA

PROJECT NO. 24/2021
 DATE OF FIRST ISSUE 30/06/2020
 SCALE AS SHOWN
 CHECKED BY EA

PROJECT NO. 24/2021
 DATE OF FIRST ISSUE 30/06/2020
 SCALE AS SHOWN
 CHECKED BY EA

PROJECT NO. 24/2021
 DATE OF FIRST ISSUE 30/06/2020
 SCALE AS SHOWN
 CHECKED BY EA

SECTION-4

FINANCIAL PROPOSAL SUBMISSION FORM

(To be submitted in separate sealed Envelop)

To

The General Manager (Communications)
Swosti Premium Ltd.
Gopalpur Palm Resort Project
Email: gm.communications@swostihotels.com ear Sirs:

We, the undersigned, offer to provide the construction services for Supply, Installation, Testing & Commissioning of Effluent Treatment Plant, Sewage Treatment Plant Water Treatment Plant & Hydro pneumatic System ,RO Plant With Electrical Installation for STP, ETP, WTP & RO and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam, on a Item Rate Contract Basis”, in accordance with your Request for Proposal dated _____ and our Technical Proposal.

“We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery. We undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely “Prevention of Corruption Act, 1988 (as updated from time to time).”

Our attached Financial Proposal is for the amount of {Indicate the corresponding to the amount(s) currency(ies)}{Insert amount(s) in words and figures}, “excluding” of all indirect local taxes as in the Data Sheet. The estimated amount of local indirect taxes is {Insert currency} {Insert amount in words and figures} which shall be confirmed or adjusted, if needed, during negotiations. {Please note that all amounts shall be the same as indicated above.

Our Financial Proposal shall be binding upon us subject to the modifications resulting from Contract negotiations, up to expiration of the validity period of the Proposal, i.e. before the date indicated in the Data Sheet.

We understand you are not bound to accept any Proposal you receive.

We remain,

Yours sincerely,

Authorized Signature {In full and initials}: _____ Name and Title of Signatory: _____

In the capacity of: _____

Address: _____

E-mail:

BOQ FOR Supply, Installation, Testing & Commissioning of Effluent Treatment Plant, Sewage Treatment Plant Water Treatment Plant & Hydro pneumatic System ,RO Plant With Electrical Installation for STP, ETP, WTP & RO and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam

S.N	Description	Unit	Qty	Rate	Amount
A	<u>EFFLUENT TREATMENT PLANT - 16 KLD</u>				
	Design, supplying, installing, testing & commissioning of Sewage Treatment Plant cum Effluent Treatment Plant (excluding excavation, back filling & disposal of surplus earth Civil construction work) for the following duty:				
	Nature of effluent - Domestic Sewage from toilet, kitchen waste water shall be discharged into the STP. Effluent from Laundry etc. shall be discharged into ETP. Design to take consideration of same.				
	Laundry Effluent Characteristics - 16 KLD				
	Inlet Parameters				
	pH - 6.5-9.0				
	BOD - 200 to 250 mg/l				
	S. Solids - 500 mg/l				
	COD - 600 to 800 mg/l				
	Outlet Parameters				
	pH - 6.5 - 9.0				
	BOD < 5 to 7 Mg/L				
	S. Solids < 5 Mg/L				
	COD < 50 Mg/L				
	Effluent Treatment Plant shall include following tanks:				
	Equalization Tank with Screen Chamber and OGT - 1 No				
	Coagulation Tank - 1 No				
	Flocculation Tank - 1 No				
	Settling Tank - 1 No				
	ETP Treated Water will mix into EQT of STP				
	Sludge Holding Tank will be common between STP & ETP				
	MS-FRP ETP Tanks				
1.00	Design, fabrication, supply, installation, testing and commissioning of ETP MS-FRP tanks with 3 to 3.25 mm thick Corrugated sheet of MS for the side walls and 1.2 mm internal FRP lining. Base of tanks to be 5 to 6 mm thick of plain MS sheet.	L/S	1		
	Equalization Tank with Screen Chamber and OGT - 1 No X 5.0 KL				
	Coagulation Tank - 1 No X 1.5 KL				
	Flocculation Tank - 1 No X 1.5 KL				
	Settling Tank - 1 No X 1.5 KL				

	Please note tank volume and sizes shall be as per the drawings.				
	Electromechanical				
1.00	Supply, installation, testing & commissioning of 2 Nos Stainless Steel Manual Bar Screens with suitable lifting arrangement (size as per drawings) Spacing between bars size: 10 mm (Coarse) and 5 mm (Fine)- Laundry Effluent	No	2		
2.00	Supply, installation, testing & commissioning of displacer type level switch for automatic operation of the system with high/low level alarm complete with auxillary NO/NC contacts for each tank.	Lot	1		
3.00	Supply, installation, testing & commissioning of non clogging type pumps having CI casing & CI impeller complete with all accessories, motor of required capacity including on delivery line with isolation cock, isolation valve, check valve, flow meter, level switch, (with wiring) to control the level of sump automatically. Pumps shall have following duty: Solid handling minimum 20 mm to maximum 40 mm as per pump manufacturer				
3.10	EQT Submersible Sump Pumps for EQT- Laundry Effluent (2 Nos. 1 working & 1 standby) :- Flow rate (each) = 0.80 m3/hr Head = 8-10 Mtr Set = 2 No (1W+1SB)	Set	1		
3.20	Plant Room Sump Pumps (in ETP Plant Room for drainage) Flow rate (each) = 1.0 m3/hr Head = 8-10 Mtr Set = 2 No (1W+1SB)	Set	1		
	Cost shall be inclusive of PVC flexible Hose pipe (for piping submeged in effluent)				
	Providing guide ropes to guide submersible pump from upper level to operational level in sump basin with channels shall be made by the STP contractor.				
4.00	Supply, installation, testing and commissioning of Electromagnetic flow meter in ETP inlet to be installed at the discharge of Effluent Transfer Pumps.				
4.10	Flow rate (each) = 0.80 m3/hr (Electro Magnetic Type - at the discharge of Effluent Transfer Pumps.	No	1		
5.00	Supply, installation, testing and commissioning of Gear Motorized Agitator mixer for Coagulation Tank and Flocculation Tank.	No	2		
6.00	Supplying, installing, testing & commissioning of Coagulant and Flocculant Dosing System comprising of 100 Litres capacity HDPE / LLDPE tank with inlet / outlet connection, piping & valves alongwith metering (0-4 lph) one working pump for dosing.	No	2		

7.00	Supply, installation, testing and commissioning of PVC tube deck settling media to be installed in tube settler tank having plain settling area 11 m2/m3 and media height of 750 mm. MS / RCC Frame for tube media will be in client scope.	Lot	1		
8.00	Supply, installation, testing & commissioning of surface monobloc self priming type pumps having CI casing & CI impeller complete with all accessories, motor of required capacity including on delivery line with isolation cock, isolation valve, check valve. Pumps shall have following duty:				
8.10	Sludge recirculation pumps cum sludge feed pumps				
	Flow rate (each) = 1.2 m3/hr				
	Head = 6 - 8 Mtr				
	Set = 1 No (1W + 1 SB)	Set	1		
9.00	Providing and fixing all piping (as described below) and isolation control valves for making the system complete.				
	UPVC Sch 40 : Submerged air & water piping, Suction and discharge headers of surface pumps, interconnecting				
	PVC Flexible / Braided : Submersible water risers / droppings				
	PVC 6 kg/cm2 : Tanks Overflow and drain	Lot	1		
	TOTAL FOR EFFLUENT TREATMENT PLANT				
B	SEWAGE TREATMENT PLANT				
	Design, Detail Engineering, supply, installation, testing and commissioning including planning of all sub activities of complete 150 KLD (75 KLD X 2) MBBR based Sewage Treatment Plant (STP).				
	Inlet Parameters				
	pH - 5.5-9.0				
	BOD - 300-350 mg/l				
	S. Solids - 200-250 mg/l				
	COD - 400 to 500 mg/l				
	O&G - less than 50 mg/l				
	Effluent discharge standard after treatment				
	pH - 5.5-9.0				
	BOD - Less than 10 Mg/L				
	S. Solids - Less than or equal to 20 Mg/L				
	COD - Less than or equal to 50 Mg/L				
	Oil & Grease - BDL				
	Sewage treatment plant shall include but not limited to the following tanks units:				
	Equalization tank with bar screen chamber & OGT - 1 No				
	Anoxic Tank - 2 No				
	Aeration MBBR Tanks - 4 No				
	Settling Tank - 2 No				
	Filter Feed Tank/Submersible UF Feed Tank - 1 No				
	Soft Water Storage Tank - 1 No				
	Irrigation / Flushing Water Storage Tank - 1 No				

	Sludge Holding Tank - 1 No				
	Note:				
	Contractor shall ensure submission of detailed GA drawings (Plan & Section), P&I diagram, schematic diagram for the above said component and additional component if so required for the complete working of the ETP.				
	PRETREATMENT DEVICES AND PLANT ACCESSORIES				
1.00	Screens				
1.10	Supply, installation, testing & commissioning of Stainless Steel 316 Manual Coarse Bar Screen and Fine Bar Screen with suitable lifting arrangement (size 500 mm wide x 500 mm high approx). Space between bars shall be 10 mm and 5 mm.	No.	2		
1.20	Supply, installation, testing & commissioning of Semi Automatic Rotary Drum Fine Screen for flow rate of 3.75 m ³ /hr complete in SS 304 Body and SS 304 drum with punched holes of 2 to 3 mm thickness and solenoid valve for automatic backwash operation complete with inlet and outlet connections and flanges.	No.	2		
2.00	Supply, installation, testing & commissioning of electronic type level controller for automatic operation of the system with high/low level alarm complete with auxillary NO/NC contacts for (To be provided for all the tanks and plant room sump)	Lot	1		
3.00	Supply of GIEP/MSEP Puddle Flanges in accordance to BS:10 table D as required to be provided (in the structural slab and wall) of various diameters. Puddle flanges shall be provided for all the structural component of the STP & ETP. The installation of the puddle flanges shall be carried out by the Civil contractor in accordance to the Civil GA drawing (to be prepared by the STP contractor) at the required levels & position; under the supervision of the STP contractor	Lot	1		
4.00	Supply of plastic manhole step / foot rest (@ 300 mm c/c) with polypropelene compound injection molded around 16 mm dia (Fe-415) steel reinforcing bar. Provision of the foot rest is envisaged in various tanks/ components of the STP for the purpose of accessibility. The installation of the foot rest shall be done by the civil contractor as per civil GA drawing.	Lot	0		
5.00	Supply, installation, testing & commissioning of double seal CI / DI medium duty circular manhole cover with frame for the feasibility of access in the tank with locking arrangement.				
	Size : 600 mm dia.	Lot	0		
6.00	Supply of vent pipes of 100/150 mm dia with mosquito proof grating suitable for the ventilation purpose of the various tanks.	Lot	0		
	MECHANICAL EQUIPMENT: PUMPS, BLOWERS etc.				

7.00	Supply, installation, testing & commissioning of non clogging type pumps capable of handling solids 20 mm to 40 mm having CI casing & CI impeller complete with all accessories, motor of required capacity. Delivery header with isolation valve, level switch to control the level of sump automatically. Pumps shall have following duty: The provision of local push button near the pumps should be considered.				
7.10	Submersible Sewage Pumps (Non-cutter type) for transfer of Raw Sewage in EQT to Anoxic :- Flow rate (each) = 3.75 m3/hr Head = 8-10 m Solid handling size for this pump =min 20 mm to 40 mm Qty - 2W+1SB	Set	1		
7.20	Submersible Sewage Pumps (Non-cutter type) for transfer of STP plant room sump pump (1 working + 1 standby) Flow rate (each) = 12.0 m3/hr Head = 8-10 m Solid handling size for this pump =min 20 mm to 40 mm Qty - 1W+1SB	Set	1		
8.00	Supply, installation, testing & commissioning of Submersible Mixer with CI Casing and PP Propeller in Anoxic Tank of 1.1 KW Rating and three phase supply complete with submersible cable.	No.	2		
9.00	Air Blowers				
9.10	Supply, installation, testing & commissioning of Twin lobe Air Blowers capable of delivering 80 M3/hr. of free air at 0.4 Kg/Cm2 driven through "V" belt or directly coupled through flexible coupling & a TEFCmotor of suitable HP Suitable for 415 ± 10% volts, 3 phase, 50 cycles A/C supply (1W +1S). (Common for Equalization Tank & SHT)	Set	1		
9.20	Supply, installation, testing & commissioning of Twin lobe Air Blowers capable of delivering 150 M3/hr. of free air at 0.4 Kg/Cm2 driven through "V" belt or directly coupled through flexible coupling & a TEFCmotor of suitable HP Suitable for 415 ± 10% volts, 3 phase, 50 cycles A/C supply (1W +1S). (For Aeration Tank)	Set	1		
####	Supply, installation, testing and commissioning of Coarse Bubble EPDM Disc Diffusers for Equalization Tank and Sludge Holding Tank and Fine Bubble EPDM Tubular Diffusers for Aeration Tanks, complete with clamps and supports etc.	Lot	1		
####	Supplying of PP floating type attached growth media for aeration tanks having 400 m2/m3 surface area. The cost shall be inclusive of strainer for the protection of media to be carried over to the tube settler tanks. 1 Lot is the quantity of media for 4 No MBBR Aeration Tanks to be quoted.	Lot	1		

####	Supply, installation, testing and commissioning of PVC Tube settling media having plain settling area of 11 m2/m3 to be installed in settling. Frame work for media in RCC / FRP/MS will be in client scope or scope of civil contractor. 1 Lot is the quantity of media for 2 No Tube Settler Tanks to be quoted.	Lot	1		
13	Supplying, installing, testing & commissioning of centrifugal filter feed water pumps SS 304 Casing, SS 304 Impeller, SS 304 Shaft with mechanical seal along with motor. Pressure gauge with isolation cock, NRV, Isolation valve on delivery line and Isolation valve, stainer at suction. The pump shall be suitable for 415 ± 10% volts, 3 phase, 50 cycles a/c supply				
####	Filter Feed Pumps				
	Flow rate : 7.5 M3/hr.				
	Head : 30-35 mtr				
	1 Set : 2 Nos. (1 Working +1 Stand By)	Set	1		
14	Supplying, installing, testing and commissioning of Composite MSEP Filter Vessel with 6 mm shell thickness and 8 mm dish end thickness , internal distribution system, MS C Class frontal piping, manual valves, first fill media, pressure gauge etc complete to give filtered treated water.				
14.1	Multigrade Pressure Sand Filter				
	Flow rate : 7.5 M3/hr.				
	Filtration velocity : 15 cum/hr/sqm				
	Filter Size : 800 mm diameter, 1800 mm Height	Set	1		
14.2	Activated Carbon Filter				
	Flow rate : 7.5 M3/hr.				
	Filtration velocity : 15 cum/hr/sqm				
	Filter Size : 800 mm diameter, 1800 mm Height	Set	1		
15	Ultra Filtration for 150 KLD in line after ACF				
	Supply, installation, testing & commissioning of <u>Side Stream Surface Mounted</u> Automatic Ultra filtration System membranes to meet flushing demand of Feed Flow of 7.5 m3/hr at 90% recovery. UF Unit should be complete with UF membrane, LLDPE backwash tank, instument & automation, necessary Dosing system, UPVC piping, pressure gauges etc complete.				
	Flow rate : 7.5 M3/hr.				
	Recovery : 90%				
	Permeate Flow Rate : 6.75 m3/hr	Set	1		
16	Optional - Alternate Submersible Ultra Filtration Unit (against conventional side Stream UF)				
	Providing , testing and commissioning Submerged Ultra Filtration System complete with Submersible Ceramic membranes, skid, Dosing system for cleaning, Supporting system for piping and equipments,etc, complete in all respects suitable for a capacity of 75 KL/day X 2 Units at 20 hours operations (i.e 3.75 m3/hr X 2 Units) Membrane shall be warranted for 4 years with a membrane life of 15 to 20 Years. Flux for membrane design should not exceed 125 LMH for clarified water. [Please note Submersible UF will replace Tertiary Filters and Surface UF]. Quoted price is for combined 2 units of 75 KLD each.	Set	1		

17	Supplying, installing, testing & commissioning of centrifugal UF Backwash Pumps SS 304 Casing, SS 304 Impeller, SS 304 Shaft with mechanical seal along with motor. Pressure gauge with isolation cock, NRV, Isolation valve on delivery line and Isolation valve, stainer at suction. The pump shall be suitable for 415 ± 10% volts, 3 phase, 50 cycles a/c supply				
####	UF Backwash Pumps				
	Flow rate : 15 M3/hr.				
	Head : 20 to 25 mtr				
	1 Set : 2 Nos. (1 Working +1 Stand By)	Set	1		
####	Dosings				
####	Supplying, installing, testing and commissioning of Dosing Units for disinfection consisting of one HDPE tank of 100 litres capacity with a positive displacement diaphragm dosing pump having variable flowrate of 0-6 lph. The motor shall be suitable for operation at 240 V / single phase/50 Hz. Supply. The pump shall be supplied complete with necessary polypropylene piping, valves, strainers, low level switch and injection fittings.	No.	2		
####	Supplying, installing, testing and commissioning of Dosing Units for CIP system consisting of one HDPE tank of 100 litres capacity with a positive displacement diaphragm dosing pump having variable flowrate of 0-50 lph. The motor shall be suitable for operation at 240 V / single phase/50 Hz. Supply. The pump shall be supplied complete with necessary polypropylene piping, valves, strainers, low level switch and injection fittings.	No.	2		
####	Providing & fixing MBR Automation Valves and HDPE Backwash/CIP Tank of 500 Liter with inlet & outlet connection and float switch.	Lot	1		
####	Softener Pumps				
	Providing, fixing, testing and commissioning of vertical multistage / horizontal multistage / end suction centrifugal pumps, 2 pole, 50 HZ, AC, softener pumps incorporating CI casing, SS 304 impeller, SS 304 Shaft. TEFC induction IE 3 motor directly coupled to the pump, IP44 protection, class B insulated, C.I. body, hydraulically and dynamically balanced to give vibration free operation, with mechanical seal arrangement, fixed on a base plate with level switch, necessary wiring / Cabling (from tank to pumps & panel), pressure gauge, valves, including non-return valve and isolating valves on suction and delivering sides as required, including suction, delivery headers and interconnecting piping (UPVC Sch 40) complete in all respects.				
####	Softener Feed Pumps				
	Capacity : 4.5 m3/h				
	Head : 30 to 35 mtrs				
	Type : Vertical Multistage / Horizontal Multistage / Horizontal End Suction				
	Efficiency: IE 3				
	1Set : 2 No (1 Working + 1 Standby)	Set	1		
####	Soft Water Transfer Pumps				
	Capacity : 140 LPM				
	Head : 80 mtrs				

	Type : Vertical Multistage / Horizontal Multistage / Horizontal End Suction				
	Efficiency: IE 3				
	1Set : 2 No (1 Working + 1 Standby)	Set	1		
####	Softener				
	Supply, installation & testing and commissioning of Composite MSEP / Composite FRP Filter vessel complete with internal distribution system, MS C Class frontal piping (in case of MS) / UPVC Sch 40 (in case of FRP), manual CI Butterfly valves, first fill media, pressure gauge at inlet and outlet.				
	Plant Sizes:				
	Flow Rate - 4.5 M3/hr				
	Operation Hours - 10 hours				
	OBR - 45 m3				
	Input Hardness - 350 mg/l				
	Output Hardness - Less than 50 mg/l				
	Operating pressure - 3.0 kg/Sq.cm				
	Test pressure - 5.5 Kg/Sq.cm				
	MOC - MSEP / Composite FRP				
	Resin - 260 litres				
	Size of softener - 500 mm dia, 1800 mm height				
	Brine Tank - 200 Litres HDPE Tank with manual agitator				
	Qty - 1 Set	Set	1		
####	Hydropneumatic System for Treated Water Supply				
	Supply, Installation, Testing And Commissioning Of Compact Self Contained Skid Mounted Hydropneumatic System As Follows:				
	a. Vertical, In-Line, Multisage, centrifugal pumps with SS 304 casing, SS 304 impeller, SS 304 shaft, IE3 TEFC motor (with mechanical seal)				
	(Vendor to submit performance curves and technical catalog of the proposed model for review & information) Pumps shall be factory assembled and factory tested with VFD on each pump.				
	The pump shall be selected for performance at best efficiency point. However, the pump selection shall be suitable for performance with set point @ + 20% of the rated head.				
	b. External Pump mounted or wall mounted microprocessor PID controller and frequency inverter integrated in a single body or as separate components with pressure sensor transmitter minimum two lined LCD display, diodes to indicate pump ready, pump running and fault and capable to communicate with other controllers following MODBUS-RTU or BACNET Class-2 protocol through RS485 port. System should be capable to compensate for frictional losses at lower flows. All alarms should be displayed in the controller. System should be equipped with dry running protection				

	Quantity of Pumps: 1 Set of Working + Standby Pumps as per application given below + Pilot pumps Quantity of VFD : VFD on each pumps				
	c. Complete (Skid mounted wall mounted / floor mounted) electrical control panel comprising of all accessories such as PLCs, pressure switches, pressure transducers, control wiring and any other necessary imports etc. (list to be provided by the vendor)				
	d. Precharged diaphragm pressure vessel with food grade membrane, charging connection, connected to outlet header with necessary flanges, gaskets, isolating valves, nuts/bolts etc complete.				
	e. Set of accessories such as pressure switches, pressure transducers, inter connecting power and control cabling etc. complete				
	f. Accessories like pressure gauge, MS base frame (Synthetic enamel painted over a coat of primer)				
	g. GI suction and delivery header with flanges for inlet connection, common outlet header with flanges for outlet connections as required, and inter connecting piping with flexible connections, eccentric type reducers etc. all necessary indigenous accessories as required to complete the installation.				
####	Irrigation Water Hydropneumatic System				
	Flow Rate of main pumps : 70 LPM each (1 W) Flow Rate of pilot pump : 35 LPM each (1W)				
	Head : 55 Meter				
	1 Set : 1 Working + 1 Standby	Set	1		
####	Flushing Water Hydropneumatic System (for High Zone)				
	Flow Rate of main pumps : 195 LPM each (2 W) Flow Rate of pilot pump : 97.5 LPM each (1 W)				
	Head : 80 Meter				
	1 Set : 2 Working + 1 Standby	Set	1		
####	Flushing Water Hydropneumatic System (for Low Zone)				
	Flow Rate of main pumps : 180 LPM each (2 W) Flow Rate of pilot pump : 90 LPM each (1 W)				
	Head : 50 Meter				
	1 Set : 2 Working + 1 Standby	Set	1		
####	Supplying, installing, testing & commissioning of ultraviolet 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 welded 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 and lamp out alert circuit.				

	The UV unit shall have with reactor, cabinet housing, cabinet cooling, treatment chamber, electrical panel, temperature safety control, lampout alert. The UV Dosage should be > 60,000 uW – Sec / sq.cm. The lamps should be selected based upon the flow requirement of respective unit.				
####	At discharge of Irrigation Water Hydropneumatic System - 105 LPM	No	1		
####	At discharge of Flushing Water Hydropneumatic System (High Zone) - 487.5 LPM	No	1		
####	At discharge of Flushing Water Hydropneumatic System (Low Zone) - 450 LPM	No	1		
####	At discharge of Soft Water Transfer Pumps - 140 LPM	No	1		
####	Providing, fixing, testing and commissioning of Digital Water meter (turbine type water meter) compatible with BMS (to be integrated with BMS) with direct reading dia in Kilo-liter with all internal part in Gun metal or brass, strainer, flanged distance pieces for easy removal, 63 mm dia burden type pressure gauge with isolation cock.				
####	At discharge of Irrigation Water Hydropneumatic System - 105 LPM	No	1		
####	At discharge of Flushing Water Hydropneumatic System (High Zone) - 487.5 LPM	No	1		
####	At discharge of Flushing Water Hydropneumatic System (Low Zone) - 450 LPM	No	1		
####	At discharge of Soft Water Transfer Pumps - 140 LPM	No	1		
####	Supplying, installation, testing and commissioning of Horizontal centrifugal non clog self priming sludge recirculation pumps for tank coupled with motor of capacity 5.6 m3/h at 6-8 m head of C.I. Parts and mechanical seal complete with isolation and non-return valves. (2 working + 1 standby)	Set	1		
####	Supplying, installation, testing and commissioning of Horizontal centrifugal non clog self priming Screw Press feed pumps for tank coupled with motor of capacity 0.5 m3/h at 5-6 m head of C.I. Parts and mechanical seal complete with isolation and non-return valves. (1 working + 1 standby)	Set	1		
####	Supply, installation, testing and commissioning of 0.5 m3/hr Screw press complete with compaction zone, flocculation tank, screw, gear box, motor, solenoid valve, agitator, poly dosing unit, control panel, showering system complete with inlet and outlet connection.	No.	1		
####	Supply, installation, testing and commissioning of 0.5 m3/hr Screw press complete with compaction zone, flocculation tank, screw, gear box, motor, solenoid valve, agitator, poly dosing unit, control panel, showering system complete with inlet and outlet connection.	No.	2		
####	Providing and fixing all piping (as described below) and isolation control valves for making the system complete.				
	UPVC Piping Schedule 40 : Suction & Discharge headers of surface pumps & submersible pumps, submerged and non submerged air & water piping & other interconnecting pipeworks.				
	MS C Class : Non Submerged air piping, frontal piping of softener				

	PVC Flexible / Braided : Submersible water risers / droppings				
	PVC 6 Kg/cm2 : Tanks overflow & drain	Lot	1		
####	Supply of Microprocessor Based Electo Magnetic Flow Meter for Total Plant Capacity of 3.75 m3/hr with pulsed DC excitation having automatic 'Zero' correction with Bi directional flow measurement , compact instrument version with measuring sensor (Primary) and Amplifier integrated in one mechanical unit (Suitable for required flow range, inlet/outlet connections, IP 67 protection, measuring pipe material SS 304, Electrode material-SS 316 with 16 character x 2 Lines LCD Alphanumeric Display for flow rate, totalizer, with all accessories for inlet flow measurement before screen chamber.	No.	2		
####	Approval from pollution board including consent to operate at initial & various other stages of works including preparation of report / drawings as per pollution board requirement, arrangement of raw sewage. Contractor shall include the cost of all chemicals consumed and the cost of such items of works which are not explicitly mentioned above, but are mandatory to have pollution board approval (Liasoning in Client Scope)	Job	1		
####	Supply, installation, testing and commissioning of Online monitoring system at outlet parameters of PH, BOD, COD, TSS for STP.	No.	1		
	Sample flow : Recommended 0-5 lpm				
	Method : UV spectroscopy with full spectrum analysis				
	Sample pressure : 0 to 4 bar				
	Sample temp: 0 to 80 degc				
	PH Range: 0 to 14				
	TSS Range : 0 to 1000 mg/l				
	BOD Range: 0 to 1000 mg/l				
	COD Range : 0 to 1000 mg/l				
	Measurement interval : 1 min to 720 min				
	Memory: 5000 lines of measurements				
	Consumption : 220 ml/day				
	Power Supply: 90-264 V AC 50 / 60 Hz 40 VA - 12 V DC 3 A maximum				
	Output : 4-20 mA / RS 485 / RS 232				
	Screen : Color TFT LCD 320 X 240 pixles with LED backlight				
	Ingress protection : IP 65				
	Communication: latest versions				
32.0	Providing and fixing M.S. structural work fabricated from structural steel sections M.S. rounds, angles, channels, tees, square bars, chequered plates including cutting to size, drilling, welding fixing and welding to insert plates in RCC structural works, as directed by Architects. M.S. ladders and tank covers & platform only. cutting and making good the wall and floor where ever required including two coats of synthetic enamel paint/epoxy paint over a coat of primer.	Kg	0		
	TOTAL FOR SEWAGE TREATMENT PLANT				
C	ELECTRICAL INSTALLATION FOR STP & ETP				

<p>Fabrication, wiring, supply, installation, testing and commissioning of motor control centre shall be fabricated out of 14 gauge CRCA sheet steel 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. Quoted rates shall inclusive of cables, cable trays, control cabling, earthing (in accordance to specification) with earthing from panel to each motor / equipment.</p>				
<u>MCC (Motor Control Centre)</u>				
<p>Note - Contractor to evaluate the feeder/MCCB rating as per actual requirement</p>				
<p>Incoming</p>				
<p>200 amps TPN MCCB with the following accessories:</p>				
<p>a. 0-500 volts 96 x 96 mm square voltmeter with selector switch shall be protected by 2 amps TP MCB. 1 Set</p>				
<p>b. 0-200 amps 96 x 96 mm square ammeter with selector switch and 200/5 amps 10 VA CL:1 CTs. 1 Set</p>				
<p>c. Phase indicating lamps shall be protected by 2 amp SP MCB 3 Sets</p>				
<p><u>Bus Bar</u></p>				
<p>200 amps TPN aluminium bus bar with heat shrinkable insulation sleeves</p>				
<p><u>Outgoing for ETP:</u></p>				
<p>2 Nos (1W+1SB) suitable rating MPCB for 0.75 KW DOL starter and outgoing feeder to raw effluent transfer pumps motor (including standby). Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.</p>				
<p>2 Nos (1W+1SB) suitable rating MPCB for 0.75 KW DOL starter and outgoing feeder to sludge transfer pumps motor (including standby). Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.</p>				
<p>2 Nos (2W) suitable rating MPCB for 0.37 KW DOL starter and outgoing feeder to agitators. Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.</p>				
<p><u>Outgoing for STP:</u></p>				

	3 Nos (2W+1SB) suitable rating MPCB for 0.75 KW DOL starter and outgoing feeder to raw sewage transfer pumps motor (including standby). Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.			
	2 Nos (1W+1SB) suitable rating MPCB for 0.75 KW DOL starter and outgoing feeder to plant room sump pumps motor (including standby). Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.			
	3 Nos (2W+1SB) suitable rating MPCB for 0.37 KW DOL starter and outgoing feeder to sludge transfer pumps motor (including standby). Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.			
	3 Nos (2W+1SB) suitable rating MPCB for 0.75 KW DOL starter and outgoing feeder to MBR suction cum CIP pumps motor (including standby). Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.			
	2 Nos (1W+1SB) suitable rating MPCB for 1.5 KW DOL starter and outgoing feeder to Softener Feed pumps motor (including standby). Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.			
	2 Nos (1W+1SB) suitable rating MPCB for 4.0 KW DOL starter and outgoing feeder to Soft Water Transfer pumps motor (including standby). Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.			
	2 Nos (2W) suitable rating MPCB for 0.75 KW DOL starter and outgoing feeder to anoxic agitator. Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.			
	2 Nos (1W+1SB) suitable rating MPCB for 4.0 KW DOL starter and outgoing feeder to Air Blowers (including stand by). Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.			
	2 Nos (1W+1SB) suitable rating MPCB for 0.75 KW DOL starter and outgoing feeder to screw pumps (including standby). Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.			
	MCB supply for screw press, UV, hydropneumatic system, dosing pumps.			
	Electrical rating of equipment in KW shall be as per actual selection.			
	Necessary cable alleys, internal wiring, and interlocking, earthing for all equipment shall also included			
	Electrical Panel for STP as described above	Set	1	
	TOTAL FOR ELECTRICAL INSTALLATION FOR STP & ETP			
D	STP WATER DISPOSAL DURING EXECUTION PERIOD			
	During the execution period temporary arrangement for disposing of the excess / untreated sewage to be made by vendor using make shift arrangements at site within the STP /			

	ETP locations / using external tankers.				
	Only cleaning of the tanks one time during execution, however dewatering of tanks will be done by client.				
	All necessary safety instruments including Oxygen Monitoring devices / safety PPE's / Manpower / Tools & Tackles shall be included in this cost				
	Any temporary modifications as may be required for making the STP functional in a temporary mode shall be included in this cost & vendor to ensure the same is cleared by them after completion of the main STP works				
	Government approvals, receipted fee and liasoning & all related scope in client scope.	Job	0		
	TOTAL FOR STP WATER DISPOSAL DURING EXECUTION PERIOD				

B. WTP & RO

S.N	Description	Unit	Qty	Rate	Amount
E	WATER TREATMENT PLANT - 160 KLD		-	-	-
	Design, supplying, installing, testing & commissioning of Water Treatment Plant (excluding excavation, back filling & disposal of surplus earth Civil construction work) for the following duty:				
	Inlet Parameters				
	pH - 5.5-9.0				
	Hardness - 350 mg/l				
	TDS - 1500 mg/l				
	Treated Water Outlet Parameters				
	pH - 5.5-9.0				
	Hardness - less than 50 mg/l				
	TDS - less than 100-200 mg/l				
	Electromechanical:				
1	Supplying, installing, testing and commissioning of end suction / SS 304 vertical multistage centrifugal pump. Each pump shall have IE 3 TEFC 2900 RPM three phase electric motor. The pump shall have cast iron head, base plate SS Shaft / Impeller along with motor, Suction & delivery Headers , pressure gauge with NRV on delivery line, strainer (with by-pass) at suction. Pump shall be provided with mechanical seal, suitable vibration elimination pads of approved design.The installation shall be complete with all necessary accessories including base plate complete as required.		-	-	-
1.1	Filter Feed Pumps		-	-	-
	Flow rate (each) - 16 m3/hr		-	-	-
	Pumping Head - 30 to 35 meter		-	-	-
	1 Set (2 Nos Pumps - 1 Working + 1 Standby)	Set	1		

2	Supplying, installing, testing and commissioning of Sodium Hypochlorite dosing system (for domestic water treatment plant) consisting of one HDPE tank of 100 litres capacity with a positive displacement diaphragm dosing pump having variable flowrate of 0-6 lph. The motor shall be suitable for operation at 240 V / single phase / 50 Hz. Supply. The pump shall be supplied complete with necessary polypropylene piping, valves, strainers, low level switch and injection fittings.	No.	1		
3	Providing, fixing, testing & commissioning of vertical MSEP filter vessels with adequate dirt holding capacity. The filter shall be complete having MS C Class piping, fitting, manual butterfly valves first fill media, pressure gauges at inlet and outlet.				
3.1	Multi Grade Filter				
	Flow rate -16 m3/hr				
	Design Velocity - 20 m/hr				
	Diameter - 1000 mm				
	Height of Straight - 1800 mm				
	Design Pressure - 3 to 3.5 kg/cm2	No	1		
3.2	Activated Carbon Filter				
	Flow rate -16 m3/hr				
	Design Velocity - 20 m/hr				
	Diameter - 1000 mm				
	Height of Straight - 1800 mm				
	Design Pressure - 3 to 3.5 kg/cm2	No	1		
4	SOFTENER				
4.1	Supply, installation & testing and commissioning of Composite MSEP Softener vessel complete with internal distribution system, MS C Class frontal piping, manual CI Butterfly valves, first fill media, pressure gauge at inlet and outlet.				
	Plant Sizes:				
	Flow flow rate - 16 m3/hr				
	Operation Hours - 10 hours				
	OBR - 160 m3				
	Input Hardness - 350 mg/l				
	Output Hardness - Less than 50 mg/l				
	Operating pressure - 3.0 kg/Sq.cm				
	Test pressure - 5.5 Kg/Sq.cm				
	MOC - MSEP				
	Resin - 800 litres				
	Size of softener - 1000 mm dia, 1800 mm height				
	Brine Tank - 500 Litres HDPE Tank with manual agitator				
	Qty - 1 Set	Set	1		
5	Hydropneumatic System for Treated Water Supply				
	Supply, Installation, Testing And Commissioning Of Compact Self Contained Skid Mounted Hydropneumatic System As Follows:				
	a. Vertical, In-Line, Multisage, centrifugal pumps with SS 304 casing, SS 304 impeller, SS 304 shaft, IE3 / IE4 TEFC motor (with mechanical seal)				

	(Vendor to submit performance curves and technical catalog of the proposed model for review & information) Pumps shall be factory assembled and factory tested with VFD on each pump.				
	The pump shall be selected for performance at best efficiency point. However, the pump selection shall be suitable for performance with set point @ + 20% of the rated head.				
	b. External Pump mounted or wall mounted microprocessor PID controller and frequency inverter integrated in a single body or as separate components with pressure sensor transmitter minimum two lined LCD display, diodes to indicate pump ready, pump running and fault and capable to communicate with other controllers following MODBUS-RTU or BACNET Class-2 protocol through RS485 port. System should be capable to compensate for frictional losses at lower flows. All alarms should be displayed in the controller. System should be equipped with dry running protection				
	Quantity of Pumps: 1 Set of Working + Standby Pumps as per application given below + 1 Working Pilot Pump Quantity of VFD : VFD on each pumps				
	c. Complete (Skid mounted wall mounted / floor mounted) electrical control panel comprising of all accessories such as PLCs, pressure switches, pressure transducers, control wiring and any other necessary imports etc. (list to be provided by the vendor)				
	d. Precharged diaphragm pressure vessel with food grade membrane, charging connection, connected to outlet header with necessary flanges, gaskets, isolating valves, nuts/bolts etc complete.				
	e. Set of accessories such as pressure switches, pressure transducers, inter connecting power and control cabling etc. complete				
	f. Accessories like pressure gauge, MS base frame (Synthetic enamel painted over a coat of primer)				
	g. GI suction and delivery header with flanges for inlet connection, common outlet header with flanges for outlet connections as required, and inter connecting piping with flexible connections, eccentric type reducers etc. all necessary indigenous accessories as required to complete the installation.				
5.1	RO Water Hydropneumatic System				
	Flow Rate of main pumps : 5 m3/hr each Flow Rate of pilot pump : 2.5 m3/hr each				
	Head : 45 to 50 Meter Head				
	1 Set : 1 Working + 1 Standby + 1 Working Pilot Pump	Set	1		
5.2	Domestic Hydropneumatic System (For Low Zone)				
	Flow Rate of main pumps : 200 LPM each Flow Rate of pilot pump : 100 LPM each				

	Head : 50 Meter Head				
	1 Set Pump : 2 Working + 1 Standby + 1 Working Pilot	Set	1		
5.3	Domestic Hydropneumatic System (For High Zone)				
	Flow Rate of main pumps : 300 LPM each Flow Rate of pilot pump : 150 LPM each				
	Head : 70 Meter Head				
	1 Set Pump : 2 Working + 1 Standby + 1 Working Pilot	Set	1		
6	Supplying, installing, testing & commissioning of ultraviolet disinfection unit. 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 & vibration resistant. The lamp life shall be rated for 6000 hours. The unit shall be complete with temperature safety control and lamp out alert circuit.				
	The UV unit shall have with reactor, cabinet housing, cabinet cooling, treatment chamber, electrical panel, temperature safety control, lampout alert. The UV Dosage should be > 30,000 uW – Sec / sq.cm. The lamps should be selected based upon the flow requirement of respective unit.				
6.1	At Discharge of RO Water Hydropneumatic System - 5.0 m3/hr	No	1		
6.2	At Discharge of Domestic Water Hydropneumatic System (For Low Zone) - 500 LPM	No	1		
6.3	At Discharge of Domestic Water Hydropneumatic System (For High Zone) - 750 LPM	No	1		
7	Supply, installation, testing and commissioning of Digital Turbine Type flow meter with online sensor and cable at WTP outlet for flow monitoring.		-		
7.1	At Discharge of RO Water Hydropneumatic System - 5.0 m3/hr	No	1		
7.2	At Discharge of Domestic Water Hydropneumatic System (For Low Zone) - 500 LPM	No	1		
7.3	At Discharge of Domestic Water Hydropneumatic System (For High Zone) - 750 LPM	No	1		
8.0	Submersible Centrifugal Non-clog Drainage Pump				
	Submersible Centrifugal pump - Supply, installation, testing and commissioning of continuous duty submersible centrifugal non-clogging drainage pumps (1 Working + 1 Standby) with 11 mm solid handling complete with 3 phase motor with all necessary protection and mechanical seal etc. complete with all accessories including level switch, electrical control panel - DOL starter, necessary wiring. Include the cost of UPVC piping header, valve, etc complete in all respect.				
	Vendor to submit proposed pump model with duty curve.				
8.1	Flow rate : 500 LPM				
	Head : 15 to 20 mtrs				
	Solid handling : 11 to 15 mm				
	MOC : CI body; CI Impeller & Shaft				
	Application : Plantroom Drainage Pump				
	Pumps per set -1W+1S	Set	1		

9	Interconnecting Piping				
	Supply, installation, testing and commissioning of all interconnecting piping, fitting and isolation control valves between the equipment within plant room.				
	UPVC Sch 40 : Submerged water piping, Suction and discharge headers of surface pumps, interconnecting				
	Suction & discharge headers of Hydropneumatic system : GI				
	PVC Flexible / Braided : Submersible water risers / droppings				
	MS C Class : Frontal piping				
	RO Piping (for low pressure as well high pressure) : CPVC SDR 11				
	PVC 6 kg/cm2 : Tanks Overflow and drain	L/S	1		
10	Valves				
	Supply, installation, testing and commissioning of all interconnecting manual valves having pressure rating of 16 kg/cm2 for WTP operation.				
	CI Lever Operated Manual Butterfly Valves, PN 16				
	CI Dual Plate Wafer Type Check Valve, PN 16				
	Forged Brass Ball Valves, PN 16				
	CI Y-Type Strainers, PN 10	L/S	1		
11	Providing, installing, testing and commissioning of automatic level control and indicator systems (having 3/5 level indicator and controller), 25 mtr control cabling of suitable size from panel/pump to tanks and starter as required to make the equipment operating complete as per specifications:				
11.1	Raw and Treated level control system protection from low level water in the tank in accordance with specifications.	No	2		
	TOTAL FOR WATER TREATMENT PLANT				
F	RO SYSTEM - 19 KLD				
	Inlet TDS assumed for design : max up to 1500 mg/l				
	Treated TDS : Less than or equal to 100-200 mg/l				
	Feed flow rate : 3.0 m3/hr				
	Permeate flow rate : 1.9 m3/hr				
	Reject flow rate : 1.1 m3/hr				
	RO Recovery: 60-65%				
1.0	RO Feed Pumps				
	Providing, fixing, testing and commissioning of Multi stage Horizontal centrifugal pumps, 2 pole, 50 HZ, AC pumps (as per IS : 9079) incorporating C.I. Base and frame with SS casing, stainless steel shaft, SS impeller, TEFC induction motor directly coupled to the pump, IP44 protection, class B insulated, C.I. body, hydraulically and dynamically balanced to give vibration free operation, with mechanical seal arrangement, fixed on a base plate with suitable vibration eliminator pads complete with level controller, necessary wiring (from tank to pumps & panel), pressure gauge on the delivery side and strainer on suction side, including isolating valves on suction and non-return valve on delivering sides as required, including suction and delivery headers complete in all respects.				
	Flow rate (each) = 3.0 m3/hr				
	Head = 20-25 m				

	Location : WTP Plant Room	Set	0		
2	RO Plant				
	Supply, installation, testing and commissioning of RO Water treatment system (1.5 m3/hr permeate capacity X 1 no.) and all its components of required size complete including the following as mentioned below.				
	Following shall be included :-				
a)	Antiscalent Dosing, SMBS Dosing & pH Correction System with HDPE tanks				
	0-6 LPH. Dosing Pump with HDPE 100 Litres tank or as per the vender specification - (3 No)				
b)	Micron Cartridge Filter				
	05 & 10 Micron Cartridge Filter - (2 No)				
c)	Vertical Multistage Inline High Pressure Pump- SS 304 (Shaft, Body & Impeller)				
	Feed Flow Rate : 2.3 m3/hr				
	Head : 100 M (as per projection)				
	Efficiency : IE 3				
	No. of Pumps - (2 No, 1 W + 1 SB)				
d)	R O Module - Elements (as per RO membrane manufacture details)				
e)	Spirally wounded RO Membranes Required R.O. Membrane Module in Structural Membrane Housing. - This System consists of an epoxy painted structural steel skid for mounting of high pressure tube with spiral wond membrane elements for each stream .	Set	1		
f)	Instrumentation including Rotameters, digital TDS meter, digital pH meter, pressure gauges, low pressure switch, high pressure switch etc. complete.				
g)	UPVC Schedule 40 piping for low pressure side, CPVC SDR 11 piping for high pressure side, valves and accessories complete with all fittings, accessories etc.				
h)	RO Plant Skid- SS 304				
i)	CIP Pump - 3 m3/hr at 20-25 meter head, with CI Casing, SS 304 Impeller, SS 304 Shaft, IE 3 efficiency. (1 No working pump)				
j)	CIP Tank with 500 ltrs capacity (HDPE) of CIP tank - or as per the vender specification (1 No)				
	Complete System as per above specification				
3	Supply, installation, testing and commissioning of 1 No. SS 304 RO treated water (permeate) storage tank of 2000 litres capacity complete with inlet and outlet connection.	No.	1		
	TOTAL FOR RO PLANT				

G	ELECTRICAL INSTALLATION FOR WTP & RO				
	Design, fabrication, assembling, wiring, supply, installation, testing and commissioning of motor control centre shall be fabricated out of 14 gauge CRCA sheet steel 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. Quoted rates shall inclusive of cables, cable trays from panel to each motor / equipment. Panel shall be outdoor type.				
1	For Water Treatment Plant & RO				
	MCC for WTP & RO		-		
			-		
	Incoming		-		
	-		-		
	200 amps TPN MCCB with the following accessories:		-		
			-		
	3 Phase, 4 Watt, 415 V AC, 25 X 10 Sq. mm TPN Aluminium Bus Bar		-		
			-		
	a. 0-500 volts 96 x 96 mm square voltmeter with selector switch protected by 2 amps TP MCB. 1 Set		-		
			-		
	b. 0-100 amps 96 x 96 mm square ammeter with selector switch and 200/5 amps 10 VA CL:1 CTs. 1 Set		-		
			-		
	c. Phase indicating lamps		-		
	Outgoings		-		
	1 No. (Common between 1W+1SB) Suitable rating MPCB for starter and outgoing feeder to Filter Feed Pumps. Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.		-		
	1 No. (Common between 1W+1SB) Suitable rating MPCB for starter and outgoing feeder to RO High Pressure Pumps. Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.		-		
	1 No. (1W) Suitable rating MPCB for starter and outgoing feeder to RO CIP Pump. Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.		-		
	1 No. (Common between 1W+1SB) Suitable rating MPCB for starter and outgoing feeder to Drainage Sump Pumps. Each compartment shall contain auto / manual selector switch and indicating / pushbutton lamps with MCB for ON / OFF / TRIP of motor.		-		
	25 to 32 A TP MCB with ON/OFF selector switch for Variable Speed Hydropneumatic System - 3 No.		-		
	6A DP MCB with ON/OFF selector switch for Dosing Pumps - 4		-		

No.				
	16A DP MCB with ON/OFF Selector switch for UV - 3 No.			
	Necessary cable and cable trays for all equipment shall also included		-	
	MCC For WTP & RO as described above.	Set	1	
	ELECTRICAL INSTALLATION FOR WTP & RO			

SUMMARY OF COSTS		
SUB-HEAD	DESCRIPTION	AMOUNT
A	EFFLUENT TREATMENT PLANT - 16 KLD	
B	SEWAGE TREATMENT PLANT - 150 KLD MBBR (75 KLD X 2)	
C	ELECTRICAL INSTALLATION FOR STP & ETP	
D	STP WATER DISPOSAL DURING EXECUTION PERIOD	
E	WATER TREATMENT PLANT & HYDROPNEUMATIC SYSTEM - 160 KLD	
F	RO PLANT - 19 KLD	
G	ELECTRICAL INSTALLATION FOR WTP & RO	
	TOTAL	
	GST is extra	

<u>OPERATION & MAINTENANCE</u>		
YEAR	OPERATION	ALL INCLUSIVE COMPREHENSIVE MAINTENANCE
DLP		Part of DLP
First Year after DLP		
Second Year after DLP		
Third Year after DLP		
Fourth Year after DLP		
Fifth Year after DLP		

Note:-

1. Above Prices will not be part of Tender Evaluation
2. It will not be binding on SWOSTI PREMIUM LTD for entering into above Comprehensive Annual Maintenance Contract
3. If SWOSTI PREMIUM LTD decides to enter into the above Comprehensive

- Annual Maintenance Contract, a separate Contract Agreement shall be made, which will not be part of this Contract
4. Tenderers are expected to quote Reasonable Prices.

DRAWINGS

Basement Drawing Drawings Shall be provided

PAYMENT TERMS:

Mobilization Advance:

- Contractor will be paid any mobilization advance as indicated in contract data.

PAYMENT SCHEDULE

The stage-wise payment to the Contractor shall be released based on the items of work executed as contained in the Bills of Quantities and rates agreed to thereto. Upon completion that item of work. Detail procedure are as below :

Preparation of R/A Bills :

- After satisfactory completion of each item of work, the bill shall be submitted with detailed measurements and invoice.
- Final bill along with no claim certificate should be submitted within 2 months from date of completion of work.
- Upon clearing the site of all debris, materials, temporary structures and machinery.
- Payments for supply/work done will be made in R/A bill based on monthly progress or work, verified with measurement by PMC/Authorised Engineer.
- R/A bills will be certified against final amounts as in contract.

Withholding of Payments:

- Payment may be withheld if contractor fails to meet contractual obligations.
- Failure to pay workers' wages or bills of contractor.

SECURED ADVANCE :

Any request for a secured advance may be requested for by Contractor along with invoice/ original shipping document copy of invoice and duly signed payment invoice. This may be considered by the Employer(Client) upon assessment by PMC/Engineer-in-Charge for items of non-perishable, non-fragile & non-consumable in nature and required for the work and in accordance with contract (Conditions & Technical Specifications), which have been brought to the site in connection with execution (having reference to an item of work in BOQ) and are adequately stored and/or protected against damage by weather or other causes and have not been incorporated in the work earlier. The amount of such advance shall be deducted from next/final payment. However, any secured advance for any material/equipment lying unutilized after 3 months/completion of work shall be recovered fully from the next/final bill.

Note:

Each payment shall be certified by the Engineer based on physical progress at site against the approved GFC drawings.

No advance payment shall be made unless specifically agreed in the contract data or special conditions.

All payments are subject to retention, tax deduction at source, and recoveries as per the contract.

SECTION 5: CONTRACT DATA, CONTRACT FORM

&

CONDITIONS OF CONTRACT

CONTRACT DATA

Clause	Description
1. Name of Work	Supply, Installation, Testing & Commissioning of Effluent Treatment Plant, Sewage Treatment Plant Water Treatment Plant & Hydro pneumatic System ,RO Plant With Electrical Installation for STP, ETP, WTP & RO and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam – (Item Rate Contract)
2. Name of the Client	Swosti Group
3. Client's Representative	Project Management Consultant (PMC) – [Insert PMC Firm Name]
4. PMC Contact Details	Name: Designation: Project Manager – PMC Email: [Insert] Phone: [Insert]
5. Site Location	Gopalpur-on-Sea, Ganjam District, Odisha – 761002
6. Scope of Work	Supply, Installation, Testing & Commissioning of Effluent Treatment Plant, Sewage Treatment Plant Water Treatment Plant & Hydro pneumatic System ,RO Plant With Electrical Installation for STP, ETP, WTP & RO and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam as per drawings and specifications.
7. Estimated Contract Value	₹ [Insert Amount] (Inclusive of all costs except GST)
8. Tender Type	Item Rate-Fixed Price Contract
9. Contract Type	Item Rate
10. Time for Completion	[Insert duration – e.g., 6 months] from the date of Letter of Acceptance (LoA)
11. Date of Commencement	Within 7 (seven) days from issuance of LoA or handing over of site, whichever is later
12. Defects Liability Period (DLP)	12 months from the date of issuance of Completion Certificate
13. Performance Security	2% of Contract Value in the form of Bank Guarantee to be submitted within 7 days of LoA
14. Retention Money	3% of Running Account Bills; to be released after successful completion of the Defects Liability Period
15. Mobilisation Advance	No
16. Schedule of Payments	Item-based payments linked to actual progress of works (Refer to Section – Payment Terms)
17. Liquidated Damages (LD)	0.2 % per day of the value of balance work delayed beyond the stipulated date of completion , subject to a maximum of 10% of Contract Value
18. Arbitration	In accordance with the Arbitration and Conciliation Act, 1996; sole arbitrator to be mutually appointed
19. Governing Law and Jurisdiction	Laws of India; jurisdiction: Bhubaneswar, Odisha
20. Insurance	Contractor to provide insurance for Works, Workmen Compensation, Equipment,

Clause	Description
	and Third-Party Liability to indemnify the Client from damage/Claims arising out all such items including loss arising out of natural calamity.
21. Taxes and Duties	Quoted price is inclusive of all taxes and duties except GST; GST shall be paid extra as applicable
22. Sub-contracting	Permitted only with prior written approval of the Client / PMC
23. Safety & Compliance	Contractor to comply with safety regulations, labor laws, and site protocols
24. Force Majeure	As per General Conditions of Contract
25. Advance Payment	10% of Contract Value, against submission of Bank Guarantee of 100% of amount; recoverable in equal instalments from running bills
26. Secured Advance	To be considered on request

AGREEMENT

AN AGREEMENT is made this ----- BETWEEN the SWOSTI PREMIUM LTD ,Bhubaneswar, which expression shall include its successor, unless repugnant to or Excluded by the contract here of and assignees of and represented by its(the first party (hereinafter called the Authority) and by..... its sole proprietor/partners/Director and having registered office at (which expression shall be including his / its successor's heirs executors, representative and or assignees of the second party (hereinafter called the contractor}).

WHEREAS the Authority has, under tender Notification No. -----

WHEREAS the contractor has submitted tender for carrying out the work as above as per the tender document page ---- to ---- and has represented that in conformity with his / its obligation contained in the tender as modified by the correction slips and corrigendum contained he / it shall carryout the same truly, faithfully and honestly.

THE SAME has been accepted by both the parties on the terms and conditions, corrections, corrigendum contained in the tender as modified as well as the letter of acceptance , at a total Contract Price of Rs. Crores (Rupees Crores) excluding GST (To be paid extra as applicable) as Issued party No.1 annexed here to as.

The same shall be binding on both the parties.

IN WITNESS WHEREOF, the parties have signed the deed of agreement on the date, month and year referred to above.

Date: At

New Delhi.

Signed by

Party No.1 Party No.2

WITNESS

1. Party No.1

2. Party No.2

Conditions of Contract

GENERAL

Terms, which are defined in the Contract Data and not defined in the Conditions of Contract shall keep their defined meanings. Capital initials are used to identify defined terms.

Bill of Quantities means the priced and completed Bill of Quantities;

Compensation Events are those defined in Document;

The **Completion Date** is the date of completion of the Works as certified by the Engineer.

The **Contract** is the contract between the Client and the Contractor to execute, complete and maintain the Works.

The **Contract Data** defines the documents and other information, which comprise the Contract;

The **Contractor** is a person or corporate body whose Bid to carry out the Works has been accepted by the Client [obligations of the Contractor mentioned in the Contract Data].;

The **Contractor's Bid** is the completed Bidding document submitted by the Contractor to the Client and includes Technical and Financial bids;

The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract;

Days are calendar days; months are calendar months;

A **Defect** is any part of the Works not completed in accordance with the Contract;

The **Defects Liability Period** is the period named in the Contract Data and calculated from the Completion Date;

The **Client** is the party who will employ the Contractor to carry out the Works; [As mentioned in the Contract Data].

The Engineer is the person named in the Contract Data (or any other competent person appointed and notified to the contractor to act in replacement of the Engineer) who is responsible for supervising the Contractor's work, administering the Contract, certifying payments due to the Contractor, issuing and valuing Variations to the Contract, recommending extensions of time, and valuing the Compensation Events;

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works;

Initial Contract Price is the Contract Price listed in the Client's Letter of Acceptance;

Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Client by issuing an extension of time;

Materials are all supplies, including consumables, used by the contractor for incorporation in the Works;

Plant is any integral part of the Works, which is to have a mechanical, electrical, electronic or chemical or biological function;The **Site** is the area defined as such in the Contract Data;

Site Investigation Reports are those, which were included in the Bidding documents and are factual interpretative reports about the surface and sub-surface conditions at the site;

Specification means the Specification of the works included in the Contract and any modification or addition made or approved by the Client;

The **Start Date / Date of Commencement** is given in. the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates;

A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site;

Temporary Works are works designed, constructed, installed, and removed by the Contractor, which are needed for construction or installation of the Works;

A **Variation or Change in Scope** is an instruction given by the Client, which varies and change the scope of Works;

Works are what the Contract requires the Contractor to construct, install, and turn over to the Client, as defined in the Contract Data;

Year may be understood as financial year;

“Approved Make” means makes of items as specified in the “List of Approved Makes/Approved Manufacturers” in this RFP. However, a higher or equivalent make can be utilized after obtaining prior approval of “Engineer-In-Charge” in writing.

Interpretation

In interpreting the Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their general meaning under the language of the Contract unless specifically defined. The Client will provide instructions clarifying queries about the Conditions of Contract.

If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion date for the whole of the Works).

The documents forming the Contract shall be interpreted in the following order of priority:

- (a) Agreement
- (b) Letter of Acceptance, notice to proceed with the works
- (c) Contractor's Bid

- (d) Contract Data
- (e) Conditions of Contract including Additional & Special Conditions of Contract
- (f) Specifications
- (g) Drawings
- (h) Bill of quantities (optional) and
- (i) Any other document listed in the Contract Data as forming part of the Contract.

Languages and Law

The language of the Contract and the law governing the Contract are stated in the Contract Data.

Engineer's Decisions:

Except where otherwise specifically stated, the Engineer will decide contractual matters between the Client and the Contractor in the role representing the Client as per the provision of the contract.

Delegation:

The Engineer may delegate any of his duties and responsibilities to other people after notifying the Contractor and may cancel any delegation after notifying the Contractor.

Communications:

Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act).

Sub-contracting:

The Contractor may sub-contract any portion of work, up to a limit of 10% of contract value, with the approval of the Engineer but may not assign the Contract without the approval of the Client in writing. Sub-contracting does not alter the Contractor's obligations.

Other Contractors:

The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Client between the dates given in the Schedule of other Contractors. The Contractor shall as refer to in the Contract Data, also provide facilities and services for them as described in the Schedule. The Client may modify the schedule of other contractors and shall notify the contractor of any such modification.

Personnel:

The Contractor shall employ the key personnel named in the Schedule of Key Personnel as referred to in the Contract Data besides those as listed to carry out the functions stated in the Schedule or other personnel approved by the Engineer. The Engineer will approve any proposed replacement of key personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.

If the Engineer asks the Contractor to remove a person who is a member of the Contractor's staff or his work force stating the reasons the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

Client's and Contractor's Risks:

The Client carries the risks which this Contract states are Client's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

Client's Risks:

The Client is responsible for the excepted risks which are in so far as they directly affect the execution of the Works in India, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor's employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive.

Contractor's Risks:

All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

Insurance:

The Contractor shall provide, in the joint names of the Client and the Contractor, insurance cover **for the period as stated below against the events and** in the amounts and deductibles stated in the Contract Data for the following events, which are due to the Contractor's risks:

A) From the starting date to the end of defect liability period:

(a) Loss of or damage to the works

B) From the start date till completion of the work as per agreement:

(a) Loss of or damage to plant, materials and equipment,

(b) Loss of or damage of property (except the works, plant, materials and equipment) in connection with the contract, and

(c) Personal injury or death.

If all the items as listed above can be combined / grouped under one insurance cover like Contractor's, All Risks (CAR) Policy **covering all-natural calamities as per local conditions.**

Prior to seven days before the start date, the Contractor shall furnish to the Engineer notarized true copies of the certificates of insurance, copies of insurance policies and premia payment receipts in respect of such insurance for the Client's approval. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

If the contractor does not provide any of the policies and certificates required, the Client may affect the insurance which the contractor should have provided and recover the premiums the Client has paid from payments otherwise due to the contractor or, if no payment is due, the payment of the premiums shall be a debt due.

Alterations to the terms of insurance shall not be made without the approval of the Client.

Both parties shall comply with any conditions of the insurance policies.

Site Investigation Reports:

The Contractor, in preparing the Bid, may rely on any site Investigation Reports referred to in the Contract Data, which are indicative and not exhaustive. The Client shall provide all available details to the Contractor (Bidder) for his information, if requested by him at least one week prior to the bid submission date. The bidder shall be responsible for interpreting all such data. After award of work, the Contractor shall carry out detail survey and investigation for preparation of detail designs as per the scope of work and time period stipulated.

To the extent which was practicable (taking account of cost and time), the Contractor (Bidder) shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Tender or Works. To the same extent, the Contractor (Bidder) shall be deemed to have inspected and examined the Site, its surroundings, the above data and other available information, and to have been satisfied before submitting the Tender as to all relevant matters, including (without limitation):

- (a) the form and nature of the Site, including sub-surface conditions,
- (b) the climatic conditions,
- (c) the extent and nature of the work and Goods necessary for the execution and completion of the Works and the remedying of any defects,
- (d) the Laws, procedures and labour practices of the Country, and
- (e) the Contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and other services.
- (f) availability of required materials

Queries about the Contract Data:

The Client will clarify queries on the Contract Data if any during the Pre-bid references.

Contractor to Construct the Works:

The Contractor shall construct and install the Works in accordance with the approved specification and drawings. All designs, drawings and specifications to be furnished by the contractor shall be approved by the Client before execution.

The Works to be completed by the Intended Completion Date:

The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the programme submitted by the Contractor, as updated with the approval of the Engineer, and complete them by the Intended Completion Date.

Approval by the Engineer:

The Contractor shall be provided Specifications and Drawings showing the proposed Temporary Works by the Engineer.

The Contractor shall be responsible for design of Temporary Works.

The Engineer's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

The Contractor shall be provided approved design, drawings and specifications of all components of the building and all allied infrastructure works, except those for the temporary works.

Safety:

The Contractor shall be responsible for the safety of all activities on the Site.

Possession of the Site:

The Client shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data the Client is deemed to have delayed the start of the relevant activities and this will be Compensation Event.

Access to the Site:

The Contractor shall allow the Client and any person authorized by the Client access to the Site, to any place where work in connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured / fabricated / assembled for the works.

Instructions:

The Contractor shall carry out all instructions of the Engineer pertaining to works, which comply with the applicable laws where the Site is located.

The Contractor shall permit the Client to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Client, if so, required by the Client.

Disputes:

That for the purpose of jurisdiction in the event of disputes if any of the Contract would be deemed to have been entered in to within the State of Odisha and it is agreed that neither party to the Contract will be competent to bring a suit in regard to the matter by this Contract at any place outside the State of Odisha.

Procedure for Settlement of Disputes:

In case of Dispute or difference arising between the Client and the contractor relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled mutually.

TIME CONTROL

Programme:

Within **7 days of issue of letter of award**, the successful bidder shall submit to the Client detail work programme for approval showing the general methods, arrangements, order and timing for all the activities in the Works along with monthly cash flow forecast. The agreed work programme / milestones during such contract negotiation shall form part of the agreement.

An update of the Programme shall be a programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.

The contractor shall submit to the Client, for approval, an updated Programme at intervals no longer than 15days. If the Contractor does not submit an updated Programme within this period, the Engineer may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue programme has been submitted.

The Client's approval of the Programme shall not alter the Contractor's obligations. The Contractor may revise the Programme and submit it to the Client again at any time. A revised Programme is to show the effect of Variations and Compensation Events.

Extension of the Intended Completion Date:

The Client shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the intended Completion Date without the Contractor taking steps to accelerate the remaining work and which would cause the Contractor to incur additional cost.

The Client shall decide whether and by how much to extend the Intended Completion Date within 15 days of the Contractor asking the Engineer for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

The Engineer shall within 7 days of receiving full justification from the contractor for extension of Intended Completion Date refer to the Client his recommendation. The Client shall in not more than 15 days communicate to the Engineer the Client's decision.

Delays Ordered by the Engineer:

The Client may instruct the Contractor to delay the start or progress of any activity within the Works.

Management Meetings:

Either the Engineer or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.

The Engineer shall record the business of management meetings and is to provide copies of his record to those attending the meeting and to the Client. The responsibility of the parties for actions to be taken is to be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

Early Warning:

The Contractor is to warn the Client/Engineer at the earliest opportunity of specific likely future events or circumstances that may adversely affect the work resulting delay in the execution. The Engineer may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Completion Date.

The Contractor shall cooperate with the Engineer in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Engineer.

QUALITY CONTROL**Identifying Defects:**

The Engineer shall check the Contractor's work regularly and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Engineer may instruct the Contractor to search for defects and to uncover and test any work that the Engineer considers may have a Defect

Tests:

If the Engineer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect the test shall be a Compensation Event.

Correction of Defects:

The Engineer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

Every time notice of a Defect is given; the Contractor shall correct the notified Defect within the length of time specified by the Engineer's notice.

Uncorrected Defects:

If the Contractor has not corrected a Defect within the time specified in the Engineer's notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

COST CONTROL

Changes in the Quantities:(OPTIONAL)

Change of Scope (Variations) and Procedure for change of Scope:

The Client may, require the Contractor to make modifications/alterations to the works before the issue of the completion certificate either by giving an instruction or by requesting the contractor to submit a proposal for change of scope involving additional cost or reduction in cost. Any such change of scope shall be made and valued in accordance with the provisions of this contract and the contractor, in that event, will have no further claim on the ground that had it been known / disclosed earlier he would have made such charges in other connected work in their design, construction which would have saved him some cost and given him other consequential benefits.

Change in scope may include;

- (a) Change in specifications of any item of works
- (b) omission/ deletion of any item of work from the scope of work
- (c) any additional work (such as addition of extra plinth area) which are not included in the scope of work including any additional test on completion

In the event of the Client determining that a change of scope is necessary, it shall issue notice to the contractor a notice specifying in reasonable detail the works contemplated there under ("Change in scope notice")

Upon receipt of change in scope notice, the contractor shall with due diligence, provide to the Client through the Engineer within seven days time such information as is necessary together with documentation in support of;

- (a) the impact, of any, which the change in scope is likely to have on the completion of the work
- (b) the options for implementing the proposed change of scope and the effect, if any, each on the cost and time thereof including the following details;
 - i. break down of quantities, unit rates and cost for different items of work
 - ii. proposed design for the change of scope
 - iii. proposed modifications, if any, to the construction period with updated work programmes (all

Variations shall be included in updated programmes produced by the Contractor).

Any change in scope shall be calculated on the basis of the following priority:

The total value of all change of scope of work shall not exceed 10% of total contract price for the construction work.

Payments for Change of Scope (Variations):

The Client shall assess the change in scope proposal and Contractor's quotation at the time of bidding in financial form and upon reaching an agreement; the Client shall issue the Change of Scope Order requiring the contractor to proceed with the performance thereof.

If the Contractor's quotation is unreasonable, the Client may order the Variation and make a change to the Contract Price which shall be based on Client's own forecast of the effects of the Variation on the Contractor's costs.

If the Client decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event, subject to condition that such variation shall not exceed 10% of the total contract price for the contract work.

The Contractor shall not be entitled to additional payment for costs, which could have been avoided by giving early warning.

Payment Certificates:

The Contractor shall submit to the Engineer statements of the value of the work completed.

The Engineer shall check the Contractor's statement within 15 days and certify the amount to be paid to the Contractor as per contract payment schedule after taking into account any credit or - debit for the month in question in respect of materials for the works in the relevant amounts and under conditions set forth, including adjustment of advance.

The value of work executed shall be determined by the Engineer.

The value of work executed shall comprise the value of the quantities of the items as per the BoQ and work programme attached to the contract.

The value of work executed shall include the valuation of Change in Scope (Variation) and Compensation Events, if any.

The Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

Payments:

Payments shall be adjusted for deductions for retention, other recoveries in terms of the contract and taxes at source, as applicable under the law. The Engineer shall pay the Contractor the amounts as per the items of work executed and agreed rates thereto as well as payment schedule attached to the contract.

Tax:

The rates quoted by the Contractor shall be deemed to be exclusive of the GST and inclusive of Royalty, Income Tax, Labour CESS and all other statutory taxes that the Contractor will have to pay for the performance of this Contract. The Client will perform such duties in regard to the deduction of such taxes at source as per applicable law.

Currencies:

All payments shall be made-in Indian Rupees.

Retention:

The Client shall retain from each payment due to the Contractor the proportion stated in the Contract Data until Completion of the whole of the works or settlement of final payment.

On completion of the whole of the works and issue of the completion certificate the performance security shall be repaid to the contractor. The retention amount shall be paid after the Defects Liability Period has passed and the Engineer has certified that all defects notified by the Engineer to the contractor before the end of the period have been corrected.

Liquidated Damages:

The Contractor shall pay liquidated damages to the Client at the rate as stated in the Contract Data that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestone as stated in the contract data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Client may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not relieve the contractor from his / her / their obligation to complete the works or from any other duties, obligations or responsibilities which he / she / they may have under the contract.

If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate.

Bonus Payment:

Deleted

Advance Payment:

The Client may make advance payment to the Contractor for mobilization and cash flow support of the amounts stated in the Contract Data by the date stated in the Contract Data, only against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a Bank acceptable to the Engineer in amounts and currencies equal to 110% of the advance payment.

The Advance Payment shall not be released until the camp setup, mobilisation of key personnel, equipment and labour at site.

The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. The contractor shall ensure that the Bank Guarantee remain enforceable until the advance payment has been fully repaid and accordingly renew it, from time to time, until the advance payment has been fully repaid.

If the terms of guarantee specify its expiry date, and the advance payment has not been re-paid by the date then 28 days prior to the expiry date, the contractor shall extend the validity of the guarantee until the advance payment has been fully repaid.

The advance payment shall be repaid through percentage deductions from the interim payments as follows:

Securities:

The Performance Security shall be provided to the Client no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank or surety acceptable to the Employee

The performance security shall be denominated in Indian Rupees. The Performance Security shall remain valid up to the period as defined in the Contract Data.

Cost of Repairs:

Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions including the situation as stipulated in the RFP.

FINISHING THE CONTRACT

Completion:

The Contractor shall request the Engineer to issue a Certificate of Completion of the Works and the Engineer will do so upon deciding that the Work is completed.

Taking Over:

The Client shall take over the Site and the Works within seven days of the Engineer issuing a certificate of Completion.

Final Account:

The Contractor shall supply to the Engineer a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Engineer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 30 days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer shall issue within 30 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Client shall decide on the amount payable to the Contractor and issue a payment certificate, within 30 days of receiving the Contractor's revised account.

Termination:

The Client may terminate the Contract if the other party causes a fundamental breach of the Contract.

Fundamental breaches of Contract include, but shall not be limited to the following:

- (a) the Contractor stops work for 15 days when no stoppage of work is shown on the current Programme and the stoppage has not been authorized by the Engineer;
- (b) the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (c) the Engineer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer;
- (d) the Contractor does not maintain a security which is required;
- (e) the Contractor has delayed the completion of works by the number of days for which the maximum number of liquidated damages can be paid as defined in the Contract data; and
- (f) if the Contractor, in the judgment of the Client has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.

For the purpose of this paragraph: "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution. "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition."

When either party to the Contract gives notice of a breach of contract to the Engineer for a cause other than those listed under Sub Clause 54.2 above, the Engineer shall decide whether the breach is fundamental or not.

Notwithstanding the above, the Client may terminate the Contract for convenience.

If the Contract is terminated the Contractor shall stop work immediately, make the Site safe and secure and leave the Site, as soon as reasonably possible.

Payment upon Termination:

If the-Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a certificate for the value of the work done fewer advance payments received up to the date of the issue of the certificate, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Client exceeds any payment due to the Contractor, the difference shall be a debt payable to the Client.

If the Contract is terminated at the Client's convenience, the Engineer shall issue a certificate for the value of the work done, less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law. No extra cost will be paid by the Client for expenditure towards removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works and the Contractor's costs of protecting and securing the Works.

Property:

All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Client, if the Contract is terminated because of a contractor's default.

Release from Performance:

If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Client or the Contractor, the Engineer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

ADDITIONAL CONDITIONS OF CONTRACT**1.WORK DESCRIPTION**

The work shall be strictly carried out as per the scope listed in this document and in accordance with the specifications. The equipment & material supplied at site will also be selected out of the list of approved makes. Bill of quantity provided with the document is for contractor guidance. It is expected that after award of work, contractor shall prepare shop drawings for approval by the Consultant & Client representative and also submit Technical documentation duly identifying shortlisted make of material/equipment along with its data sheets. Actual ordering shall be based on approved shop drawings & documents.

The work at site shall comply with the approved shop drawings and will meet the satisfaction of Client representative. The contractor shall be required to demonstrate satisfactory operation of entire system (including client supplied equipment installed by contractor) and furnish the required labour, material & tools to install & commission the system.

The broad scope of work for proposed HVAC system covered under this contract shall include supply, installation, testing & commissioning of the following:

Water cooled chiller (free supply)
Constant primary & Variable secondary Pumping system.
Smart Air handling units (AHU's).
FRP Cooling towers.
VFD's.
Dedicated outdoor air system including heat recovery wheel.
Mechanical ventilation systems.
Chilled, Condenser and Drain piping with associated fittings, valves etc.
Air distribution system.
Associated electrical works.
Kitchen ventilation.
Basement car parking ventilation.
Testing Adjusting & Balancing of the entire HVAC and mechanical ventilation installation.

Besides above, contractor shall also be required to undertake following:

Obtain fire approval from Local Authorities prior & post installation for operation of system by the land owner. Coordination for submission of required documents & demonstration of systems to obtain the Approval by the Contractor.
Minor civil works which include making openings in walls & slabs and making good of the same.
Commissioning of the plant including test reports to demonstrate satisfactory working prior to handing over.
Provide as-built drawings and handing over document comprising of list of recommended spares, catalogues and service schedule for each equipment/material.
Training of Client's staff.
Documents related LEED requirement

2.SITE MANAGEMENT

The Contractor shall be required to provide following staffing for the project:

Design Engineer who will work with Consultant for getting shop drawings, technical submittal and variation in quantity statement approved.

Procurement team.

Full time dedicated 1 manager (minimum 15 year experience) and Engineer (minimum 10 year experience) & one supervisor posted at site.

The contractor shall submit organization chart and CV prior to starting work at site.

The Contractor shall have required stores, tools & plant, security and facility to transport materials to place of installation for speedy execution of work.

3.REGULATIONS & PERMITS

Prior to starting work at site, the contractor shall obtain required permits/ licenses required for satisfactory execution and operation of the installation. All receipted amounts shall be reimbursed by Client on production of proof of payment by the contractor.

The executed work shall strictly confirm to applicable laws, regulations and Indian Standards which become applicable. In case the specifications and drawings contained in this document call for higher standard than those required by prevailing regulations, then these specifications & drawings shall become applicable. However, in case of any conflict or violation between the document/drawings and prevailing laws, then the applicable laws & regulations shall be governing & binding.

4.SHOP DRAWINGS

A set of design drawings listed in this document are available at Consultant office and may be issued with the tender document. These design drawings are for reference of the contractor and indicate proposed arrangement and the extent of work covered in the contract. The data given in the drawings and specifications is as exact as could be procured, but its accuracy is not guaranteed. The contractor cannot execute work or scale these drawings for reference.

Following shall be the procedure followed by contractor while preparation of shop drawings:

The contractor shall refer the design drawings for understanding the scope and proposed routes to be followed during execution.

Collate latest architectural backgrounds from the Client representative / Architect / Consultant.

Examine all related services drawings but not limited to structural, plumbing, electrical, HVAC, Interior, landscape and others including as-built works before starting the work. Any discrepancy must be report to the Client's site representative in writing and obtain approval for go-ahead.

Within one week of award of work, the Contractor shall prepare a list of shop drawing along with submission schedule for approval of Client representative/Consultant. The list of drawings must include layouts for Plant room, Pump room, Typical drawings showing exact location of supports, flanges, bends, tee connections, reducers, detailed piping drawings showing exact location and type of supports, valves, fittings etc; electrical panels inside/outside views, power and control wiring schematics, cable trays, supports and terminations.

Maximum headroom shall be maintained at all points and in case the same is inadequate, then written approval from Client representative must be obtained prior to execution at site.

These shop drawings shall depict information required to complete the Project as per specifications and as required by the Consultant/Client representative. These Drawings shall contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other contractors. Each shop drawing shall contain tabulation of all measurable items of equipment/materials/works and progressive cumulative totals from other related drawings to arrive at a variation-in-quantity statement at the completion of all shop drawings.

Where the work under this contract is proposed to be installed in close proximity or is interfering with other trades, then based on client representative/consultant directions, the contractor shall prepare all services coordinated working drawings and sections at a suitable scale (not less than 1:50), clearly showing proposed installed in relation to the work of other trades.

The contractor shall thereafter furnish 6 sets of detailed shop drawings to Client representative/Consultant for obtaining comments/approval. The Contractor will make unlimited number of re-submissions of shop drawings unless Client representative/Consultant/Architect approval is obtained.

The Contractor will thereafter submit 6 sets of final shop drawings to the Client representative for their exclusive use and all other agencies.

No material or equipment may be delivered or installed at the job site until the contractor has in his possession, the approved shop drawing for the particular material/equipment/installation.

In case installation is carried out without following above process or obtaining a waiver to follow the procedure from Client representative, the work shall be rejected and contractor shall rectify the same at their own cost.

Shop drawings shall be submitted for approval minimum four weeks in advance of planned

delivery and installation of any material to allow Client representative/Consultant ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved program.

Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the contract requirements, nor does it in any way relieve the contractor of the responsibility or requirement to furnish material and perform work as required by the contract.

5. TECHNICAL DOCUMENTATION

The contractor prior to supplying material at site, will submit the following documentation to Consultant/Client representative for approval:

Manufacturers drawings, catalogues, pamphlets and other documents in triplicate. Each item shall be properly labeled, indicating the specific services for which material or equipment is to be used, giving reference to the governing section and clause number and clearly identifying in ink the items and the operating characteristics. Data of general nature shall not be accepted.

Samples of all materials shall be submitted to the Client's site representative prior to procurement. These will be submitted in two sets for approval and retention by Client's representative and shall be kept in their site office for reference and verification till the completion of the Project. Wherever directed, a mockup or sample installation shall be carried out for approval before proceeding for further installation.

Where the contractor proposes to use an alternate make or model of equipment other than that specified, all new drawings and detailing required thereafter shall be prepared by the contractor at his own expense including any re-design required for other discipline/trade. Any delay on such account shall also be at the cost of and consequence of the Contractor.

Contractor to refer Annexure –II for list of approved makes & materials for this project.

6. VARIATION IN QUANTITY STATEMENT

After approval of major & relevant shop drawings, the contractor shall submit four copies of a comprehensive variation in quantity statement. This statement must be submitted prior to completing ordering of equipment and should identify imported/local materials in this contract as well as proposed spares/tools. The Consultant shall provide recommendation to Client representative for acceptance of anticipated variation in contract amounts and also advise Client to initiate action for procurement of spare parts and tools at the completion of project.

7. QUALITY ASSURANCE

The contractor to ensure that all materials and equipment supplied shall be new and of best available quality conforming to the relevant Indian Standard Specifications and to these specifications. Makes shall be strictly in conformity with list of approved manufacturers as per Annexure -II. Owners reserve the right to reject any item which in their assessment is second hand

Any deviations from above shall be clearly highlighted prior to supply and shall be brought to the notice of the Client representative/Consultant for further instructions in the matter.

Prior to starting execution work at site, the Contractor shall verify the sufficiency of the size of the shaft openings, clearances and ceiling spaces for proper installation. Failure to communicate insufficiency of any of the above, shall constitute Contractor acceptance of the same. The Contractor shall locate all equipment in fully accessible locations which can be easily serviced, operated or maintained. The exact location and size of access panels, required for each concealed, valve or other devices requiring attendance shall be finalized and communicated in sufficient time.

Failing this, the Contractor shall make all the necessary repairs and changes at own expense. Access panel shall be marked.

8. WORKS NOT COVERED UNDER THIS CONTRACT

Following works are excluded from the scope under this contract. These shall be executed by respective contractor in accordance with approved shop drawings where these details must be highlighted. However, contractor shall be responsible for providing details and thereafter supervision to ensure satisfactory & timely execution of these associated items as they have a bearing on this contract.

9. EXCLUDED FROM SCOPE OF WORK ASSOCIATED CIVIL WORKS

Following civil works associated with HVAC installation are excluded from the scope of this contract. These shall be executed by other agencies in accordance with approved shop drawings of and under direct supervision of the air conditioning contractor.

- i. RCC foundation for water chilling machine's pumps & centrifugal fans with angle iron frame work at the edges to protect these from damage.
- ii. RCC basin & supports & MS Joists for cooling towers.
- iii. PCC foundation blocks with angle iron frame work edging for all motor control center.
- iv. PCC foundation for pot strainers.
- v. PCC foundation blocks for all air handling units.
- vi. Air-tight fire doors with minimum one hour fire rating for plant room, AHU rooms, fan rooms and other equipment rooms.
- vii. Water proofing of floors of AHU rooms, air washer rooms and fan rooms.
- viii. Masonry drain channels and sumps with CI gratings in AC plant room including provision for sump pump and disposal.
- ix. Supply and fixing of G.I./wooden frame for mounting of grilles in masonry walls.
- x. Supply and fixing of GSS frame for mounting of grilles / diffusers in false ceiling / boxing.
- xi. Thermal insulation of terraces above air-conditioned areas exposed to sun.
- xii. Making of trenches and back filling the same after laying / pressure testing etc. of pipes.

ELECTRICAL SERVICES WORKS

All associated ELECTRICAL WORKS listed below are excluded from the scope of this contract. These shall be installed by other agencies in accordance with approved shop drawings of, and under direct supervision of the air conditioning contractor.

Providing power supply with earthing at the incoming of control panel in A/C plant room.

- ii. Providing power supply and earthing at the incoming MCCB in each air handling unit room.
- iii. Providing power and earthing at the incoming MCCB in each centrifugal fan panel and pump panel at locations called for on air conditioning Contractor's shop drawings.

iv. Providing 15 amps power outlet within 2 meter reach of each fan coil unit and VAV boxes at locations called for on air conditioning Contractor's shop drawings.

v. Providing 15 amps power outlet within 2 meter reach of each single phase propeller fan/inline fan at locations called for on air conditioning contractor's shop drawings.

vi. Providing wiring and earthing for sump pumps in air conditioning plant room.

PLUMBING SERVICES WORKS

All associated PLUMBING WORKS listed below are excluded from the scope of this contract. These shall be installed by other agencies, in accordance with approved shop drawings of, and under direct supervision, of the air conditioning contractor.

Providing soft water (Commercial hardness 0 ppm and PH 7+1) at air washers, humidifiers and at chilled water expansion tank.

Providing make up water for cooling tower as per RO water quality

iii. Disposal of condensate drain from fan coil units / ceiling suspended units beyond the condensate drain riser.

Providing sump pumps and necessary piping for drainage of air conditioning plant room and other machine rooms located below ground level.

Providing floor drains in cooling tower area and in air handling unit rooms.

Note : Preparation of shop drawings defining the Foundation details to civil contractor will be under HVAC Contractor scope of work.

10. INTEGRATION WITH BUILDING AUTOMATION SYSTEM

The scope shall include providing following for the interface to Building Automation System.

Sockets /Nipples including shut-off valve for mounting sensors/transmitters on pipe lines.

Space in electrical panel for running of LV cables.

CT of 15 VA burden with potential free taps.

Auto/manual changeover switch with potential free contact at manual position.

Installation of motorized control valves with provision of counter flanges

Installation of current transformer & Transducer along with wiring between Current Transformer & Transducer up to the terminal block

Provision for mounting BAS sensors.

15 Amps. Power supply with MCB in all AHU panels and 32 Amps MCB on HVAC plant room panel for power supply to DDC Panel.

It is to be clearly understood that the final responsibility for the sufficiency, adequacy and conformity to the contract requirements lies solely with the contractor.

11. TESTING, ADJUSTING AND BALANCING

Air and water balancing shall be carried out by the contractor through a specialist team (different than erection team) as per Specifications and ASHRAE Guidelines. Performance test shall consist of three days of 10 hour each operation of system for each season. The results for each season shall be submitted to Client representative/Consultant. The submittal shall include operational parameters marked on performance curves for each equipment along with test certificates and safety/control settings.

The installation shall be tested again after removal of defects and shall be commissioned only after approval by the Client's site representative. All tests shall be carried out in the presence of the

representatives of the Construction Manager/Architect /Consultant and Client's site representative. After commissioning, the results shall be submitted for scrutiny in quadruplicate.

All equipment installation shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Client's site representative. In case of rotating machinery sound or vibration noticeable outside the room in which it is installed, or annoyingly noticeable inside its own room, shall be considered objectionable. Such conditions shall be corrected by the Contractor at his own expense. The contractor shall guarantee that the equipment installed shall maintain the specified Noise Control levels.

12. COMPLETION CERTIFICATE

On completion of the installation, a certificate shall be furnished by the contractor, counter signed by the licensed supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local authority engineer in-charge.

The contractor shall be responsible for getting the entire installation duly approved by the local authorities Engineer in Charge concerned, and shall bear expenses if any, in connection with the same.

13. AS-BUILT DRAWINGS

Contractor shall submit following as-built drawings as and when work is completed:

6 set of hard copies of all as-built drawings duly corrected and incorporating any modifications during execution.

Two set of pen drive containing the drawings.

The drawings shall provide plant room layouts, piping layouts, location of all concealed accessories/piping, wiring diagram, control diagram, Single line diagram, control schematic with detailed bill of materials, showing makes, types & description of all components & accessories and sequencing of automatic controls and other services.

14. MAINTENANCE MANUAL

Upon completion and commissioning of works, the contractor shall submit a draft copy of comprehensive operating instructions, maintenance schedule and log sheets for all systems and equipment included in this contract. This shall be supplementary to manufacturer's operating and maintenance manuals. Upon approval of the draft, the contractor shall submit four (4) complete bound sets of typewritten operating instructions and maintenance manuals; one each for retention by Consultant and Client's site representative and two for Clients Operating Personnel. These manuals shall also include basis of design, detailed technical data for each piece of equipment as installed, spare parts manual and recommended spares for 4 year period of maintenance of each equipment. The manuals shall include:

- i. Description of the work carried out / installed.
- ii. Operating instructions.
- iii. Maintenance instructions including procedures for preventive maintenance.
- iv. Manufacturers catalogues.
- v. Spare parts list.
- vi. Trouble shooting charts.
- vii. Drawings
- viii. Type and routine test certificates of major items.

Details of all the bought out item should be part of this maintenance manual.

15. ON SITE TRAINING

Upon completion of all work and all tests, the Contractor shall furnish necessary operators, labor

and helpers for operating the entire installation for such periods so as to enable the Client's staff to get acquainted with the operation of the system. During this period, the contractor shall train the Client's personnel in the operation, adjustment and maintenance of all equipment installed.

16. DEFECTS LIABILITY PERIOD

Complaints

The Contractor shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 10 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.

Repairs

All equipment that requires repairing shall be immediately serviced and repaired. Since the period of Mechanical Maintenance runs concurrently with the defects liability period, all replacement parts and labour shall be supplied promptly free-of-charge to the Client.

17. UPTIME GUARANTEE

The contractor shall guarantee for the installed system an uptime of 98%. In case of shortfall in any month during the defects liability period, the Defects Liability period shall get extended by a month for every month having shortfall and no reimbursement shall be made for the extended period.

18. OPERATION & MAINTENANCE CONTRACT

Contractor may be required to carry out the operation of the installation during and after the defects liability period. Further, it may also be required to carry out all-inclusive maintenance of the entire system for a period of four years beyond the defects liability period.

Operation Contract:

It will involve round the clock operation for 24 hours a day wherein work will include but not limited to operation of installation, maintaining log books, complain register and summary of operation.

The terms of payment shall be monthly at the end of each month on pro-rata basis.

All Inclusive Maintenance Contract:

The work will involve routine preventive maintenance with monthly status report. Entire installation shall be painted every two years. 98% uptime of all systems is expected under this contract wherein up time shall be assessed every month and in case of shortfall during any month the contract shall be extended by a month. No reimbursement shall be payable for the extended period.

Adequate number of persons to the satisfaction of the Client representative shall be provided including relievers wherein statutory compliances such as of EPF, ESIC and other applicable labour legislations shall be to contractor account. No overtime shall be payable. Routine shut downs shall be permitted with prior permission of the Owner.

Payment shall be Quarterly at the beginning of each quarter on pro-rata basis.

19 BIM Implementation

It is expected that Contractor, if required shall prepare all shop drawings in latest version of Revit

only and coordinate with other contractors to provide a clash free model. Thereafter, all shop drawings shall be provided in PDF, 2D CAD plans and critical sections in 3D. The drawings shall be submitted in hard copy in A0/A1 size at 1:100 scale including all annotations, heights, bottom of duct/pipe/tray etc complete in all respect as required.

20. GREEN BUILDING COMPLIANCE

Actions required by Contractor:

Contractor will provide full support in complying to Green Building requirements for the desired level of Green Building Rating in the project.

Contractor shall implement the recommendations provided by Green Building Consultant and provide support during the site inspections.

Contractor shall provide respective documentation including but not limited to specification sheets, manufacturer cutsheets, Test Certificates, Brochures, purchase records, manufacturer declarations, calculations, site photographs, commissioning reports.

Contractor is encouraged to designate an individual in their existing team who will be responsible for regular coordination with respective site people to ensure implementation of required green building measures and ultimately provide the required documentation for aspired Green Building Rating.

In case of any deviations in implementing recommended green building measures and/ or using specified material/ equipment/ system, contractor will have to inform Owners/ Services Consultant/ Green Building Consultant/ Architect as applicable for their formal approval.

In case of any additional requirement to comply with Green Building rating as identified during construction/ installation/ commissioning based on the actual site conditions/ construction activities, Contractor shall implement

21 PERFORMANCE GUARANTEE

The contractor shall carry out the work in accordance with the Approved shop drawings, Specifications, Schedule of Quantities and other documents forming part of the Contract. Contractor shall carry out heat load calculation, Ventilation calculation & Smoke calculation & submit the same for client / consultants approvals. The contractor shall be fully responsible for the performance of the selected equipment (installed by him) at the specified parameters and for the efficiency of the installation to deliver the required end result.

The contractor shall guarantee that the HVAC system as installed shall maintain the inside conditions in the air-conditioned spaces as described under “Basis of Design” in the specifications.

Complete set of architectural drawings is available in the Architect/Consultant’s office and reference may be made to same for any details or information. The contractor shall also guarantee that the performance of various equipment individually, shall not be less than the quoted capacity; also actual power consumption shall not exceed the quoted rating, during testing and commissioning, handing over and guarantee period.

LABOUR:

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Engineer may require.

COMPLIANCE WITH LABOUR REGULATIONS:

During continuance of the contract, the Contractor and his sub-contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to the construction industry are given below. The Contractor shall keep the Client indemnified in case any action is taken against the Client by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Client is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer/Client shall have the right to deduct any money due to the Contractor including his amount of performance security. The Client/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Client.

The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Client at any point of time.

SPECIAL CONDITIONS OF CONTRACT

SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK.

- a) **Workmen Compensation Act 1923:** - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- b) **Payment of Gratuity Act 1972:** Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more or on death the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.

- c) Employees P.F. and Miscellaneous Provision Act 1952: - The Act Provides for monthly contributions by the Client plus workers @ 10% or 8.33%. The benefits payable under the Act are:
 - (i) Pension or family pension on retirement or death, as the case may be.
 - (ii) Deposit linked insurance on the death in harness of the worker.
 - (iii) Payment of P.F. accumulation on retirement/death etc.
- d) Maternity Benefit Act 1951: -The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- e) Contract Labour (Regulation & Abolition) Act 1970: - The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Client by Law. The Principal Client is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Client if they employ 20 or more contract labour.
- f) The Code on Wages, 2019: This code consolidates the Laws relating to Wages and Bonus and matters connected therewith or incidental thereto.
- g) Industrial Disputes Act 1947: - The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- h) Industrial Employment (Standing Orders) Act 1946: - It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Client on matters provided in the Act and get the same certified by the designated Authority.
- i) Trade Unions Act 1926: - The Act lays down the procedure for registration of trade unions of workmen and Clients. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.
- j) Child Labour (Prohibition & Regulation) Act 1986: - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.

- k) Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act 1979: - The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter- State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home up to the establishment and back, etc.

- l) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: - All the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Client of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as Canteens, First-Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Client to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

- m) Factories Act 1948: -The Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

SPECIAL CONDITIONS

1.It must be understood that the work has to be completed as per the time provided in the contract and as such time is the essence of the contract.

2.The quantities furnished in the bills of quantities are only probable quantities liable to alternation by omission, deduction or addition, and it would be clearly understood that the contract is not a lump sum contract and the SWOSTI PREMIUM LTD do not, in any way, assure the tenderer or guarantee that the said probable quantities are correct or that the work would correspond thereto. Payments will be regulated on the actual quantities of work authorizedly done and measured at the accepted rates. No claims due to change in quantities (+ or -) will be entertained. The drawings, forming parts of complementary installations work specifications and the bills of quantities, of the contract, are explanatory of and are to one another, representing together the works / to be carried out. If neither the drawings nor the specifications nor the accepted bills of quantities include any part/parts the intention to include which is nevertheless clearly inferred and which are obviously necessary for the proper completion of the works/ installations, all such parts shall be supplied and executed by the contractor at no extra charge. Anything contained in one or another of (a) the drawings, (b) the specifications and (c) the accepted bills of quantities and not found in the others will be equally binding as if it were contained in each of them.

3.No alterations, that might have been made by the tenderer in the drawings, specifications, conditions or probable quantities accompanying this notice will be recognized and if any such alterations are made the tender, will be invalid. Conditional tenders will however be liable for rejection.

4.The tenderer must obtain for himself on his own responsibility and at his own expense all the information necessary, including risks, contingencies and other circumstances to enable him to make a proper tender and to enter into a contract with the SWOSTI PREMIUM LTD . He must examine the drawings, specifications, conditions and so on and must inspect the site of work, examine the nature of the ground and the subsoil (so far as is practicable) and acquaint himself with local conditions, means of access to the work, storage facilities or areas for staff colony, the nature of the work, in fact all matters pertaining thereto before he submits his tender.

5.The tender accepted shall not be entitled to make any claim for increase in the rates quoted and accepted excepting in pursuance of any specific provision in the contract.

6.Only approved agencies/ skilled workers shall be deployed to carry out requisite specialized items of work. The Officer/ Engineer in charge's decision in consultation with Architect's/ in this regard shall be binding to all the parties concerned.

7. The rates shall be firm and not be subject to any variations in exchange rates, in taxes, duties etc. in railway freight and the like including labour conditions, etc. The rates are not subject to escalation.

8.It will be the sole responsibility of the contractor to procure all the equipments/ materials and other materials required for the work.

9.The SWOSTI PREMIUM LTD further reserves the right to delete or reduce at any time, any section of the bills of quantities with out assigning any reasons whatsoever there for and no claim will be entertained in this regard.

10.The tenderer whose tender is accepted is bound to execute formal agreement with the SWOSTI PREMIUM LTD within one week of the date of intimation of award of work in

accordance with the draft agreement which will include conditions of tender, form of tender (general conditions of contract & Special Condition of Contract), Articles of Agreement, Bills of quantities, Conditions of contract, Special conditions if any, the drawings and specifications, but his liability under the contract shall commence from the date of written order to commence work whether the formal agreement is drawn or not.

The Contractor shall bear all expenses in connection with the execution of the said agreement including fees for stamping and registration of documents as required.

11. The Security Deposit will bear no interest whatsoever until the date of release.

12.

(a) The contractor, upon award of work, shall submit a memorandum of procedure giving the outline of his general scheme, programme and time table, in the form of a chart that shall be scrutinized and approved (with modifications as necessary), which shall become the approved programme for execution. The approved programme shall be the basis for assessment of comparative progress under the relevant conditions of contract.

(b). Over and above, the contractor has to supply programme chalked out showing important milestones to be achieved and the progress actually achieved compared with, the target of the same in the programme and shortfall, if any planned for being made up in the programme for next month.

13. The work in general shall conform to the Specifications provided.

(a) In case items not covered by the general specifications referred above, reference shall be made to the appropriate I.S. Code.

(b) Should there be any difference in the particular specifications of individual item of work and the description of item as given in the Schedule of quantity, the latter shall prevail, which will be as per the relevant drawing.

(c) In case of any work for which there is no specification in I.S. specifications or in the specifications forming part of tender documents or in case there is any variation, such work shall be carried out in all respects in accordance with the instructions to be issued by the Engineer in charge.

14. The work of any part of it shall not be transferred, assigned or sublet without the written consent of the SWOSTI PREMIUM LTD .

15. The Contractor shall be required to co-operate and work in co-ordination with and afford reasonable facilities for such other agencies / specialists / interior designers/ consultants as may be employed by the Architects / Project Management Consultant/ Officer in Charge on other works / sub-works in connection with the project/scheme of which this work forms a part.

16. The Contractor shall get the necessary insurance done for their personal employed/ Swosti Premium Ltd third party insurance in name of G.M(B D), Swosti Premium Ltd and for all other risk insurance or any other insurance as required.

17. The Contractor shall make arrangements of carrying water and electricity .

18. The Contractor is required to comply with all Acts of Government relating to labour, safety, environment and other Rules and Regulations made there under from time to time

and to submit at the proper times all particulars and statements required to be furnished to the appropriate Authorities.

19. Contractor shall not in any way interrupt or do any act, matter or thing to prevent or hinder such other Contractor or other person or persons employed for completing and finishing or using the materials and plant for the Work. When the Work shall be completed or as soon thereafter as convenient the Architect shall give a notice in writing to the Contractor to remove his surplus materials and plant, and should the Contractor fail to do so within a period of 14 days after receipt thereof by him, Owner shall sell the same, and shall give credit to the Contractor for the amount realized. The Architect shall thereafter ascertain and certify in writing what (if anything) shall be due or payable to or by the Owner for the value of the said plant and materials so taken possession of by the Owner and the expense or loss which the Owner shall have been put to in procuring the works to be completed, and the amount, if any, owing to the Contractor and the amount which shall be so certified shall thereupon be paid by the Owner to the Contractor or by the Contractor to the Owner, as the case may be, and the certificate of the Architect shall be final and conclusive between the parties.

20. If at any time after the commencement of the work the Owner shall for any reason whatsoever not require the whole thereof, as specified in the tender, to be carried out, but need to abridge the Contract, the Owner shall give notice in writing of the fact to the Contractor who shall have no claim to any payment or compensation which he might have derived from the execution of the work in full, but which he did not derive in consequence of the whole amount of the work not having been carried out. The Contractor shall in this case, however, be entitled to payment for the work already executed by him in accordance with the agreed rates. The Owner shall also take over all building materials as might have been ordered for the work, but orders for which cannot be canceled, if delivered within a reasonable time, and shall pay for them at cost price. The Contractor shall also be allowed to remove his tools and plants from the site.

Contractor Responsibility Matrix

Work Element / Activity	Contractor	Client (Swosti)	PMC (You)	Architect / Consultants
1. Mobilisation & Site Establishment	R	A	C	-
2. Setting Out and Site Survey	R	C	C	C
3. Site Safety & Housekeeping	R	C	C	-
4. Approvals from Local Authorities (as applicable)	C	A	R	C
5. Scaffolding, Centering, and Shuttering	R	I	C	-
6. Quality Control & Testing	R	I	C	C
7. Coordination with MEP teams	C	I	C	C
8. Materials Procurement (Cement, Steel, Bricks, etc.)	R	I	C	-
9. Submission of Progress Reports & MIS	R	I	A	-
10. Adherence to Timeline / Work Schedule	R	I	C	-
11. Rectification of Defects During DLP	R	A	C	-
11. Final Handover & Completion Report	R	A	C	-

Legend:

- **R = Responsible** – Main executor.
- **A = Accountable** – Final decision-maker or owner.
- **C = Consultative** – Provides input and coordination.
- **I = Informed** – Kept in the loop, but not involved in execution.

Management Meetings

- Either the Engineer or the Contractor may call for a management meeting.
- These meetings are held to review progress plans and handle issues flagged under the early warning system.
- The Engineer shall record meeting proceedings and circulate to attendees and the Client.
- Action items shall be assigned and communicated in writing.

Quality Control

- The Engineer shall regularly inspect the Contractor's work and identify any defects. Instructions may be issued to uncover or test work suspected to be defective.
- **Tests** If the Engineer instructs tests not specified in the specifications, and the work is found defective, the Contractor shall bear the cost of tests. If no defect is found, it will be treated as a Compensation Event.

Payments & Liquidated Damages Payments

- Payments shall be adjusted for deductions for retention, other recoveries in terms of the contract and taxes at source, as applicable under the law.
- The Engineer shall pay the Contractor the amounts as per the payment schedule attached to the contract.

Retention

- The performance security obtained at the time of signing of contract shall be retained till successful conclusion of project completion and issue of completion certificate.
- The Client shall retain from each payment due to the Contractor the proportion stated in the Contract Data until Completion of the whole of the works or settlement of final payment.
- On completion of the whole of the works half the total amount retained is repaid to the contractor and half when the Defects Liability Period has passed, and the Engineer has certified that all defects notified by the Engineer to the contractor before the end of the period have been corrected.

Milestone

Milestone No.	To be Achieved	Timeline
Milestone 1-	60 % of value of contract	Upto 120 Days
Milestone 2-	100 % of value of contract	Upto 180 Days

Liquidated Damages

- The Contractor shall pay liquidated damages to the Client at the rate 0.2%/day on the value of balance work beyond stipulated date of completion as per following milestones of execution subject to a maximum of 10% of contract value.
 - a) Up to end of 120 days of signing of contract – 60 % of value of contract
 - b) Up to end of 180 days of signing of contract –100 % of value of contract