

Specific Procurement Notice – Request for Bids (RFB)

March, 2019

**PROJECT NAME: SETTING UP OF 42.0 KLD FAECAL
SLUDGE TREATMENT PLANT (FSTP) FOR CITY OF PORT
BLAIR, ANDAMAN & NICOBAR**



Standard Procurement Document

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PART 1 – Bidding Procedures

Section I - Instructions to Bidders

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Section I - Instructions to Bidders

A. General	
1. Scope of Bid	<p>1.1 In connection with the Specific Procurement Notice – Request for Bids (RFB), specified in the Bid Data Sheet (BDS), the Employer, as specified in the BDS, issues this bidding document for the provision of Works as specified in Section VII, Works’ Requirements. The name, identification, of this RFB are specified in the BDS.</p>
	<p>1.2 Throughout this bidding document:</p> <ul style="list-style-type: none"> (a) the term “in writing” means communicated in written form (e.g. by mail, e-mail, fax, including if specified in the BDS, distributed or received through electronic-procurement system used by the Employer) with proof of receipt; (b) if the context so requires, “singular” means “plural’ and vice versa; and (c) “Day” means calendar day, unless otherwise specified as a “Business Day.” A Business Day is any day that is a working day of the Employer. It excludes the Employer’s official public holidays.
2. Source of Funds	<p>2.1 Source of Fund is from Smart City Mission funds by Ministry of Urban Development (Government of India), available as ULBs share of equity capital in SPV.</p>
3. Fraud and Corruption	<p>3.1 The Employer requires compliance with the Employer’s Anti-Corruption Guidelines and shall not be debarred/blacklisted by Central Government / State Government / Central PSU/ State PSU or any other Autonomous Organisation in India and Funding Agencies, as set forth in Section VI.</p> <p>3.2 In further pursuance of this policy, Bidders shall permit and shall cause their agents (where declared or not), subcontractors, sub-consultants, service providers, suppliers, and their personnel, to permit the Employer to inspect all accounts, records and other documents relating to any initial selection process, prequalification process, bid submission, proposal submission, and contract performance (in the case of</p>



	award), and to have them audited by auditors appointed by the Employer.
4. Eligible Bidders	<p>4.1 A Bidder may be a firm that is a private entity, or a state-owned enterprise or institution —subject to ITB 4— or any combination of them in the form of a joint venture (JV), under an existing agreement, or with the intent to enter into such an agreement supported by a letter of intent. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the entire Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the Bidding process and, in the event the JV is awarded the Contract, during contract execution. Unless specified in the BDS, there is no limit on the number of members in a JV.</p>
	<p>4.2 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this Bidding process, if the Bidder:</p> <ul style="list-style-type: none">(a) directly or indirectly controls, is controlled by or is under common control with another Bidder; or(b) receives or has received any direct or indirect subsidy from another Bidder; or(c) has the same legal representative as another Bidder; or(d) has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the Bid of another Bidder, or influence the decisions of the Employer regarding this Bidding process; or(e) or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the Bid; or(f) or any of its affiliates has been hired (or is proposed to be hired) by the Employer as Project Manager for the Contract implementation;(g) would be providing goods, works, or non-consulting services resulting from or directly related to consulting

	<p>services for the preparation or implementation of the project specified in the BDS 2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; or</p> <p>(h) has a close business or family relationship with a professional staff of the Employer (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding document or specifications of the contract, and/or the Bid evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Employer throughout the procurement process and execution of the contract.</p>
	<p>4.3 A firm that is a Bidder shall not participate in more than one Bid, except for permitted alternative Bids. This includes participation as a subcontractor in other Bids. Such participation shall result in the disqualification of all Bids in which the firm is involved. A firm that is not a Bidder may participate as a subcontractor in more than one Bid.</p>
	<p>4.4 A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed subcontractors or sub-consultants for any part of the Contract including related Services.</p>
	<p>4.5 Bidders that are state-owned enterprises or institutions in the Employer’s Country may be eligible to compete and be awarded a Contract(s) only if they can establish, in a manner acceptable to the Employer, that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not under supervision of the Employer unless</p>

	approved by the Employer.
	4.6 A Bidder shall provide such documentary evidence of eligibility satisfactory to the Employer, as the Employer shall reasonably request.
	4.7 A Bidder shall not be been Debarred / Black Listed / termination of contract except for reasons of convenience of Employer by any Government/ Government Board/ Corporation/ company/ Statutory Body/ PSU company / Government of any sovereign countries/ and funding Agencies as on date of submission.
5. Eligible Materials, Equipment and Services	5.1 The materials, equipment and services to be supplied under the Contract may have their origin in any country subject to the restrictions specified in Section V, Eligible Countries, and all expenditures under the Contract will not contravene such restrictions. At the Employer’s request, Bidders may be required to provide evidence of the origin of materials, equipment and services.
B. Contents of Bidding Document	
6. Sections of Bidding Document	<p>6.1 The bidding document consist of Parts 1, 2, and 3, which include all the sections specified below, and which should be read in conjunction with any Addenda issued in accordance with ITB 8.</p> <p>PART 1 Bidding Procedures</p> <ul style="list-style-type: none"> • Section I - Instructions to Bidders (ITB) • Section II - Bid Data Sheet (BDS) • Section III - Evaluation and Qualification Criteria • Section IV - Bidding Forms • Section V - Eligible Countries • Section VI - Fraud and Corruption <p>PART 2 Works’ Requirements</p> <ul style="list-style-type: none"> • Section VII – Works’ Requirements <p>PART 3 Conditions of Contract and Contract Forms</p> <ul style="list-style-type: none"> • Section VIII - General Conditions of Contract • Section IX - Particular Conditions of Contract • Section X - Contract Forms

	<p>6.2 Unless obtained directly from the Employer, the Employer is not responsible for the completeness of the bidding document, responses to requests for clarification, the minutes of the pre-Bid meeting (if any), or Addenda to the bidding document in accordance with ITB 8. In case of any contradiction, documents obtained directly from the Employer shall prevail.</p>
	<p>6.3 The Bidder is expected to examine all instructions, forms, terms, and specifications in the bidding document and to furnish with its Bid all information and documentation as is required by the bidding document.</p>
<p>7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting</p>	<p>7.1 A Bidder requiring any clarification of the bidding document shall contact the <i>Employer</i> in writing at the <i>Employer's</i> address specified in the BDS or raise its inquiries during the pre-Bid meeting if provided for in accordance with ITB 7.4. The <i>Employer</i> will respond in writing to any request for clarification, provided that such request is received prior to the deadline for submission of Bids within a period specified in the BDS. The <i>Employer</i> may forward copies of its response to all Bidders who have acquired the bidding document in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. If so specified in the BDS, the Employer shall also promptly publish its response at the web page identified in the BDS. Should the clarification result in changes to the essential elements of the bidding document, the Employer shall amend the bidding document following the procedure under ITB 8 and ITB 22.2.</p>
	<p>7.2 The Bidder is advised to visit and examine the Site of works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.</p>
	<p>7.3 "The Bidder and/or any of his authorised representatives or agents will be granted access by the Employer to enter upon its premises and lands for the purpose of such visit, upon the express condition that the Bidder ensures complete safety of his authorised personnel, and agents and holds complete responsibility against all liabilities whatsoever and release and indemnify the Employer and his personnel and agents from and against all such liabilities whatsoever. The liabilities</p>

	including (but not limited to) costs incurred as a result of the inspection, any other loss or damage to personal belongings / property, personnel injury (amounting upto fatality) in respect thereof".
	7.4 If so specified in the BDS , the Bidder's authorised representative is invited to attend a pre-Bid meeting and/or a Site of works visit. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised until that stage.
	7.5 The Bidder is requested, to submit any questions in writing, to reach the <i>Employer</i> not later than one week before the pre-Bid meeting.
	7.6 Minutes of the pre-Bid meeting, if applicable, including the text of the questions asked by Bidders, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the bidding document in accordance with ITB 6.3. If so specified in the BDS , the Employer shall also promptly publish the Minutes of the pre-Bid meeting at the web page identified in the BDS . Any modification to the bidding document that may become necessary as a result of the pre-Bid meeting shall be made by the <i>Employer</i> exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-Bid meeting. Nonattendance at the pre-Bid meeting will not be a cause for disqualification of a Bidder.
8. Amendment of Bidding Document	8.1 At any time prior to the deadline for submission of Bids, the <i>Employer</i> may amend the bidding document by issuing addenda.
	8.2 Any addendum issued shall be part of the bidding document and shall be communicated in writing to all who have obtained the bidding document from the Employer in accordance with ITB 6.3. The Employer shall also promptly publish the addendum on the Employer's web page in accordance with ITB 7.1.

	<p>8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their Bids, the Employer may, at its discretion, extend the deadline for the submission of Bids, pursuant to ITB 22.2.</p>
<p>C. Preparation of Bids</p>	
<p>9. Cost of Bidding</p>	<p>9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the <i>Employer</i> shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the Bidding process.</p>
<p>10. Language of Bid</p>	<p>10.1 The Bid, as well as all correspondence and documents relating to the Bid exchanged by the Bidder and the <i>Employer</i>, shall be written in the language specified in the BDS. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the BDS, in which case, for purposes of interpretation of the Bid, such translation shall govern.</p>
<p>11. Documents Comprising the Bid</p>	<p>11.1 The Bid shall comprise two Parts, namely the Technical Part and the Financial Part. These two Parts shall be submitted simultaneously in two separate sealed envelopes (two-envelope Bidding process). One envelope shall contain only information relating to the Technical Part and the other, only information relating to the Financial Part. These two envelopes shall be enclosed in a separate sealed outer envelope marked “ORIGINAL BID”.</p> <p>11.2 The Technical Part shall contain the following:</p> <ul style="list-style-type: none"> (a) Letter of Bid – Technical Part, prepared in accordance with ITB 12; (b) Bid Security, in accordance with ITB 19.1; (c) Authorization: written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.3; (d) Bidder’s Eligibility: documentary evidence in accordance with ITB 17.1 establishing the Bidder’s eligibility to Bid;

	<p>(e) Qualifications: documentary evidence in accordance with ITB 17.2 establishing the Bidder’s qualifications to perform the Contract if its Bid is accepted;</p> <p>(f) Conformity: a technical proposal in accordance with ITB 16;</p> <p>(g) any other document required in the BDS.</p> <p>(h) Similar work performed.</p> <p>11.3 The Financial Part shall contain the following:</p> <p>(a) Letter of Bid – Financial Part: prepared in accordance with ITB 12 and ITB 14;</p> <p>(b) any other document required in the BDS.</p> <p>11.4 The Technical Part shall not include any information related to the Bid price. Where material financial information related to the Bid price is contained in the Technical Part the Bid shall be declared non-responsive and rejected.</p> <p>11.5 In addition to the requirements under ITB 11.2, Bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all members. Alternatively, a letter of intent to execute a Joint Venture Agreement in the event of a successful Bid shall be signed by all members and submitted with the Bid, together with a copy of the proposed Agreement.</p> <p>11.6 The Bidder shall furnish in the Letter of Bid – Financial Part information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Bid.</p>
<p>12. Letters of Bid and Schedules</p>	<p>12.1 The Letter of Bid – Technical Part, Letter of Bid – Financial Part shall be prepared using the relevant forms furnished in Section IV, Bidding Forms. The forms must be completed without any alterations to the text, and no substitutes shall be accepted except as provided under ITB 20.3. All blank spaces shall be filled in with the information requested.</p>
<p>13. Alternative Bids</p>	<p>13.1 Unless otherwise specified in the BDS, alternative Bids shall not be considered.</p>
	<p>13.2 When alternative times for completion are explicitly invited, a statement to that effect will be included in the BDS, and the method of evaluating different alternative times for</p>

	completion will be described in Section III, Evaluation and Qualification Criteria.
	13.3 Except as provided under ITB 13.4 below, Bidders wishing to offer technical alternatives to the requirements of the bidding document must first price the Employer’s design as described in the bidding document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the Bidder with the Most Advantageous Bid conforming to the basic technical requirements shall be considered by the Employer.
	13.4 When specified in the BDS , Bidders are permitted to submit alternative technical solutions for specified parts of the Works. Such parts will be identified in the BDS and described in Section VII, <i>Works’ Requirements</i> . The method for their evaluation will be stipulated in Section III, Evaluation and Qualification Criteria.
14. Bid Prices and Discounts	14.1 The prices and discounts quoted by the Bidder in the Letter of Bid – Financial Part and in the Priced Activity Schedule or Bill of Quantities shall conform to the requirements specified below.
	14.2 The Bidder shall submit a Bid for the whole of the Works described in ITB 1.1 by filling in prices for all items of the Works, as identified in Section IV, Bidding Forms. In case of admeasurement contracts, the Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.
	14.3 The price to be quoted in the Letter of Bid – Financial Part, in accordance with ITB 12.1, shall be the total price of the Bid, excluding any discounts offered.
	14.4 The Bidder shall quote any discounts and indicate the methodology for their application in the Letter of Bid - Financial Part, in accordance with ITB 12.1.

	<p>14.5 Unless otherwise provided in the BDS, and the Conditions of Contract, the prices quoted by the Bidder shall be fixed. If the prices quoted by the Bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract, the Bidder shall furnish the indices and weightages for the price adjustment formulae in the Schedule of Adjustment Data in Section IV- Bidding Forms and the Employer may require the Bidder to justify its proposed indices and weightings.</p> <p>14.6 If so specified in ITB 1.1, Bids are invited for individual contracts. Bidders wishing to offer discounts for the award of more than one Contract shall specify in their Bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Discounts shall be submitted in accordance with ITB 14.4, provided the Bids for all contracts are opened at the same time.</p>
	<p>14.7 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 28 days prior to the deadline for submission of Bids, shall be included in the rates and prices and the total Bid price submitted by the Bidder.</p>
<p>15. Currencies of Bid and Payment</p>	<p>15.1 The currency(ies) of the Bid and the currency(ies) of payments shall be the same and shall be as specified in the BDS.</p>
	<p>15.2 Bidders may be required by the Employer to justify, to the Employer's satisfaction, their local and foreign currency requirements, and to substantiate that the amounts included in the unit rates and prices and shown in the Schedule of Adjustment Data are reasonable, in which case a detailed breakdown of the foreign currency requirements shall be provided by Bidders.</p>
<p>16. Documents Comprising the Technical Proposal</p>	<p>16.1 The Bidder shall furnish a technical proposal in the Technical Part of the Bid including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section IV, Bidding Forms, in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work's requirements and the completion time.</p>
<p>17. Documents Establishing the</p>	<p>17.1 To establish Bidder's eligibility in accordance with ITB 4, Bidders shall complete the Letter of Bid, – Technical Part,</p>

<p>Eligibility and Qualifications of the Bidder</p>	<p>included in Section IV, Bidding Forms.</p> <p>17.2 In accordance with Section III, Evaluation and Qualification Criteria, to establish its qualifications to perform the Contract, the Bidder shall provide the information requested in the corresponding information sheets included in Section IV, Bidding Forms.</p>
	<p>17.3 If a margin of preference applies as specified in accordance with ITB 38.1, domestic Bidders, individually or in joint ventures, applying for eligibility for domestic preference shall supply all information required to satisfy the criteria for eligibility specified in accordance with ITB 38.1.</p>
<p>18. Period of Validity of Bids</p>	<p>18.1 Bids shall remain valid for the Bid Validity period specified in the BDS. The Bid Validity period starts from the date fixed for the Bid submission deadline (as prescribed by the Employer in accordance with ITB 22.1). A Bid valid for a shorter period shall be rejected by the Employer as nonresponsive.</p>
	<p>18.2 In exceptional circumstances, prior to the expiration of the Bid validity period, the Employer may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If a Bid Security is requested in accordance with ITB 19, it shall also be extended for twenty-eight (28) days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its Bid Security. A Bidder granting the request shall not be required or permitted to modify its Bid, except as provided in ITB 18.3.</p>
	<p>18.3 If the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial Bid validity period, the Contract price shall be determined as follows:</p> <p>(a) in the case of fixed price contracts, the Contract price shall be the Bid price adjusted by the factor specified in the BDS;</p>
	<p>(b) in the case of adjustable price contracts, no adjustment shall be made; or</p>
	<p>(c) in any case, Bid evaluation shall be based on the Bid price without taking into consideration the applicable correction from those indicated above.</p>

<p>19. Bid Security</p>	<p>19.1 The Bidder shall furnish as part of its Technical Part of its Bid, either a Bid-Securing Declaration or a Bid Security as specified in the BDS, in original form and, in the case of a Bid security, in the amount and currency specified in the BDS.</p>
	<p>19.2 A Bid-Securing Declaration shall use the form included in Section IV, Bidding Forms.</p>
	<p>19.3 <i>If a Bid Security is specified pursuant to ITB 19.1</i>, the Bid Security shall be a demand guarantee, and in any of the following forms at the Bidder’s option:</p> <p>(a) Transfer through Demand Draft or any other format as prescribed in this RFP</p>
	<p>19.4 If a Bid Security or Bid-Securing Declaration is specified pursuant to ITB 19.1, any Bid not accompanied by a substantially responsive Bid Security or Bid-Securing Declaration shall be rejected by the Employer as non-responsive.</p>
	<p>19.5 If a Bid Security is specified pursuant to ITB 19.1, the Bid Security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder’s signing the Contract and furnishing the Performance Security.</p>
	<p>19.6 The Bid Security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required Performance Security and.</p>
	<p>19.7 The Bid Security may be forfeited or the Bid-Securing Declaration executed:</p> <p>(a) if a Bidder withdraws its Bid during the period of Bid validity specified by the Bidder on the Letter of Bid – Technical Part and repeated in the Letter of Bid – Financial Part or any extension thereto provided by the Bidder; or</p> <p>(b) if the successful Bidder fails to:</p> <p>(i) sign the Contract in accordance with ITB 49; and/or</p> <p>(ii) furnish a Performance Security.</p>

	<p>19.8 The Bid Security or the Bid-Securing Declaration of a <i>JV</i> shall be in the name of the <i>JV</i> that submits the Bid. If the <i>JV</i> has not been constituted into a legally enforceable <i>JV</i>, at the time of Bidding, the Bid Security or the Bid-Securing Declaration shall be in the names of all future members as named in the letter of intent mentioned in ITB 4.1 and ITB 11.5.</p>
	<p>19.9 If a Bid Security is not required in the BDS, pursuant to ITB 19.1, and:</p> <ul style="list-style-type: none"> (a) if a Bidder withdraws its Bid during the period of Bid validity specified by the Bidder in the Letters of Bid; or (b) if the successful Bidder fails to: sign the Contract in accordance with ITB 49; or furnish a Performance Security; <p>the Employer may, if provided for in the BDS, declare the Bidder ineligible to be awarded a contract by the Employer for a period of time as stated in the BDS.</p>
<p>20. Format and Signing of Bid</p>	<p>20.1 The Bidder shall prepare one original of the documents comprising the bid as described in ITB 11 and clearly mark it “ORIGINAL”. Alternative bids, if permitted in accordance with ITB 13, shall be clearly marked “ALTERNATIVE”. In addition, the Bidder shall submit copies of the bid in the number specified in the BDS, and clearly mark each of them “COPY.” In the event of any discrepancy between the original and the copies, the original shall prevail.</p>
	<p>20.2 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the BDS and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid where entries or amendments have been made shall be signed or initialled by the person signing the bid.</p>
	<p>20.3 In case the Bidder is a <i>JV</i>, the Bid shall be signed by an authorized representative of the <i>JV</i> on behalf of the <i>JV</i>, and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized</p>

	<p>representatives.</p> <p>20.4 Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialled by the person signing the bid.</p>
<p>D. Submission of Bids</p>	
<p>21. Sealing and Marking of Bids</p>	<p>21.1 The Bidder shall enclose the original and all copies of the bid, including alternative bids, if permitted in accordance with ITB 13, in separate sealed envelopes, duly marking the envelopes as “ORIGINAL”, “ALTERNATIVE” and “COPY.” These envelopes containing the original and the copies shall then be enclosed in one single envelope.</p>
	<p>21.2 The inner and outer envelopes shall:</p> <ul style="list-style-type: none"> (a) bear the name and address of the Bidder; (b) be addressed to the Employer as provided in the BDS pursuant to ITB 22.1; (c) bear the specific identification of this bidding process specified in accordance with BDS 1.1; and (d) bear a warning not to open before the time and date for bid opening.
	<p>21.3 If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the bid.</p>
<p>22. Deadline for Submission of Bids</p>	<p>22.1 Bids must be received by the <i>Employer</i> at the address and no later than the date and time specified in the BDS. When so specified in the BDS, Bidders shall have the option of submitting their Bids electronically. Bidders submitting Bids electronically shall follow the electronic Bid submission procedures specified in the BDS.</p>
	<p>22.2 The <i>Employer</i> may, at its discretion, extend the deadline for the submission of Bids by amending the bidding document in accordance with ITB 8, in which case all rights and obligations of the <i>Employer</i> and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.</p>



23. Late Bids	23.1 The <i>Employer</i> shall not consider any Bid that arrives after the deadline for submission of Bids, in accordance with ITB 22. Any Bid received by the <i>Employer</i> after the deadline for submission of Bids shall be declared late, rejected, and returned unopened to the Bidder.
24. Withdrawal, Substitution, and Modification of Bids	24.1 A Bidder may withdraw, substitute, or modify its Bid after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 20.3, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the Bid must accompany the respective written notice. All notices must be: (a) prepared and submitted in accordance with ITB 20 and ITB 21 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked “WITHDRAWAL,” “SUBSTITUTION,” “MODIFICATION;” and (b) received by the Employer prior to the deadline prescribed for submission of Bids, in accordance with ITB 22.
	24.2 Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders.
	24.3 No Bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of Bids and the expiration of the period of Bid validity specified by the Bidder on the Letter of Bid or any extension thereof.
E. Public Opening of Technical Parts of Bids	
25. Public Opening of Technical Parts of Bids	25.1 Except in the cases specified in ITB 23 and ITB 24.2, the Employer shall publicly open and read out all Bids received by the deadline, at the date, time and place specified in the BDS , in the presence of Bidders` designated representatives and anyone who chooses to attend. All Bidders, or their representatives and any interested party may attend a public opening. Any specific electronic Bid opening procedures required if electronic bidding is permitted in accordance with ITB 22.1, shall be as specified in the BDS .



	<p>25.2 First, the written notice of withdrawal in the envelopes marked “WITHDRAWAL” shall be opened and read out and the envelope with the corresponding Bid shall not be opened, but returned to the Bidder. No Bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at Bid opening.</p> <p>25.3 Next, envelopes marked “Substitution” shall be opened and read out and exchanged with the corresponding Bid being substituted, and the substituted Bid shall not be opened, but returned to the Bidder. No Bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at Bid opening.</p>
	<p>25.4 Next, envelopes marked “MODIFICATION” shall be opened and read out with the corresponding Bid. No Bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at Bid opening.</p>
	<p>25.5 Next, all other envelopes marked “TECHNICAL PART” shall be opened one at a time. On opening the envelopes marked “TECHNICAL PART” the Employer shall read out: the name of the Bidder, the presence or the absence of a Bid Security, or Bid-Securing Declaration, if required, and whether there is a modification; and Alternative Bid - Technical Part; and any other details as the Employer may consider appropriate.</p> <p>25.6 Only Technical Parts of Bids and Alternative Bid - Technical Parts that are read out at Bid opening shall be considered further for evaluation. The Letter of Bid- Technical Part: FINANCIAL PROPOSAL” are to be initialed by representatives of the Employer attending Bid opening in the manner specified in the BDS.</p>
	<p>25.7 At the Bid opening the Employer shall neither discuss the merits of any Bid nor reject any Bid (except for late Bids, in accordance with ITB 23.1).</p>
	<p>25.8 The Employer shall prepare a record of the Technical Parts of Bid opening that shall include, as a minimum:</p> <p>(a) the name of the Bidder and whether there is a</p>

	<p>withdrawal, substitution, or modification;</p> <p>(b) the receipt of envelopes that there are no “FINANCIAL PART” submitted in the Hard Copy;</p> <p>(c) the presence or absence of a Bid Security or Bid-Securing Declaration, if one was required; and</p> <p>(d) if applicable, any Alternative Bid – Technical Part.</p> <p>25.9 The Bidders’ representatives who are present shall be requested to sign the record. The omission of a Bidder’s signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.</p>
<p>F. Evaluation of Bids – General Provisions</p>	
<p>26. Confidentiality</p>	<p>26.1 Information relating to the evaluation of Bids and recommendation of contract award, shall not be disclosed to Bidders or any other persons not officially concerned with the Bidding process until information on Intention to Award the Contract is transmitted to all Bidders in accordance with ITB 44.</p>
	<p>26.2 Any effort by a Bidder to influence the Employer in the evaluation of the Bids or Contract award decisions may result in the rejection of its Bid.</p>
	<p>26.3 Notwithstanding ITB 26.2, from the time of Bid opening to the time of Contract award, if a Bidder wishes to contact the <i>Employer</i> on any matter related to the Bidding process, it shall do so in writing.</p>
<p>27. Clarification of Bids</p>	<p>27.1 To assist in the examination, evaluation, and comparison of the Bids, and qualification of the Bidders, the Employer may, at its discretion, ask any Bidder for a clarification of its Bid given a reasonable time for a response. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer’s request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease in the prices or substance of the Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the</p>

	Bids, in accordance with ITB 36.
	27.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the <i>Employer's</i> request for clarification, its Bid may be rejected.
28. Deviations, Reservations, and Omissions	<p>28.1 During the evaluation of Bids, the following definitions apply:</p> <ul style="list-style-type: none"> (a) “Deviation” is a departure from the requirements specified in the bidding document; (b) “Reservation” is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the bidding document; and (c) “Omission” is the failure to submit part or all of the information or documentation required in the bidding document.
29. Nonmaterial Nonconformities	<p>29.1 Provided that a Bid is substantially responsive, the Employer may waive any non-conformities in the Bid.</p> <p>29.2 Provided that a Bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.</p>
	29.3 Provided that a Bid is substantially responsive pursuant to ITB 31, the <i>Employer</i> shall rectify quantifiable nonmaterial nonconformities related to the Bid price. To this effect, the Bid price may be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component in the manner specified in the BDS .

G. Evaluation of Technical Parts of Bids	
30. Evaluation of Technical Parts	30.1 In evaluating the Technical Parts of each Bid, the Employer shall use the criteria and methodologies listed in this ITB and Section III, Evaluation and Qualification Criteria. No other evaluation criteria or methodologies shall be permitted.
31. Determination of Responsiveness	<p>31.1 The <i>Employer's</i> determination of a Bid's responsiveness is to be based on the contents of the Bid itself, as defined in ITB 11.</p> <p>31.2 A substantially responsive Bid is one that meets the requirements of the bidding document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that:</p> <p style="margin-left: 40px;">(a) if accepted, would:</p> <p style="margin-left: 80px;">(i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or</p> <p style="margin-left: 80px;">(ii) limit in any substantial way, inconsistent with the bidding document, the Employer's rights or the Bidder's obligations under the proposed Contract; or</p> <p style="margin-left: 40px;">(b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive Bids.</p>
	31.3 The Employer shall examine the technical aspects of the Bid submitted in accordance with ITB 16, in particular, to confirm that all requirements of Section VII, Works' Requirements have been met without any material deviation, reservation or omission.
	31.4 If a Bid is not substantially responsive to the requirements of the bidding document, it shall be rejected by the <i>Employer</i> and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.
32. Qualification of the Bidder	32.1 The <i>Employer</i> shall determine to its satisfaction whether the eligible Bidders that have submitted substantially responsive Bid - Technical Parts meet the qualifying criteria specified in

	Section III, Evaluation and Qualification Criteria.
	32.2 The determination shall be based upon an examination of the documentary evidence of the Bidder’s qualifications submitted by the Bidder, pursuant to ITB 17. The determination shall not take into consideration the qualifications of other firms such as the Bidder’s subsidiaries, parent entities, affiliates, subcontractors (other than Specialized Subcontractors if permitted in the bidding document), or any other firm different from the Bidder.
	32.3 If a Bidder does not meet the qualifying criteria specified in Section III, Evaluation and Qualification Criteria, its Bid shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.
	32.4 Only Bids that are both substantially responsive to the bidding document, and meet all Qualification Criteria shall have their “FINANCIAL PART” will be opened at the second public opening.
33. Subcontractors	<p>33.1 Unless otherwise stated in the BDS, the Employer does not intend to execute any specific elements of the Works by subcontractors selected in advance by the Employer.</p> <p>33.2 The subcontractor’s qualifications shall not be used by the Bidder to qualify for the Works unless their specialised parts of the Works were previously designated by the Employer in the BDS as can be met by subcontractors referred to hereafter as ‘Specialized Subcontractors’, in which case, the qualifications of the Specialized Subcontractors proposed by the Bidder may be added to the qualifications.</p> <p>33.3 Bidders may propose subcontracting up to the percentage of total value of contracts or the volume of works as specified in the BDS. Subcontractors proposed by the Bidder shall be fully qualified for their parts of the Works.</p>
H. Public Opening of Financial Parts of Bids	
34. Public Opening of Financial Parts	34.1 Following the completion of the evaluation of the Technical Parts of the Bids, and the Employer may notify in writing or inform those Bidders whose Bids were considered non-responsive to the bidding document or failed to meet the

	<p>Qualification Criteria, advising them of the following information:</p>
	<p>(a) the grounds on which their Technical Part of Bid failed to meet the requirements of the bidding document;</p> <p>(b) their “FINANCIAL PART” submitted will be not be opened; and</p>
	<p>34.2 The Employer shall, simultaneously, notify in writing those Bidders whose Technical Part have been evaluated as substantially responsive to the bidding document and met all Qualifying Criteria, advising them of the following information:</p> <p>(a) their Bid has been evaluated as substantially responsive to the bidding document and met the Qualification Criteria;</p> <p>(b) their “FINANCIAL PART” will be opened at the public opening of the Financial Parts; and</p> <p>(c) notify them of the date, time and location of the second public opening of the “FINANCIAL PART” as specified in the BDS.</p>
	<p>34.3 The opening date should allow Bidders sufficient time to make arrangements for attending the opening. The Financial Part of the Bid shall be opened publicly in the presence of Bidders’ designated representatives and anyone who chooses to attend.</p>
	<p>34.4 At this public opening the Financial Parts will be opened by the Employer in the presence of Bidders, or their designated representatives and anyone else who chooses to attend. Bidders who met the Qualification Criteria and whose bids were evaluated as substantially responsive will have their “FINANCIAL PART” opened at the second public opening. The Employer shall read out the names of each Bidder, and the total Bid prices, per contract if applicable, and any other details as the Employer may consider appropriate.</p>
	<p>34.5 The Employer shall neither discuss the merits of any Bid nor reject “FINANCIAL PART”.</p>

	<p>34.6 The Employer shall prepare a record of the Financial Part of the Bid opening that shall include, as a minimum:</p> <p>(a) the name of the Bidder whose Financial Part was opened;</p> <p>(b) the Bid price, per contract if applicable, including any discounts; and</p>
	<p>34.7 The Bidders whose “FINANCIAL PART” have been opened or their representatives who are present shall be requested to sign the record. The omission of a Bidder’s signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.</p>
<p>I. Evaluation of Financial Parts of Bids</p>	
<p>35. Evaluation of Financial Parts</p>	<p>35.1 To evaluate the Financial Part, the Employer shall consider the following:</p>
	<p>(a) the Bid price, excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities¹ for admeasurement contracts, but including Daywork² items, where priced competitively;</p>
	<p>(b) price adjustment for correction of arithmetic errors in accordance with ITB 36.1;</p>
	<p>(c) price adjustment due to discounts offered in accordance with ITB 14.4;</p>
	<p>(d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 37;</p> <p>(e) price adjustment due to quantifiable nonmaterial nonconformities in accordance with ITB 29.3; and</p>
	<p>(f) the additional evaluation factors are specified in</p>

¹ In lump-sum contracts, delete “Bill of Quantities” and replace with “Activity Schedule.”

² Day work is work carried out following instructions of the Project Manager and paid for on the basis of time spent by workers, and the use of materials and the Contractor’s equipment, at the rates quoted in the Bid. For Daywork to be priced competitively for Bid evaluation purposes, the Employer must list tentative quantities for individual items to be costed against Daywork (e.g., a specific number of tractor driver staff-days, or a specific tonnage of Portland cement), to be multiplied by the Bidders’ quoted rates and included in the total Bid price.

	Section III, Evaluation and Qualification Criteria.
	35.2 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in Bid evaluation.
	35.3 If this bidding document allows Bidders to quote separate prices for different contracts, the methodology to determine the lowest evaluated cost of the contract combinations, including any discounts offered in the Letter of Bid – Financial Part, is specified in Section III, Evaluation and Qualification Criteria
36. Correction of Arithmetical Errors	36.1 In evaluating the Financial Part of each Bid, the Employer shall correct arithmetical errors on the following basis:
	<p>(a) only for admeasurement contracts, if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected;</p> <p>(b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and</p> <p>(c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.</p>
	36.2 Bidders shall be requested to accept correction of arithmetical errors. Failure to accept the correction in accordance with ITB 36.1, shall result in the rejection of the Bid.
37. Conversion to Single Currency	37.1 For evaluation and comparison purposes, the currency(ies) of the Bids shall be converted in a single currency as specified in the BDS.

38. Margin of Preference	38.1 Unless otherwise specified in the BDS , a margin of preference for domestic Bidders ³ shall not apply.
39. Comparison of Financial Parts	39.1 The Employer shall compare the evaluated costs of all responsive and qualified Bids to determine the Bid that has the lowest evaluated cost.
40. Abnormally Low Bids	40.1 An Abnormally Low Bid is one where the Bid price, in combination with other constituent elements of the Bid, appears unreasonably low to the extent that the Bid price raises material concerns as to the capability of the Bidder to perform the Contract for the offered Bid price.
	<p>40.2 In the event of identification of a potentially Abnormally Low Bid, the Employer shall seek written clarifications from the Bidder, including detailed price analyses of its Bid price in correlation to the subject matter of the contract, scope, proposed methodology, schedule, allocation of risks and responsibilities and any other requirements of the bidding document.</p> <p>40.3 After evaluation of the price analyses, in the event that the Employer determines that the Bidder has failed to demonstrate its capability to deliver the contract for the offered tender price, the Employer shall reject the Bid.</p>
41. Unbalanced or Front Loaded Bids	<p>41.1 If the Bid for an admeasurement contract, which results in the lowest evaluated cost, in the Employer’s opinion, seriously unbalanced or front loaded the Employer may require the Bidder to provide written clarifications. Clarifications may include detailed price analyses to demonstrate the consistency of the Bid prices with the scope of works, proposed methodology, schedule and any other requirements of the bidding document.</p> <p>41.2 After the evaluation of the information and detailed price analyses presented by the Bidder, the Employer may as appropriate:</p>

³ An individual firm is considered a domestic bidder for purposes of the margin of preference if it is registered in the country of the Employer, has more than 50 percent ownership by nationals of the country of the Employer, and if it does not subcontract more than 10 percent of the contract price, excluding provisional sums, to foreign contractors. JVs are considered as domestic bidders and eligible for domestic preference only if the individual member firms are registered in the country of the Employer or have more than 50 percent ownership by nationals of the country of the Employer, and the JV shall be registered in the country of the Employer. The JV shall not subcontract more than 10 percent of the contract price, excluding provisional sums, to foreign firms. JVs between foreign and national firms will not be eligible for domestic preference.

	<ul style="list-style-type: none"> (a) accept the Bid; or (b) require that the amount of the performance security be increased at the expense of the Bidder to a level not exceeding 20% of the Contract price; or (c) Reject the Bid.
<p>42. Most Advantageous Bid</p>	<p>42.1 Having compared the evaluated costs of Bids, the Employer shall determine the Most Advantageous Bid. The Most Advantageous Bid is the Bid of the Bidder that meets the Qualification Criteria and whose Bid has been determined to be:</p> <ul style="list-style-type: none"> (a) substantially responsive to the bidding document; and (b) the lowest evaluated cost.
<p>43. Employer’s Right to Accept Any Bid, and to Reject Any or All Bids</p>	<p>43.1 The <i>Employer</i> reserves the right to accept or reject any Bid, and to annul the Bidding process and reject all Bids at any time prior to Contract Award, without thereby incurring any liability to Bidders. In case of annulment, all Bids submitted and specifically, Bid Securities shall be promptly returned to the Bidders.</p>
<p>44. Standstill Period</p>	<p>44.1 The Contract shall be awarded not earlier than the expiry of the Standstill Period. The duration of the Standstill Period is specified in the BDS. Where only one Bid is submitted, the Standstill Period shall not apply.</p>
<p>45. Notice of Intention to Award</p>	<p>45.1 When a Standstill Period applies, it shall commence when the Employer has transmitted to each Bidder (that has not already been notified that it has been unsuccessful) the Notification of Intention to Award the Contract to the successful Bidder. The Notification of Intention to Award shall contain, at a minimum, the following information:</p> <ul style="list-style-type: none"> (a) the name and address of the Bidder submitting the successful Bid; (b) the Contract price of the successful Bid; (c) the names of all Bidders who submitted Bids, and their Bid prices as readout, and as evaluated; (d) a statement of the reason(s) the Bid (of the unsuccessful Bidder to whom the letter is addressed) was unsuccessful, unless the price information in c)



	<p>above already reveals the reason;</p> <p>(e) the expiry date of the Standstill Period; and</p> <p>(f) instructions on how to request a debriefing and/or submit a complaint during the standstill period.</p>
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J. Award of Contract	
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46. Award Criteria	46.1 Subject to ITB 43, the Employer shall award the Contract to the successful Bidder. This is the Bidder whose Bid has been determined to be the Most Advantageous Bid as specified in ITB 42.
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47. Notification of Award	<p>47.1 Prior to the expiration of the Bid Validity Period and upon expiry of the Standstill Period, specified in BDS ITB 44.1 or any extension thereof, or upon satisfactorily addressing a complaint that has been filed within the Standstill Period, the Employer shall transmit the Letter of Acceptance to the successful Bidder. The Letter of Acceptance shall specify the sum that the Employer will pay the Contractor in consideration of the execution of the contract (hereinafter, and in the Conditions of Contract and Contract Forms, called “the Contract Price”).</p> <p>47.2 At the same time, the Employer shall publish the Contract Award Notice which shall contain, at a minimum, the following information:</p> <ul style="list-style-type: none"> (a) name and address of the Employer; (b) name and reference number of the contract being awarded, and the selection method used; (c) names of all Bidders that submitted Bids, and their Bid prices as read out at Bid opening, and as evaluated; (d) names of all Bidders whose Bids were rejected either as nonresponsive or as not meeting qualification criteria, or were not evaluated, with the reasons therefor; and (e) the name of the successful Bidder, the final total contract price, the contract duration and a summary of its scope. <p>47.3 The Contract Award Notice shall be published on the</p>
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	<p>Employer’s website with free access.</p> <p>47.4 Until a formal Contract is prepared and executed, the Letter of Acceptance shall constitute a binding Contract.</p>
48. Debriefing by the Employer	<p>48.1 On receipt of the Employer’s Notification of Intention to Award referred to in ITB 45.1, an unsuccessful Bidder has three (3) Business Days to make a written request to the Employer for a debriefing. The Employer shall provide a debriefing to all unsuccessful Bidders whose request is received within this deadline.</p>
	<p>48.2 Where a request for debriefing is received within the deadline, the Employer shall provide a debriefing within five (5) Business Days, unless the Employer decides, for justifiable reasons, to provide the debriefing outside this timeframe. In that case, the standstill period shall automatically be extended until five (5) Business Days after such debriefing is provided. If more than one debriefing is so delayed, the standstill period shall not end earlier than five (5) Business Days after the last debriefing takes place. The Employer shall promptly inform, by the quickest means available, all Bidders of the extended standstill period</p>
	<p>48.3 Where a request for debriefing is received by the Employer later than the three (3)-Business Day deadline, the Employer should provide the debriefing as soon as practicable, and normally no later than fifteen (15) Business Days from the date of publication of Public Notice of Award of contract. Requests for debriefing received outside the three (3)-day deadline shall not lead to extension of the standstill period.</p>
	<p>48.4 Debriefings of unsuccessful Bidders may be done in writing or verbally. The Bidder shall bear their own costs of attending such a debriefing meeting.</p>
49. Signing of Contract	<p>49.1 Promptly upon Notification of Award, the Employer shall send the successful Bidder the Contract Agreement.</p>
	<p>49.2 Within twenty-eight (28) days of receipt of the Contract Agreement, the successful Bidder shall sign, date, and return it to the Employer.</p>
50. Performance Security	<p>50.1 Within twenty-eight (28) days of the receipt of the Letter of Acceptance from the Employer, the successful Bidder shall furnish the Performance Security, in accordance with the</p>

	<p>General Conditions of Contract, subject to ITB 41.2 (b), using for that purpose the Performance Security, Contract Forms, or another form acceptable to the Employer. If the Performance Security furnished by the successful Bidder is in the form of a bond, it shall be issued by a bonding or insurance company that has been determined by the successful Bidder to be acceptable to the Employer. A foreign institution providing a bond shall have a correspondent financial institution located in the Employer’s Country, unless the Employer has agreed in writing that a correspondent financial institution is not required.</p>
	<p>50.2 Failure of the successful Bidder to submit the above-mentioned Performance Security, or to sign the Contract Agreement shall constitute sufficient <i>grounds</i> for the annulment of the award and forfeiture of the Bid Security. In that event the Employer may award the Contract to the Bidder offering the next Most Advantageous Bid.</p>
<p>51. Adjudicator</p>	<p>51.1 The Employer proposes the person named in the BDS to be appointed as Adjudicator under the Contract, at the hourly fee specified in the BDS, plus reimbursable expenses. If the Bidder disagrees with this proposal, the Bidder should so state in his Bid. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator, the Employer will request the Appointing Authority designated in the Particular Conditions of Contract (PCC) pursuant to Clause 23.1 of the General Conditions of Contract (GCC), to appoint the Adjudicator.</p>
<p>52. Procurement Related Complaint</p>	<p>52.1 The procedures for making a Procurement-related Complaint are as specified in the BDS.</p>

Section II - Bid Data Sheet (BDS)

A. General	
ITB 1.1	<p>The reference number of the Request for Bids (RFB) is:: <u>23-41/8/PBSPL/STP/2019/514</u></p> <p>The Employer is: <i>Port Blair Smart Projects Limited</i></p> <p>The name of the RFB is: Selection of Contractor was “SETTING UP OF 42.0 KLD FAECAL SLUDGE TREATMENT PLANT (FSTP) FOR PORT BLAIR CITY, ANDAMAN & NICOBAR”</p>
ITB 1.2 (a)	<p>The number and identification of comprising this RFB is: <u>23-41/8/PBSPL/STP/2019/514</u></p>
ITB 2.1	<p>The name of the Project is: “SETTING UP OF 42.0 KLD FAECAL SLUDGE TREATMENT PLANT (FSTP) FOR PORT BLAIR, CITY, ANDAMAN & NICOBAR”</p>
ITB 4.1	<p>No Joint Ventures is allowed.</p>
B. Contents of Bidding Document	
ITB 7.1	<p>For clarification purposes only, the Employer’s address is:</p> <p>Attention: <i>Chief Executive Officer</i></p> <p>Port Blair Municipal Council, Indira Bhavan, Mohanpura, Port Blair 744101, South Andaman, A&N Islands, India</p> <p>Electronic mail address: <i>smartcityportblair@gmail.com</i></p>
ITB 7.1	<p>Requests for clarification should be received by the Employer no later than: 15.03.2019.</p> <p>Email: <i>smartcityportblair@gmail.com</i></p>
ITB 7.4	<p>A Pre-Bid meeting “shall” take place at the following date, time and place:</p> <p>Date: 22.03.2019, 1600 Hrs.</p> <p>Conference Hall of Port Blair Municipal Council,</p>

	Indira Bhavan, Mohanpura, Port Blair 744101, South Andaman, A&N Islands, India
ITB 7.6	Web page: www.eproc.andaman.gov.in , http://andaman.nic.in/ , http://www.andaman.gov.in/ , http://eproc.andaman.gov.in/ , https://smartnet.niua.org/ , http://db.and.nic.in/pbmcwebsite/Forms/home.aspx
C. Preparation of Bids	
ITB 10.1	The language of the Bid is: <i>English</i> All correspondence exchange shall be in <i>English</i> language. Language for translation of supporting documents and printed literature is <i>English</i>
ITB 11.2 (h)	Capacity of similar work performed for each of the last seven years; <u>Similar Work is defined as:</u> Setting up of Faecal Sludge Treatment Plant / Sewage treatment Plant/ Septage treatment Plant of a minimum capacity of 34 KLD in last 7.0 years up to the last date of bidding and is in successful operation in India. Setting up will be inclusive of Design, Construction, Testing & Commissioning and Operation and Maintenance of plants and machinery. Prospective Bidders are required to submit the proof of their respective eligibility in the form of work orders, award of contracts, work completion certificates from the Client, as well as satisfactory operation reports copies and establishment details in its technical bid. <u>Other Conditions</u> (a) Experience in works of similar nature and size for each of the last seven years, and details of works underway or contractually committed with their certificates from the concerned officer not less than the rank of Executive Engineer or Equivalent. A list of clients with their contact details, who may be contacted for further information / verification on those contracts, shall also be provided. (b) Major items of construction equipment proposed to carry out the Contract; (c) Qualifications and experience of key site management and technical personnel proposed for Contract; Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past three years; (d) Authority may seek references from the Bidder's bankers; (e) Information regarding any litigation, current or during the last

	<p>seven years, in which the Bidder is involved, the parties concerned, and disputed Amount</p> <p>(f) Self-certified copy that none of the members has not been Debarred / Black Listed by the Government of India or any State Government in India and no bar subsists as on the Application Due Date.</p>
ITB 11.3 (b)	The following schedules shall be submitted with the Bid: <i>Time Schedule for Project.</i>
ITB 14.5	The prices quoted by the Bidder <i>shall not be</i> subject to adjustment during the performance of the Contract.
ITB 15.1	The price shall be quoted by the Bidder in: <i>Indian Rupees</i>
ITB 18.1	The Bid validity period shall be <i>120</i> days.
ITB 19.1	<p>A Bid Security <i>shall be</i> required.</p> <p>If a Bid Security/EMD shall be required, the amount and currency of the Bid Security shall be: INR 7,40,000/- (Rupees Seven Lakhs Forty Thousand Only)</p> <p>Bid Document fee of INR 5,000/- (Rupees Five Thousand only) is also to be deposited separately.</p>
ITB 19.3 (d)	<p>Bid Security/ EMD shall be drawn in favour of <i>Chief Executive Officer, Port Blair Smart Projects Limited</i> payable at Port Blair.</p> <p>Acceptable Securities:</p> <p>(a) <i>NEFT</i></p> <p>(b) <i>Net Banking</i></p> <p>(c) <i>RTGS</i></p> <p>(d) <i>FDR</i></p> <p><i>If FRD it shall be drawn in favour of Port Blair Smart Projects Limited, Payable at Port Blair (Bank Details: Syndicate Bank A/C No.991021400000- IFSC Code: SYNB0009910)</i></p>
ITB 19.9	If the Bidder performs any of the actions prescribed in ITB 19.9 (a) or (b), the Employer will declare the Bidder <i>ineligible</i> to be awarded contracts by the Employer for a period of <i>3</i> years.
ITB 20.3	The written confirmation of authorization to sign on behalf of the Bidder shall consist of; <i>Duly executed Power of Attorney in favour of person</i>

	<i>who is submitting the Bid</i>
--	----------------------------------

D. Submission of Bids	
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ITB 21.2	In addition to the original of the Bid, the number of copies is: Zero (0) .
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ITB 22.1	<p>For <u>Bid submission purposes</u> only, the Employer’s address is:</p> <p>Chief Executive Officer</p> <p>Port Blair Municipal Council, Indira Bhavan, Mohanpura, Port Blair 744101, South Andaman, A&N Islands, India</p> <p>Date: 08.04.2019, 1500Hrs.</p> <p>Bidders “shall” mandatorily submit all the copies of the Bid</p> <p>Bidders are requested to submit the bid in two stages:</p> <p style="padding-left: 40px;">Stage – I: Eligibility and Technical Bid Stage. Stage – II: Financial Bid Stage.</p> <ul style="list-style-type: none"> ● The first stage will cover the qualifications and eligibility criteria and the technical bid. The bidder shall submit price bid under second stage which will include proposals for financing to cover part of the Scope of Work as per bid documents before the bid submission closing date. ● Bidders shall submit a declaration without any reservation whatsoever that the submitted eligibility and qualification details, Techno-Commercial bid and financial bid are without any deviations and are strictly in conformity with the bid documents issued by the Employer. ● Declaration should be given by the bidder for the correctness of the credentials submitted by him.
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E. Public Opening of Technical Parts of Bids	
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ITB 25.1	<p>The Bid opening shall take place at:</p> <p>Chief Executive Officer</p> <p>Port Blair Municipal Council, Indira Bhavan, Mohanpura, Port Blair 744101,</p>
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	South Andaman, A&N Islands, India Date: 08.04.2019, Time: 1600 Hrs
F. Evaluation of Bids – General Provisions	
ITB 29.3	<i>Not Applicable</i>
G. Evaluation of Bids - Technical Parts	
ITB 33.1	At this time the Employer to execute certain specific parts of the Works by subcontractors selected in advance- <i>None</i>
ITB 33.3	Contractor’s proposed subcontracting: <i>None</i>
H. Public Opening of Financial Parts	
ITB 34.2 (c)	Following the completion of the evaluation of the Technical Parts of the Bids, the Employer will notify vide the corrigendum/ email mentioning of the location, date and time of the public opening of Financial Bid.
I. Evaluation of Bids - Financial Parts	
ITB 37.1	The currency that shall be used for Bid evaluation and comparison purposes to convert at the selling exchange rate all Bid prices expressed in various currencies into a single currency is: <i>Indian Rupees(INR)</i> The source of exchange rate shall be: <i>Reserve Bank of India</i> The date for the exchange rate shall be: <i>28 days before the Submission of Bid</i>
ITB 44 Standstill Period	<i>Not Applicable</i>
J. Award of Contract	
ITB 51 Adjudicator	The Adjudicator proposed by the Employer is: to be proposed later.



Section III - Evaluation and Qualification Criteria

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each member	At least one member	
1. Eligibility							
1.1	Nationality	Nationality in accordance with ITB 4	Must meet requirement	N/A	N/A	N/A	Forms ELI – 1.1 and 1.2, with attachments
1.2	Conflict of Interest	No conflicts of interest in accordance with ITB 4	Must meet requirement	N/A	N/A	N/A	Letter of Bid
1.3	Employer Eligibility	Not having been declared ineligible by the Employer, as described in ITB 4.	Must meet requirement	N/A	N/A	N/A	Letter of Bid
1.4	State-owned enterprise or institution of the Employer country	Meets conditions of ITB 4	Must meet requirement	N/A	N/A	N/A	Forms ELI – 1.1 and 1.2, with attachments

Eligibility and Qualification Criteria			Compliance Requirements			Documentation	
No	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each member	At least one member	
1. Historical Contract Non-Performance							
2.1	History of Non-Performing Contracts	Non-performance of a contract ¹ did not occur as a result of contractor default since 7 years prior to 30 days from the due date of Bidding.	Must meet requirement ¹	N/A	N/A	N/A	Form CON-2
2.2	Suspension Based on Execution of Bid/Debarment Declaration by the Employer or withdrawal of	Not under suspension based on execution of a Bid/ Debarment Declaration pursuant to ITB 4.7 or withdrawal of the Bid pursuant ITB 19.9.	Must meet requirement	N/A	N/A	N/A	Letter of Bid

¹ Non-performance, as decided by the Employer, shall include all contracts where (a) non performance was not challenged by the contractor, including through referral to the dispute resolution mechanism under the respective contract, and (b) contracts that were so challenged but fully settled against the contractor. Non performance shall not include contracts where Employers decision was overruled by the dispute resolution mechanism. Non performance must be based on all information on fully settled disputes or litigation, i.e. dispute or litigation that has been resolved in accordance with the dispute resolution mechanism under the respective contract and where all appeal instances available to the Bidder have been exhausted.

Eligibility and Qualification Criteria			Compliance Requirements			Documentation	
No	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each member	At least one member	
	the Bid/ LoA from the Employer within Bid validity period						
2.3	Pending Litigation	Bidder's financial position and prospective long term profitability sound according to criteria established in 3.1 below and assuming that all pending litigation will be resolved against the Bidder	Must meet requirement	N/A	N/A	N/A	Form CON – 2
2.4	Litigation History	No consistent history of court/arbitral award decisions against the Bidder ² since last Seven	Must meet requirement	N/A	N/A	N/A	Form CON – 2

² The Bidder shall provide accurate information on the letter of Bid about any litigation or arbitration resulting from contracts completed or ongoing under its execution over the last seven years. A consistent history of court/arbitral awards against the Bidder or any member of a joint venture may result in disqualifying the Bidder.

Eligibility and Qualification Criteria			Compliance Requirements			Documentation	
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each member	At least one member	
		years from the Proposal Due Date					
3. Financial Situation and Performance							
3.1	Financial Capabilities	The Bidder shall demonstrate that it has access to, or has available, liquid assets, unencumbered real assets, lines of credit, and other financial means (independent of any contractual advance payment) sufficient to meet the construction cash flow requirements estimated as not less than INR 93 Lakhs of the estimated contract value, in Indian Rupees for the	Must meet requirement	N/A	N/A	Must meet requirement	Form FIN – 3.1, with attachments

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each member	At least one member	
		subject contract(s) net of the Bidder's other commitments					
		The audited balance sheets for the last 3years shall be submitted and must demonstrate the current soundness of the Bidder's financial position and <i>shall be a profit making organisation.</i>	Must meet requirement	N/A	N/A	Must meet requirement	
3.2	Average Annual Turnover	Minimum average annual turnover of INR 370 Lakhs (INR Three Crores Seventy Lakhs Only) calculated as total turnover received within the last 3 years, divided by 3 years	Must meet requirement	N/A	N/A	N/A	Form FIN – 3.2
4. Experience							
4.1	General	Experience under	Must meet	N/A	N/A	N/A	Form EXP –

Eligibility and Qualification Criteria			Compliance Requirements			Documentation	
No	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each member	At least one member	
(a)	Construction Experience	construction contracts in the role of prime contractor, JV member, nominated sub-contractor, or management contractor for at least the last 1 year, starting 7 years prior to 30 days from the due date of Bidding.	requirement				4.1
4.2 (a)	Specific Construction & Contract Management Experience	(i) A minimum Works means Similar Completed Works as a prime contractor, joint venture member, management contractor or nominated sub-contractor between 7 years prior to 30 days from the due date of Bidding:	Must meet requirements	N/A	N/A	N/A	Form EXP 4.2(a)

Eligibility and Qualification Criteria			Compliance Requirements			Documentation	
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each member	At least one member	
		<p><u>Completed Similar Work :</u> <u>Similar Works defined as</u> <u>BDS 11.2 (h)</u></p> <p><i>1(One) number similar completed work each of INR 296 Lakhs (excluding the cost of the land) in a single contract.</i> OR <i>2(Two) numbers similar completed works each of INR 185 Lakhs (excluding the cost of the land) in two different contract.</i> OR <i>3(three) numbers similar completed works each of INR 148 Lakhs (excluding the cost of the land) in three different contracts.</i></p>					



Eligibility and Qualification Criteria			Compliance Requirements			Documentation	
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each member	At least one member	
		<p><i>In case a project has been executed by a joint venture, weightage towards experience of the project would be given to each joint venture in proportion to their participation in the joint venture.</i></p> <p><i>The applicant has to attach the copies of JV agreement and Certificate in support which has been issued from the concerned officer not less the rank of Executive Engineer or Equivalent</i></p>					

5. Key Personnel

The Bidder must demonstrate that it will have a suitably qualified (and in adequate numbers) minimum Support Personnel, as described in the table below, that are required to perform the Contract.

The Bidder shall provide details of the Key Personnel and such other Key Personnel that the Bidder considers appropriate, together with their academic qualifications and work experience. The Bidder shall complete the relevant Forms in Section IV, Bidding Forms.

The Contractor shall require the Employer’s consent to substitute or replace the Key Personnel (reference the Particular Conditions of Contract 9.1).

Key Personnel

S. No.	Position	Qualifications and Experience	Nos
1	Project Manager	B.E Civil/Mechanical/Electrical+7 Years of relevant experience	1 Nos
2	Site Engineer	B.E Civil/Mechanical/Electrical +3 Years of relevant experience or Diploma Civil / Mechanical / Electrical + 5 Years of relevant experience	1 Nos

6. Equipment

The Bidder shall ensure that it has the following key equipment available for dedicated use in the project, prior to commencement of works:

S. No	Type of Equipment	Maximum age as on 31.03.2018 (years)	Minimum Nos.
1	Welding sets	-(preferably new)	01 Nos
2	Water Tanker	-(preferably new)	03 Nos
3	DG sets	-(preferably new)	02 nos

The Bidder shall provide further details of proposed items of equipment using Form EQU in Section IV, Bidding Forms.

Section IV - Bidding Forms

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Letter of Bid - Technical Part

Date of this Bid submission: *[insert date (as day, month and year) of Bid submission]*

Request for Bid No.: *[insert identification]*

To:

*Chief Executive Officer
Port Blair Smart Projects Limited
Indira Bhavan
Port Blair Municipal Council,
Mohanpura, PortBlair 744101
email: smartcityportblair@gmail.com*

We, the undersigned, hereby submit our Bid, in two parts, namely:

- (a) the Technical Part, and
- (b) the Financial Part

In submitting our Bid, we make the following declarations:

- (a) **No reservations:** We have examined and have no reservations to the bidding document, including Addenda issued in accordance with Instructions to Bidders (ITB 8);
- (b) **Eligibility:** We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;
- (c) **Bid-Securing Declaration:** We have not been suspended nor declared ineligible by the Employer based on execution of a Bid-Securing Declaration or Proposal-Securing Declaration in the Employer's country in accordance with ITB 4.7;
- (d) **Conformity:** We offer to execute in conformity with the bidding document the following Works: *[insert a brief description of the Works]* _____
_____;
- (e) **Bid Validity Period:** Our Bid shall be valid for a period specified in BDS 18.1 (or as amended if applicable) from the date fixed for the Bid submission deadline specified in BDS 22.1 (or as amended if applicable), and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

- (f) **Performance Security:** If our Bid is accepted, we commit to obtain a Performance Security in accordance with the bidding document;
- (g) **One Bid Per Bidder:** We are not submitting any other Bid(s) as an individual Bidder or as a subcontractor, and we are not participating in any other Bid(s) as a Joint Venture member, and meet the requirements of ITB 4.3, other than alternative Bids submitted in accordance with ITB 13;
- (h) **State-owned enterprise or institution:** *[select the appropriate option and delete the other]*
[We are not a state-owned enterprise or institution] / [We are a state-owned enterprise or institution but meet the requirements of ITB 4.6];
- (i) **Binding Contract:** We understand that this Bid, together with your written acceptance thereof included in your Letter of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed;
- (j) **Not Bound to Accept:** We understand that you are not bound to accept the lowest evaluated cost Bid, the Most Advantageous Bid or any other Bid that you may receive; and
- (k) **Fraud and Corruption:** We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf engages in any type of Fraud and Corruption;

Name of the Bidder: **[insert complete name of person signing the Bid]*

Name of the person duly authorized to sign the Bid on behalf of the Bidder: *** [insert complete name of person duly authorized to sign the Bid]*

Title of the person signing the Bid: *[insert complete title of the person signing the Bid]*

Signature of the person named above: *[insert signature of person whose name and capacity are shown above]*

Date signed *[insert date of signing]* **day of** *[insert month]*, *[insert year]*

Date signed _____ day of _____,

*: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder

** : Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid

Appendix B to Technical Part: Equipment

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section III, Evaluation and Qualification Criteria. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder.

Item of equipment		
Equipment information	Name of manufacturer	Model and power rating
	Capacity	Year of manufacture
Current status	Current location	
	Details of current commitments	
Source	Indicate source of the equipment (a) <input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

Omit the following information for equipment owned by the Bidder.

Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rental / lease / manufacture agreements specific to the project	



Appendix C to Technical Part: Key Personnel

Form PER -1: Key Personnel
Schedule

Bidders should provide the names and details of the suitably qualified Key Personnel to perform the Contract. The data on their experience should be supplied using the Form PER-2 below for each candidate.

Key Personnel

1.	Title of position:	
	Name of candidate:	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment: for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]</i>
2.	Title of position:	
	Name of candidate:	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment: for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]</i>
3.	Title of position:	
	Name of candidate:	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment: for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>

	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]</i>
4.	Title of position:	
	Name of candidate:	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment: for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]</i>

5.	Title of position: <i>[insert title]</i>	
	Name of candidate	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment: for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]</i>

**Form PER-2: Resume and Declaration
Key Personnel**

Name of Bidder

Position [#1]: <i>[title of position from Form PER-1]</i>		
Personnel information	Name:	Date of birth:
	Address:	E-mail:
	Professional qualifications:	
	Academic qualifications:	
	Language proficiency: <i>[language and levels of speaking, reading and writing skills]</i>	
Details	Address of employer:	
	Telephone:	Contact (manager / personnel officer):
	Fax:	
	Job title:	Years with present employer:

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

Project	Role	Duration of involvement	Relevant experience
<i>[main project details]</i>	<i>[role and responsibilities on the project]</i>	<i>[time in role]</i>	<i>[describe the experience relevant to this position]</i>

Declaration

I, the undersigned Key Personnel, certify that to the best of my knowledge and belief, the information contained in this Form PER-2 correctly describes myself, my qualifications and my experience.

I confirm that I am available as certified in the following table and throughout the expected time schedule for this position as provided in the Bid:

Commitment	Details
Commitment to duration of contract:	<i>[insert period (start and end dates) for which this Key Personnel is available to work on this contract]</i>
Time commitment:	<i>[insert the number of days/week/months/ that this Key Personnel will be engaged]</i>

I understand that any misrepresentation or omission in this Form may:

- (a) be taken into consideration during Bid evaluation;
- (b) my disqualification from participating in the Bid;
- (c) my dismissal from the contract.

Name of Key Personnel: *[insert name]*

Signature: _____

Date: (day month year): _____

Countersignature of authorized representative of the Bidder:

Signature: _____

Date: (day month year): _____



Appendix D to Technical Part: Bidder's Qualification

To establish its qualifications to perform the contract in accordance with Section III (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder.



Form ELI -1.1 Bidder Information Form
Date: _____ RFB _____ No. _____ and _____ title: _____ Page _____ of _____ pages
Bidder's name
In case of Joint Venture (JV), name of each member:
Bidder's actual or intended country of registration: <i>[indicate country of Constitution]</i>
Bidder's actual or intended year of incorporation:
Bidder's legal address [in country of registration]:
Bidder's authorized representative information Name: _____ Address: _____ Telephone/Fax numbers: _____ E-mail address: _____
1. Attached are copies of original documents of <input type="checkbox"/> Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITB 4.4. <input type="checkbox"/> In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. <input type="checkbox"/> In case of state-owned enterprise or institution, in accordance with ITB 4.6 documents establishing: <ul style="list-style-type: none">• Legal and financial autonomy• Operation under commercial law• Establishing that the Bidder is not under the supervision of the Employer
2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.



Form ELI -1.2

Bidder's JV Information Form

(to be completed for each member of Bidder's JV)

Date: _____

RFB _____ No. _____ and _____ title: _____

Page _____ of _____ pages

Bidder's JV name:
JV member's name:
JV member's country of registration:
JV member's year of constitution:
JV member's legal address in country of constitution:
<p>JV member's authorized representative information</p> <p>Name: _____</p> <p>Address: _____</p> <p>Telephone/Fax numbers: _____</p> <p>E-mail address: _____</p>
<p>1. Attached are copies of original documents of</p> <p><input type="checkbox"/> Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITB 4.4.</p> <p><input type="checkbox"/> In case of a state-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and that they are not under the supervision of the Employer, in accordance with ITB 4.6.</p> <p>2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.</p>

Form CON – 2

Historical Contract Non-Performance, Pending Litigation and Litigation History

Bidder's Name: _____

Date: _____

RFB No. and title: _____

Page _____ of _____ pages

Non-Performed Contracts in accordance with Section III, Evaluation and Qualification Criteria			
<input type="checkbox"/> Contract non-performance did not occur since 1 st January <i>[insert year]</i> specified in Section III, Evaluation and Qualification Criteria, Sub-Factor 2.1.			
<input type="checkbox"/> Contract(s) not performed since 1 st January <i>[insert year]</i> specified in Section III, Evaluation and Qualification Criteria, requirement 2.1			
Year	Non-performed portion of contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and INR equivalent)
<i>[insert year]</i>	<i>[insert amount and percentage]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for non-performance: <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>
Pending Litigation, in accordance with Section III, Evaluation and Qualification Criteria			
<input type="checkbox"/> No pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3.			
<input type="checkbox"/> Pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3 as indicated below.			

Year of dispute	Amount in dispute (currency)	Contract Identification	Total Contract Amount (currency), INR Equivalent (exchange rate)
		Contract Identification: _____ Name of Employer: _____ Address of Employer: _____ Matter in dispute: _____ Party who initiated the dispute: _____ Status of dispute: _____	
		Contract Identification: Name of Employer: Address of Employer: Matter in dispute: Party who initiated the dispute: Status of dispute:	
Litigation History in accordance with Section III, Evaluation and Qualification Criteria			
<input type="checkbox"/> No Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4. <input type="checkbox"/> Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4 as indicated below.			
Year of award	Outcome as percentage of Net Worth	Contract Identification	Total Contract Amount (currency), INR Equivalent (exchange rate)



<i>[insert year]</i>	<i>[insert percentage]</i>	Contract Identification: <i>[indicate complete contract name, number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Matter in dispute: <i>[indicate main issues in dispute]</i> Party who initiated the dispute: <i>[indicate "Employer" or "Contractor"]</i> Reason(s) for Litigation and award decision <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>
----------------------	----------------------------	--	------------------------

ON BIDDER LETTER HEAD

Ref.: _____

Date: _____ xxxx, 20xx

DECLARATION

To:

*Chief Executive Officer
Port Blair Smart Projects Limited
Indira Bhavan
Port Blair Municipal Council,
Mohanpura, PortBlair 744101
Email: smartcityportblair@gmail.com*

**Sub.: SETTING UP OF 42.0 KLD FAECAL SLUDGE TREATMENT PLANT (FSTP)
FOR PORT BLAIR SMART PROJECTS LIMITED (PBSPL), ANDAMAN &
NICOBAR**

Dear Sir,

I hereby declare that (Bidder) has not been Debarred / Black Listed / termination of contract except for reasons of convenience of client by any Government/ Government Board/ Corporation/ company/ Statutory Body/ PSU company / Government of any sovereign countries/ and funding Agencies as on date of submission.

Yours faithfully,

(Signature of the Bidder) :
Name :
Designation :
Seal :
Date :
Business Address :

Form FIN – 3.1
Financial Situation and Performance

Bidder's Name: _____
 Date: _____
 JV Member's Name _____
 RFB No. and title: _____
 Page _____ of _____ pages

1. Financial data[#]

Type of Financial information in (currency)	Historic information for previous _____ years, (amount in currency, currency, exchange rate*, in INR equivalent)				
	Year 1	Year 2	Year 3	Year 4	Year 5
Statement of Financial Position (Information from Balance Sheet)					
Total Assets (TA)					
Total Liabilities (TL)					
Total Equity/Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (WC)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Cash Flow Information					
Cash Flow from Operating Activities					

*Refer to ITB 15 for the exchange rate

The Financial Certificate shall be certified by the Chartered Accountant.

Form FIN - 3.2:

Average Annual Turnover

(See Section III, Evaluation and Qualification Criteria, Sub-Factor 3.2)

Bidder's Name: _____
Date: _____

S. No.	Financial Year	Annual Construction Turnover (INR Crore)
1	Financial Year 2015-16	
2	Financial Year 2016-17	
3	Financial Year 2017-18	

Note: The audited Financial Statements for the corresponding year has to be attached.

Name of the auditor issuing the certificate

Name of the auditor's Firm:

Seal of the auditor's Firm:

Date:

(Signature, name and designation of the authorised signatory for the Auditor's Firm)

* See Section III, Evaluation and Qualification Criteria, Sub-Factor 3.2.



Form FIN – 3.3
Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as specified in Section III (Evaluation and Qualification Criteria)

Financial Resources		
No.	Source of financing	Amount (INR equivalent)
1		
2		
3		

Form FIN – 3.4
Current Contract Commitments / Works in Progress

Bidders and each member to a JV should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Current Contract Commitments					
No.	Name of Contract	Employer's Contact Address, Tel, Fax	Value of Outstanding Work [Current INR Equivalent]	Estimated Completion Date	Average Monthly Invoicing Over Last Six Months [INR month]
1					
2					
3					
4					
5					



**Form EXP - 4.1
General Construction Experience**

Bidder's Name: _____
Date: _____
JV Member's Name _____
RFB No. and title: _____
Page _____ of _____ pages

Starting Year	Ending Year	Contract Identification	Role of Bidder
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	



Form EXP - 4.2(a)

Specific Construction and Contract Management Experience

Bidder's Name: _____

Date: _____

JV Member's Name _____

RFB No. and title: _____

Page _____ of _____ pages

Similar Contract No.	Information			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor <input type="checkbox"/>	Member in JV <input type="checkbox"/>	Management Contractor <input type="checkbox"/>	Sub-contractor <input type="checkbox"/>
Total Contract Amount			INR	
If member in a JV or sub-contractor, specify participation in total Contract amount				
Employer's Name:				
Address:				
Telephone/fax number				
E-mail:				



Form EXP - 4.2(a) (cont.)

Specific Construction and Contract Management Experience (cont.)

Similar Contract No.	Information
Description of the similarity in accordance with Sub-Factor 4.2(a) of Section III:	
1. Amount	
2. Physical size of required works items	
3. Complexity	
4. Methods/Technology	
5. Construction rate for key activities	
6. Other Characteristics	

Letter of Bid - Financial Part

Date of this Bid submission: *[insert date (as day, month and year) of Bid submission]*

Request for Bid No.: *[insert identification]*

To:

*Chief Executive Officer
Port Blair Smart Projects Limited
Indira Bhavan
Port Blair Municipal Council,
Mohanpura, PortBlair 744101
Email: smartcityportblair@gmail.com*

We, the undersigned, hereby submit the second part of our Bid, the Bid Price and Bill of Quantities. This accompanies the Letter of Technical Part.

In submitting our Bid, we make the following additional declarations:

- (a) **Bid Validity Period:** Our Bid shall be valid for a period specified in BDS 18.1 (or as amended if applicable) from the date fixed for the Bid submission deadline specified in BDS 22.1 (or as amended if applicable), and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (b) **Commissions, gratuities and fees:** We have paid, or will pay the following commissions, gratuities, or fees with respect to the Bidding process or execution of the Contract: *[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity].*

Name of Recipient	Address	Reason	Amount

(If none has been paid or is to be paid, indicate “none.”)

Name of the Bidder: **[insert complete name of person signing the Bid]*

Name of the person duly authorized to sign the Bid on behalf of the Bidder: ** *[insert complete name of person duly authorized to sign the Bid]*

Title of the person signing the Bid: *[insert complete title of the person signing the Bid]*

Signature of the person named above: *[insert signature of person whose name and capacity are shown above]*

Date signed *[insert date of signing]* **day of** *[insert month]*, *[insert year]*

*: In the case of the Bid submitted by a Joint Venture specify the name of the Joint Venture as Bidder.

** : Person signing the Bid shall have the power of attorney given by the Bidder. The power of attorney shall be attached with the Bid Schedules

PAYMENT SCHEDULE/SCHEDULE OF PRICES

Name of the Project: SETTING UP OF 42.0 KLD FAECAL SLUDGE TREATMENT PLANT (FSTP) FOR PORT BLAIR CITY, ANDAMAN & NICOBAR PREAMBLE

1. The parameters given by Employer are only as a guideline. Contractor shall carryout his own survey, investigation and design the system as per requirements as specified in the bid document and whatever else is necessary for successful completion of the works. The system should be designed in such a way that it meets all Architectural, Urban Planning, Engineering requirements of project, including Performance Criteria as Specified, functional requirements, feasibility requirements. The quoted bid price is deemed to be covered with all activities those are required to complete the work as per the conditions of contract, scope of work and technical specifications and as per RFB, even if such items are not included in the given schedule.
2. Tender drawings given in the bid document are indicative. Contractor shall submit his own detailed design and drawings including all GA drawings, Civil / Electrical / Mechanical / Instrumentation / Structural drawings, detailed construction drawings etc. as per specification and works requirement. The designs and drawings shall be approved from Engineer in Charge before executing the work.
3. Contractor has to get familiar with site conditions such as location, approach, availability of water, power, nearby features such as canal, Roads, Highways, Residential areas and plots, accessibility, weather conditions, including flood levels, flood conditions, high flood level, labour conditions, bye laws and local rules, safety rules and regulations, labour hire policy and insurance policies etc. prior to quoting. No extra claim will be entertained to Contractor for ignorance of site conditions as mentioned above or any other such conditions.
4. *The overall contract price shall be inclusive of royalties, Goods and Service Tax (GST) and other applicable duties/taxes, if any.*
5. *Bidder who meet the requirement of Technical Eligibility Criteria and who would offer the Least Quote (LI) of summation of Construction Cost and NPV of Operation and Maintenance Cost will be awarded the Contract.*
6. The bidder shall quote price for the total work of design, engineering, supply, construction, erection, testing and commissioning along with defect liability period as mentioned in RFB.

Section V - Eligible Countries

Eligibility of Procurement for the Provision of Goods, Works and Non-consulting Services in the projects financed by Government of India/ State Government in India/ Government Board/ Corporation/ company/ Statutory Body/ PSU company / Government of any sovereign countries/ and funding Agencies

In reference to ITB 4.8 and ITB 5.1, the bidders are requested to check the eligibilities of the countries for procurement of goods, works and Non-consulting Services whether declared prohibited/ ineligible/ debarred/ blacklisted for trade and/or procurement by the Government of India (GoI)/ any State Government in India/ Government Board/ Corporation/ company/ Statutory Body/ PSU company / Government of any sovereign countries/ and funding Agencies. During the Contract agreement, if at any time GoI declares the prohibition of trade/procurement of goods, works, Non-consulting services from country/countries, the same shall be applicable w.e.f. the date of enforcement declared by the Government of India.

Section VI - Fraud and Corruption

- 6.1 The Bidders and their respective officers, employees, agents and advisers shall observe the highest standard of ethics during the Bidding Process and subsequent to the issue of the Letter of Acceptance and/or Letter of Award and during the subsistence of the Contract Agreement. Notwithstanding anything to the contrary contained herein, or in the Letter of Acceptance and/or Letter of Award or the Contract Agreement, the Employer shall reject a Bid, withdraw the Letter of Acceptance and/or Letter of Award, or terminate the Contract Agreement, as the case may be, without being liable in any manner whatsoever to the Bidder or Contractor or Concessionaire, as the case may be, if it determines that the Bidder or Contractor or Concessionaire, as the case may be, has, directly or indirectly or through an agent, engaged in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice in the Bidding Process. In such an event, the Employer shall forfeit and appropriate the Bid Security or Performance Security, as the case may be, as mutually agreed genuine pre-estimated compensation and damages payable to the Employer towards, inter alia, time, cost and effort of the Employer, without prejudice to any other right or remedy that may be available to the Employer hereunder or otherwise.
- 6.2 Without prejudice to the rights of the Employer under Clause 6.1 hereinabove and the rights and remedies which the Employer may have under the Letter of Acceptance and/or Letter of Award or the Contract Agreement, if a Bidder or contractor or Concessionaire, as the case may be, is found by the Employer to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Bidding Process, or after the issue of the Letter of Acceptance and/or Letter of Award or the Contract Agreement or the execution of the Contract Agreement, such Bidder or Contractor or Concessionaire shall not be eligible to participate in any tender or RFB issued by the Employer during a period of 3 (three) years from the date such Bidder or Contractor or Concessionaire, as the case may be, is found by the Employer to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practices, as the case may be.
- 6.3 For the purposes of this Clause 6, the following terms shall have the meaning hereinafter respectively assigned to them:
- (a) “corrupt practice” means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the actions of any person connected with the Bidding Process (for avoidance of doubt, offering of employment to or employing or engaging in any manner whatsoever, directly or indirectly, any official of the Employer who is or has been associated in any manner, directly or indirectly with the Bidding Process or the Letter of Acceptance and/or Letter of Award or has dealt with matters concerning the Contract Agreement or arising therefrom, before or after the execution thereof, at any time prior to the expiry of

one year from the date such official resigns or retires from or otherwise ceases to be in the service of the Employer, shall be deemed to constitute influencing the actions of a person connected with the Bidding Process); or (ii) engaging in any manner whatsoever, whether during the Bidding Process or after the issue of the Letter of Acceptance and/or Letter of Award or after the execution of the Contract Agreement, as the case may be, any person in respect of any matter relating to the Project or the Letter of Acceptance and/or Letter of Award or the Contract Agreement, who at any time has been or is a legal, financial or technical adviser of the Employer in relation to any matter concerning the Project;

- (b) “fraudulent practice” means a misrepresentation or omission of facts or suppression of facts or disclosure of incomplete facts, in order to influence the Bidding Process ;
- (c) “coercive practice” means impairing or harming, or threatening to impair or harm, directly or indirectly, any person or property to influence any person’s participation or action in the Bidding Process;
- (d) “undesirable practice” means (i) establishing contact with any person connected with or employed or engaged by the Employer with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the Bidding Process; or (ii) having a Conflict of Interest; and
- (e) “Restrictive practice” means forming a cartel or arriving at any understanding or arrangement among Bidders with the objective of restricting or manipulating a full and fair competition in the Bidding Process.



PART 2 –Works’ Requirements

Section VII - Works' Requirements

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Chapter-8 Testing, Erection and Commissioning and Trial Run of the Plant

Chapter-9 Operation and Maintenance Requirements

Chapter-10 Indicative Concept design drawings

Chapter-1

Project Requirements

1.1 Background of the project;

Port Blair city is the capital of the Andaman and Nicobar Islands, an archipelago and a union territory of India situated in the Bay of Bengal. It serves as an entry point to one of the major tourist destinations in India i.e. Andaman and Nicobar Islands. Port Blair Municipal Council is the urban local body governing the city.

Due to its undulating terrain, the municipal council is unable to implement a centralized sewerage system. The population is now being served by a non sewerage system. All the households have access to toilet linked to septic tanks. The commercial properties also have sewage treatment plants which have sludge holding tanks. These containment units are emptied when full and the sludge is disposed-off at the designated landfill site under the control on municipal council.

1.2 Proposed Faecal and Septage Treatment;

In order to complete the sanitation value chain, a faecal sludge/septage treatment plant and a system for safe disposal/reuse of end products is required. This document creates the foundation for the treatment and 100% reuse of the end product, making the treatment plant zero discharge plant. The scheme consists of natural treatment process for solid liquid separation and anaerobic digestion and further to process the separated solids and liquid, mechanized treatment components have been proposed. The solids will undergo dewatering through belt press filter and further disinfected using heat drying. The solids will be further reused in the co composting by municipal council. The liquid will be treated using MBBR technology and the treated water will be used as process water, flushing and landscaping.

The total capacity of the treatment plant is 42 KLD comprising of 30 KLD of the settling thickening tank and 12 KLD of anaerobic digester. The solid and liquid treatment process has the capacity of handling 4 KLD and 42 KLD of flow respectively.

1.3 Description of Works

The Faecal Sludge & Septage Treatment Plant shall comprise the following components:

- (i) To accord all the Environmental clearances i.e. CRZ, land use change or any other relevant one & related to project specific from state or national authority.

- (ii) Components and unit processes as described in Part 8 (Process Requirements) of this section of bid document.
- (iii) All functional buildings, structures, equipment, and any and all other items, accessories, and ancillaries required for proper functioning and operation of the above components and unit processes.
- (iv) Civil and Building Works for
 - Structures for electro-mechanical units
 - Internal pipeline systems and Channels
 - Roadways, Curbs, Pavements, Parking Spaces, and associated drainage
- (v) Complete Electrical Equipment and Systems
- (vi) Complete Mechanical Equipment and Systems
- (vii) Complete Instrumentation, Control, and Automation Equipment and Systems along with online monitoring system at effluent inlet and final treated water outlet point.
- (viii) Civil, Mechanical, Electrical, and Instrumentation, Control, and Automation for successful Erection, Installation, Testing, and Commissioning Services.

1.4 Scope of Work

The scope of this bid document is Faecal Sludge & Septage Management of Port Blair Town, Andaman & Nicobar - including:

- a) Supply, construction, installation, testing and commissioning of faecal sludge & septage treatment plant at Port Blair town; and
- b) Operation and maintenance of the above system for 5 years.

The detailed scope of work is as follows:

Civil Works;

- i. Survey & Investigations;
 - Geotechnical investigations, Environmental Clearances.
 - Faecal Sludge & Septage influent parameters lab analysis
- ii. Construction of 42 KLD capacity Faecal Sludge & Septage Treatment Plant including:
 - Receiving Station and Screening
 - Settling Thickening tank
 - Anaerobic Digester
 - Equalization Tank
 - Foundation work for Aeration Tank
 - Treated water tank
 - Access Road up to Faecal Sludge & Septage Treatment Plant and internal roads along with culverts.
 - Toilet, Washroom and Safety shower
 - Solid Handling room
 - Administrative Building

- Boundary Walls and Gates
- Drainage & Rain water System,
- Any other required storage tanks, i.e. sludge sump, centrate collection tank, etc.
- Any other required civil structure for elector-mechanical units.
- Security Room
- Panel/ DG Room
- Landscaping including green belt development within the site premises
- Dismantling/Clearing of site

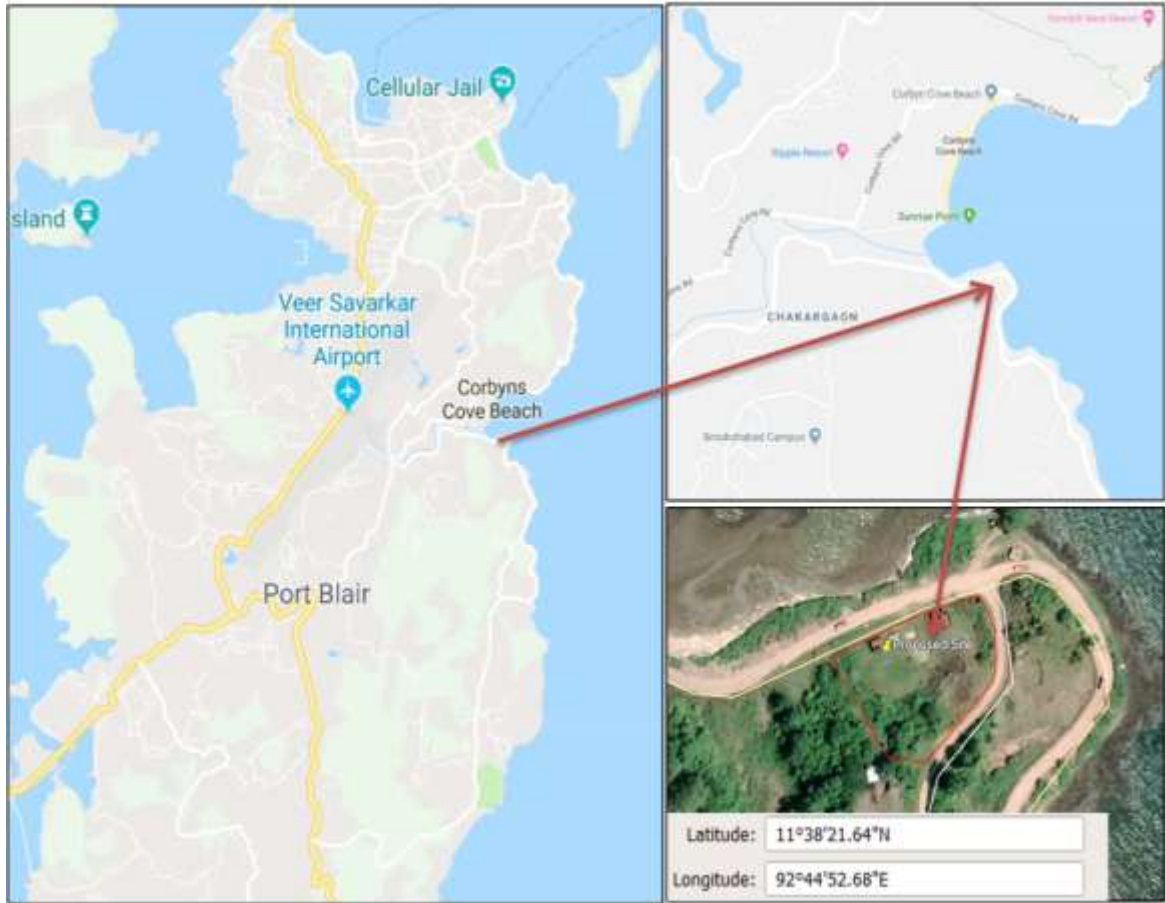
Mechanical Works;

- i. Coarse screen.
- ii. Mechanical Fine Screens with Conveyor Belt System.
- iii. Belt press
- iv. Drum thickener
- v. Rotary dryer
- vi. Liquid treatment scheme;
 - MBBR/Aeration Tank
 - Tube Settler
 - Dual Media Filter
 - Activated Carbon Filter
 - Chlorine dosing
- vii. Other chemical dosing system i.e. poly, lime, etc.
- viii. Required Pumps, Piping and valves system for all units
- ix. In addition to above, all necessary pipes and associated mechanical item required for the proper functioning of Faecal Sludge & Septage Treatment Plant are to be covered
- x. Desludging truck having load carrying capacity of 4KL as per the specification
- xi. Water tanker of water storage capacity 5 KL
- xii. GPS system for the Desludging vehicles (4Nos)
- xiii. CCTV system at proper location of site.

Electrical & Instrumentation Works;

- i. Supply, installation, testing and commissioning of complete electrical system as required for providing power to all the equipment's and accessories of FSSTP, Buildings, Facilities and Roads.
- ii. Diesel Generator set
- iii. Solar Power System
- iv. Installation of flowmeters and Online Monitoring system.
- v. Installation of other necessary equipment's like pressure switches, level transmitters, etc. as per good engineering practice.
- vi. In addition to above, all necessary pipes and associated E&I items for the proper functioning of Faecal Sludge & Septage Treatment Plant are to be covered

1.5 Site location;



Chapter-2

General Requirements

This Part sets out the technical requirements that are general to the Contract

2.1 Technical Standards and Regulations

Except where otherwise specified in the bid document plant, materials and workmanship shall comply with the requirements of the relevant Indian Standards (hereinafter referred to as IS) issued by the Bureau of Indian Standards (BIS). Other equivalent National or International Standard Specifications such as those issued by the International Organisation for Standardisation (ISO) or the International Electro technical Commission (IEC) may be substituted by the Contractor (so as long as they are more stringent than the equivalent IS) at the sole discretion of the Employer's Representative or as may have been agreed in the Contract. All standards used shall be the current and latest version.

All works shall comply with all relevant statutory regulations and standards current at date of bids, unless otherwise indicated within the Employer's Requirements.

All materials, plant and equipment shall be new and all materials and workmanship not fully specified herein or covered by an approved standard shall be of such kind as is used in first class work and suitable to the climate in the project area.

Where reference is made in the Specification to a British Standard Specification (hereinafter abbreviated to 'B.S.')

issued by the British Standards Institution of 2, Park street, London W.I., or to an Indian Standard Specification (I.S.) issued by the Bureau of Indian Standards, (earlier known as Indian Standards Institution), Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002, or American Society for Testing and Materials (ASTM) issued by ASTM 1916 Race Street, Philadelphia, P.A., 19103, U.S.A. or American National Standards Institute (ANSI) issued by ANSI 1430, Broadway, New York, N.Y., 10018, U.S.A. or to any other equivalent Standard it shall be to the latest revision of that Standard at the Tender opening date.

All details, materials and equipment supplied and workmanship performed shall comply with these Standards. If the Bidder offers equipment to other Standards, the equipment/material should be equal or superior to those specified and shall be subject to approval by the Employer's Representative and full details of the difference shall be supplied by the Contractor.

In the event of conflict between this Specification and the Codes for equipment, the most stringent provision shall govern, except as otherwise approved by the Employer. Certain specifications issued by national or other widely recognised bodies are referred to in this Specification. Such specifications shall be defined and referred to

hereinafter as Standard Specifications. In referring to the Standard Specifications the following abbreviations are used:

IS : Indian Standard

ANSI: American National Standards Institute

API: American Petroleum Institute

ASME: American Society of Mechanical Engineers

ASTM: American Society of Testing and Materials

AWS: American Welding Society

AWWA: American Water Works Association

ISO: International Organisation for Standardisation

DIN: Deutsches Institute fur Normung

BS: British Standard

IEC: International Electrotechnical Commission

IEE: Institution of Electrical Engineers

IEEE : Institute of Electrical and Electronic Engineers

NEMA : National Electrical Manufacturers Association

AGMA : American Gear Manufacturer's Association

2.2 Precedence of Employer's Requirements

The requirements specified in the Project and Process Requirements parts, shall be in addition to those specified in the General Requirements parts. In case of conflict between the parts, the requirements of the Project and Process Requirements parts shall take precedence.

2.3 Units of Measurement

All designs, drawings, specifications and manuals shall use SI units and all measurements, dimensions and performance data shall be quoted in those units.

2.4 Programme

The Contractor shall submit within in the stipulated time detailed contract programme for approval, which shall include details of all temporary and permanent works, construction procedures and methodologies.

In addition to the requirements set down in the Conditions of Contract the programme shall include the following details:

- a) Contractor's organisational family tree for the Contract including details of all site supervisors and their responsibilities;
- b) A statement giving the numbers and categories of supervisory and technical staff and skilled and unskilled labour to be employed on the Works;

- c) A list and type details of major constructional plant (including vehicles) which the Contractor proposes to employ on the Works, including programmed dates for order and delivery;
- d) Details of the Contractor's methods of working for all operations;
- e) A statement giving the proposals for location or locations and sizes of offices, workshops and stores at the Site;

A complete resource allocation showing the number of units and allotted times for each unit of constructional plant, materials and labour allocated to each part of the Works;

The programme shall be co-ordinated to take into account the requirements of climatic, groundwater and other conditions to provide for the completion of the Works in accordance with the Contract.

The programme shall be prepared using MS Project software and other latest software shall be submitted in both electronic softcopy and paper hardcopy form.

2.5 Contract Management

The Contractor shall be responsible for administration of the Contract from award of Contract through design, manufacture, manufacturer's works testing, and delivery of Plant to Site installation, testing and performance testing to final take over. For this purpose he shall nominate a Contractor's Representative who shall be fully responsible for and undertake this administration.

2.6 Assistance to the Employer's Representative

The Contractor shall provide all necessary assistance to the Employer's Representative and his staff in carrying out their duties of checking, inspecting, and measuring the Works. The Contractor shall provide, at no additional cost, chainmen, staffmen, office attendants, and labourers as may be needed from time to time by the Employer's Representative.

The Contractor shall provide for the Employer's Representative and his staff, consultants and their staff and visitors such protective clothing, safety helmets and rubber boots of suitable sizes, hand lamps and the like as may be reasonably required by them. These articles shall remain the property of the contractor. No extra payment shall be made on this account.

2.7 Erection of Plant

Plant shall be erected in a neat and workmanlike manner on the foundations and at the locations shown on the Approved Drawings. Unless otherwise directed by the Employer's Representative, the Contractor shall adhere strictly to the aforesaid drawings.

The Contractor shall be responsible for setting up and erecting the Plant to the line and level required and shall ensure that all Plant is securely held and remains in correct alignment before, during and after grouting-in. This responsibility shall not be passed to any other contractor.

Any damage caused by the Contractor during the course of erection to new or existing plant or building or any part thereto, the Contractor shall at his own cost, make good, repair or replace the damage, promptly and effectively as approved by the Employer's Representative.

2.8 Languages

All drawings, instructions, signs, notices, name-plates, etc. for use in the design, construction, operation and maintenance of the Works shall be in English.

All site sign boards and warning signs shall be in Hindi and English Languages.

2.9 Drawings and Information to be provided

Drawings and all other submittals required by this contract shall be submitted in editable electronic softcopy format on CD(s) or DVD(s) as well as in hardcopy paper format.

The softcopy format for various items shall be as follows:

- Drawings: AutoCAD Latest version
- Text Documents: Microsoft Word version 2007
- All programmes and schedules related to the project: Microsoft Project version 2007
- Spreadsheets, calculations, tables, technical schedules, prices schedules, and other numerical data: Microsoft Excel version 2007
- Databases: Microsoft Access version 2007
- All other required information not included in the above: Adobe Portable Document Format (PDF) version 7.x
- The hardcopy format/sizes for various items shall be as follows:
- Drawings: Standard A1 size paper. The scale for each drawing shall be selected such that the information is presented without any clutter or ambiguity and is clearly and easily legible without the use of magnifying aids other than a reader's normal eye-glasses.
- All other information: Standard A4 or A3 paper size, except for any pre-printed standard information such as brochures or catalogue information, which may be submitted in the original size and format.

2.10 Pre-contract Drawings

The Pre-contract Drawings are those issued to Bidders either with the Bidding Documents for the purpose of illustrating and clarifying the Works described in the Employer's Requirements or later during the bidding period as part of an Addendum to the Contract Documents.

Such drawings shall be deemed to have been issued for the guidance of Bidders.

2.11 Bid Drawings and Details

The Bid Drawings are those furnished by a Bidder with his Bid for the purpose of illustrating and clarifying his proposals.

2.11.1 General and Process;

- (i) Narrative Description of the Works
- (ii) Plant Operation and Control Philosophy
- (iii) Sizing and Design Calculations covering all Major Unit Processes and components of the Works
- (iv) List of all structures (basins, tanks, channels, buildings, etc.) including dimensions and freeboards
- (v) Major Equipment List
- (vi) All Equipment Catalogues and selection chart (with all relevant manufacturers' documentation).
- (vii) Major Piping Schedule to include service (process stream), installation type (e.g., buried, exposed, submerged, etc.), size, material, coating, lining, joint type(s), gauge/thickness, pressure rating, testing protocol, design standards
- (viii) Major Valve Schedule to include service (process stream), installation type (e.g., buried, exposed, submerged, etc.), size, type, material, joint type(s), pressure rating, differential pressure rating, testing protocol, design standards, operator/actuator type, and whether Open/Close or Modulating.
- (ix) Major Gate Schedule to include service (process stream), installation type (e.g., buried, exposed, submerged, etc.) size, type, differential head, seating or unseating, testing protocol, design standards, operator/actuator type, and whether Open/Close or Modulating
- (x) Plant Layout
- (xi) Hydraulic Profile
- (xii) Process Flow Diagram
- (xiii) Process and Instrumentation Diagrams (P&IDs)
- (xiv) Electrical Load List & Power Consumption Chart.
- (xv) List of Chemical Consumption on Daily/ Monthly Basis.

2.11.2 Mechanical;

Data sheets for various mechanical equipments shall be submitted by the bidder.

2.11.3 Electrical & Instrumentation;

Data sheets for various electrical & instrumentation equipments shall be submitted by the bidder.

- (i) Electrical Load List.
- (ii) Electrical Single Line Diagram
- (iii) Sizing Calculations for Transformers and DG Sets.
- (iv) Specific Energy Consumption
- (v) Technical Schedules for Electrical Works duly filled in.
- (vi) Instrumentation
- (vii) Construction schedule

2.12 Details of Drawings and Calculations to be submitted by the Contractor for Approval

Drawings / Calculations for approval shall be submitted by the selected Contractor after award of the contract in two Phases.

The first phase shall be the Preliminary Drawings / Designs. Drawings / Designs submitted during this phase shall be of sufficient detail for the Employer and Employer's Representative to understand in outline the Contractor's proposals for the design and construction of the Works. The lists provided below shall not be considered comprehensive. The Contractor shall be responsible for including any and all drawings and information for any and all works that may be necessary for full and complete definition or clarification of the design, regardless of whether or not such drawings, information, or works are explicitly included in the lists below or elsewhere in these bid documents.

- The Preliminary Drawings / Designs shall inter alia comprise:
 - Detailed Description of the proposed Septage Treatment Plant and Treatment Process offered (including Raw and Treated Sewage Quality).
 - Detailed Plant Operation and Control Philosophy;
 - Detailed Process Design Calculations / Mass Balance Calculations covering all Units/ Equipment.
 - Detailed List of Units including Unit Dimensions/ Free Boards.
 - Detailed Equipment List
 - Major Equipment /Instrument Specifications (with supporting Brochures).
 - Major Piping Schedule to include size, material, coating, lining, gauges/thickness, and pressure rating

- Major Valve Schedule to include size, type, material, pressure rating, operator/actuator type, and whether Open/Close or Modulating
- Gate Schedule to include size, type, differential head, seating or unseating, operator/actuator type, and whether Open/Close or Modulating
- Detailed Plant Layout (including Pipe Sizes/ Pipe Routing/ Channel Size/ Channel Routing/ Site Roads/ Site Drainage)
- Detailed Hydraulic Profile including Hydraulic Calculations;
- Detailed Process Flow Diagram (inclusive of Mass Balance)
- Process and Instrumentation Diagram (P&ID).
- Detailed Electrical Load List
- Transformer sizing calculation
- D.G sizing calculation
- Detailed Chemical Consumption Calculations (Daily/ Monthly Basis).
- Full Hazardous Area Classification Analysis and Report per IS 5572
- Hazardous Area Classification Drawings per IS 5572

The second phase shall be the Detailed Engineering Design phase and shall comprise the submission of the Detailed Mechanical/ Electrical/ Instrumentation/ Structural/ Civil Construction Drawings and Calculations. These shall be submitted after the approval of the Preliminary Drawings. The lists provided below shall not be considered comprehensive. The Contractor shall be responsible for including any and all drawings and information for any and all works that may be necessary for full and complete definition or clarification of the design, regardless of whether or not such drawings, information, or works are explicitly included in the lists below or elsewhere in these bid documents.

2.13 As-Built Drawings

These drawings shall be compiled by the Contractor and shall constitute a permanent record of the Works as executed. These shall include all such drawings, schedules, documentation and calculations as necessary for a complete understanding of the Works design, operation and maintenance.

The As-Built Drawings shall consist of the fully up-dated versions of the approved Construction Documents incorporating any additional information which will assist the Employer in operating, maintaining and if necessary modifying or extending the Works at a later date. These drawings should extend and supplement the information given in the Operating and Maintenance Manuals.

A3 and smaller sized As-Built Drawings shall be provided on durable paper for reproduction by photocopier. As-Built Drawings larger than A3 sized shall be provided as a paper copy and also produced in the form of black lines on a durable translucent film from which further paper prints can be taken by others as required. In

addition drawings shall be provided as an AutoCAD software copy in editable form in Compact Disc (CD) in two sets.

Other related information shall be provided in hardcopy as well as editable softcopy format (Microsoft Word, Excel, Access, or Project).

2.14 Operating and Maintenance Manuals

The Contractor shall compile operating, maintenance and overhauling instructions for the whole of the Plant.

The instructions shall consist of one volume of:

- a) General descriptive text (including drawings for illustration) of the Works described section by section.
- b) Complete operational instructions for the sewage treatment plant. This shall be termed the Operators Manual. It shall be aimed at the operational staff and shall be written in clear unambiguous text complete with drawings which necessary for clarification of any issues. The manual shall comprehensively detail what to do on a day to day basis and also what to do in the event of faults develop. It shall in addition provide a complete list of the process maintenance tasks the operator should carry out including the intervals between these tasks.
- c) Essential instructions for mechanical and electrical maintenance of the Plant. These instructions shall be short and concise and set out in a consolidated schedule the inspection, lubrication, cleaning and any other type of servicing operations required.
- d) The Contractor shall prepare typical maintenance log sheets that the Employer can subsequently use for daily, weekly, monthly or other periodic maintenance and shall form record sheets of plant maintenance operations.
- e) Instructions for use of skilled maintenance personnel in fault location, carrying out routine replacements, withdrawing, dismantling, overhauling, re-assembling and testing the various items of Plant.
- f) Manufacturer's Technical Documentation.
- g) Civil As-Built Drawings.
- h) Comprising the FDS and PLC code.
- i) Electrical As-Built Drawings: The electrical drawings shall be complete sets including all information necessary for maintenance and spares replacement.
- j) Control and instrumentation As-Built Drawings: The drawings shall be complete sets including all information necessary for maintenance and spares replacement.
- k) Mechanical As-Built Drawings: The mechanical drawings shall be complete sets including all information necessary for maintenance and spares replacement.

- l) Electrical and mechanical building services As-Built Drawings: The drawings shall be complete sets including all information necessary for maintenance and spares replacement.
- m) FAT records for the Plants and Works.
- n) SAT records for the Plants and Works.

Each volume shall be subdivided (relating to areas of plant) into sub sections or sub-volumes in order to ease the location of plant details. Each volume or sub volume shall be provided with a comprehensive index for the volume or sub-volume concerned and the O & M manual as a whole.

Each volume shall be enclosed within A4 and A3 ring binders having tough grease resistant covers suitable for use on site and designed to permit the easy removal and insertion of the contents. The front cover and spine of each volume shall show details of the project, Employer, Employer's Representative and a volume title.

Text shall generally be enclosed in A4 ring binders, A3 drawings shall be enclosed within A3 ring binders except where they accompanies A4 text in which case they shall be folded. A1 drawings shall generally be folded and enclose in A4 box files. Where A1 drawings accompany text they shall be folded and enclosed in an A4 plastic wallet, one wallet per drawing.

2.15 Reinstatement and Compensation for Damage to Persons or Property

The Contractor shall reinstate all properties whether public or private which are damaged in consequence of the construction and operation & maintenance of the Works to a condition as specified and at least equal to that obtaining before his first entry on them.

2.16 Packing and Protection

Before any Plant is dispatched from a manufacturer's factory it shall be adequately protected and packed to ensure that it will arrive on the Site in an undamaged condition. The methods employed for protection and packing must be suitable for withstanding the conditions which may be experienced during shipment, delivery to the Site and prolonged periods of storage in the open, whether the items are shipped in packing cases, crates or only partially protected according to their nature.

Bright parts and bearing surfaces shall be protected from corrosion by applying a rust preventive lacquer, high melting point grease or similar temporary protection. A sufficient quantity of solvent shall be supplied with the plant to enable this coating to be removed on the Site.

All machined flanges and other mating surfaces shall be protected by means of wood templates. The bolts for securing these templates shall not be reused in the final installation.

No one crate or package shall contain items of Plant intended for incorporation in more than one part of the Works.

All items of Plant shall be clearly marked for identification against the packing list, which shall be placed in a waterproof envelope inside every packing case or crate.

Every packing case and crate shall be indelibly marked to show its weight, serial number, top and bottom, shipping marks and handling instructions or sling marks.

Electrical Plant shall be enclosed in sealed airtight packages with dehydrating material, before being placed in packing cases on shock-absorbent material and secured by means of battens.

2.17 Quality Assurance

The Contractor shall apply the formal requirements of Quality Assurance to the design, supply, construction and operation & maintenance of the Works. This shall be achieved through the implementation of a Quality System compliant with the requirements of BS 5750 or an equivalent International Standard.

2.18 Safety

The Contractor shall prepare a Safety Plan and submit the same to the Employer's Representative for approval within 28 days of receiving the Notice to Commence.

The Safety Plan shall be followed at all times by the Contractor and shall contain adequate control measures, in accordance with the relevant protection of property and local laws and regulations as well as internationally accepted good practice, for the prevention of accidents, fires and public nuisance.

2.19 Project Monitoring Consultant

Port Blair Smart Project Limited has appointed M/s URS as consultant (PMC), The scope of PMC is bid process management and project monitoring during construction phase.

The Project Monitoring Consultant is expected to play a positive and independent role in discharging its functions, thereby facilitating the smooth implementation and operation of the Project.

Chapter-3

Specifications for Civil Works

Materials and methods of construction for all civil works shall be as per relevant Indian standard specification, part of which are incorporated in the standard specification for Andaman & Nicobar Island and all will be followed during the execution of the work. The work shall be executed as per the guidelines and provisions of B.I.S. All materials shall conform to Indian standard code of practice National Building Code and CPHEEO manual to maintain quality of work.

3.1 Contractor's Responsibility

The information given hereunder and provided elsewhere is given in good faith but the Contractor shall satisfy himself regarding all aspects of site conditions and no claim whatsoever will be entertained on the plea that information supplied by the Engineers is erroneous or insufficient.

3.2 Construction Water

The Contractor shall make his own arrangement for the fresh water required for the manufacturing of the pipes, construction of civil works and testing of pipeline as well as for the potable water required for his factory & labour camps.

3.3 Construction Power

The Contractor shall make his own arrangement for supply of electrical energy required at his sites and the works from the local electricity board/Employer. The Contractor is forewarned that there can be interruptions in power supply for reasons beyond the control of the local Electricity Department and therefore, the Contractor is advised to make his standby arrangement to provide and maintain all essential power supply for his work area at his expense. The Contractor shall not be entitled to any compensation for any loss or damage to his machinery or any equipment or any consequential loss in progress of work and idle labour.

3.4 Survey

The Contractor shall, at his own expense provide and maintain survey stations which he may be required to carry out the works and shall remove the same on completion of the works. The Contractor shall, at his own expense, carry out all the necessary surveys, measurements and setting out of the works and shall for this purpose engage qualified and competent engineering surveyors.

3.5 Temporary Fencing

The Contractor shall, at his own expense, erect and maintain in good condition temporary fences and gates along the boundaries of the areas assigned, if any, to him by the Employer for the purpose of the execution of the works. The Contractor shall, except when authorized by the Engineer, confine his men, materials and plant within the site of which he is given possession. The Contractor shall not use any part of the site for purposes not connected with the works unless prior written consent of the Engineer has been obtained. Access shall be made to such areas only by way of approved gateways.

3.6 Sanitary Facilities

The Contractor shall provide and maintain in a clean and sanitary condition adequate W.Cs and wash places which may be required on the various parts of the site for use of his employees, to the satisfaction of the Engineer. The Contractor shall make all arrangements for the disposal of sewage or drainage in accordance with the directions of the Engineer.

3.7 Existing Services

Drains, pipes, cables, overhead electric wires and similar services encountered in the course of the works shall be guarded from injury by the Contractor at his own cost, so that they may continue in full and uninterrupted use to the satisfaction of the Employer and the Contractor shall not store materials or otherwise occupy any part of the site in a manner likely to hinder the operation of such services. Should any damage be done by the Contractor on any mains, pipes, cables or lines (whether above or below ground), whether or not shown on the drawings, the Contractor must make good or bear the cost of making good the same without delay to the satisfaction of the Engineer and of the Employer.

3.8 Local Roads and Haul Roads

The approach roads and other public roads in the state may be used by the Contractor to haul construction materials and equipment subject to restriction of load carrying capacity on the roads in particular over bridges and culverts. However, the Contractor will have to pay customary vehicles license and permit fees for use of public roads. The Contractor shall plan transportation of construction materials to site in such a way that road accidents are avoided.

3.9 Permission for Road Cuts

Wherever the Contractor considers that it is necessary to cut through an existing road or track he shall submit details to the Engineer for approval, a minimum of seven days before such work commence. In the event of cutting a road by the Contractor without permission from the Engineer the Contractor shall pay compensation as claimed by the owner of the road until it is restored at the cost of the erring Contractor. Trench Digging: Digging of trench by the Contractor beyond the length than that is specified by the Engineer shall invite penalty till such time the damage is restored.

3.10 Temporary Diversion of Roads

During the execution of the works the Contractor shall make at his cost all necessary provision for the temporary diversion of roads, cart-tracks, footpaths, drains, water courses, channels etc., Should he fail to do so, the same shall be done by the Engineer and the cost thereof will be recovered from the Contractor.

3.11 Excess Materials

The Contractor shall be responsible for the procurement of required quantity of materials like pipes, specials, machinery, electrical items etc. Any materials procured for the work, if found excess due to any reasons after completion of the works, shall be taken back by the Contractor and the Employer / Engineer shall not be responsible for such excess materials. Amount paid if any for such excess materials shall be deducted from any bills payable to the Contractor.

3.12 Tsunami Damages, etc.

The Contractor has to take risk insurance at his cost against losses due to unprecedented floods and other acts of God. No claim shall be entertained on this account and paid for.

3.13 Design Standards

All the designs shall be based on the latest Bureau of Indian Standard (BIS) Specifications or Codes of Practice. The design standards adopted shall follow the best engineering practice. In case of any variation or contradiction between the provisions of the BIS Standards or Codes and the specifications given along with the tender document, the provision given in this Specification shall be followed.

All reinforced concrete structural design shall generally conform to the following publications of the Indian Standards Institution:

- (i) I.S. 456 : Code of Practice for plain and reinforced concrete
- (ii) I.S. 875 : Code of Practice for design loads for buildings and structures (Part I to V)
- (iii) I.S. 3370 : Code of Practice for concrete structures for the storage of liquids (Part I to IV)
- (iv) I.S. 1893 : Criteria for earthquake resistant design of structures (Part-1)
- (v) I.S. 2974 : Code of Practice for design and construction of machine foundations (Part 1 to 4)
- (vi) I.S. 4326: Code of Practice for Earthquake Resistant Design and Construction of Buildings
- (vii) I.S. 13920: Ductile Detailing of Reinforced Concrete Structures subjected to Seismic forces- Code of Practice
- (viii) IRC: 6: Standard specification and Code of Practice for road bridges Loads and Stresses
- (ix) IRC: 21: Standard specification and code of practice for road bridge, section III Cement Concrete
- (x) IRC 78 : Standard specification and code of practice for road and bridge, section VII Foundation & Sub-Structures

All structural steel design shall generally conform to the following publications of the Indian Standards Institution:

- (i) I.S. 800 : Code of Practice for general construction in steel
- (ii) I.S. 806 : Code of Practice for use of steel tubes in general building construction

3.14 Design Life

The design life of all structures and buildings shall be 60 years.

3.15 Design Loadings

All buildings and structures shall be designed to resist the worst combination of the following loads/stresses under test and working conditions; these include dead load, live load, wind load as per I.S. 875 Part (III), seismic load as per seismic Zone-V, Earthquake load as per I.S. 1893, stresses due to temperature changes, shrinkage and creep in materials, and dynamic loads. Detailing of the reinforcement shall be done as per latest IS-13920 considering Earthquake Seismic Zone-V.

3.16 Standards for Material

- (i) IS: 269 - Specification for 33 grade ordinary Portland cement

- (ii) IS: 383 - Specification for coarse and fine aggregates from natural sources for concrete
- (iii) IS: 428 - Specification for distemper, oil emulsion, colour as required
- (iv) IS: 432 - Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement (Parts 1 & 2)
- (v) IS: 455 - Specification for Portland slag cement
- (vi) IS: 458 - Specification for precast concrete pipes (with and without reinforcement)
- (vii) IS: 650 - Specification for standard sand for testing of cement
- (viii) IS: 651 - Specification for salt glazed stoneware pipes and fittings
- (ix) IS: 808 - Specification for dimensions for hot rolled steel beam, column channel and angle sections
- (x) IS: 814 - Specification for covered electrodes for manual metal arc welding of Carbon and Carbon Manganese steel
- (xi) IS: 1003 - Specification for timber panelled and glazed shutters (Parts 1 & 2)
- (xii) IS: 1038 - Specification for steel doors, windows and ventilators
- (xiii) IS: 1077 - Specification for common burnt clay building bricks
- (xiv) IS: 1398 - Specification for packing paper, water proof, bitumen laminated
- (xv) IS: 1489 - Specification for Portland pozzolana cement (Parts 1 & 2)
- (xvi) IS: 1566 - Specification for hard drawn steel wire fabric for concrete reinforcement
- (xvii) IS: 1580 - Specification for bituminous compounds for water proofing and caulking purposes
- (xviii) IS: 1786 - Specification for high strength deformed steel bars and wires for concrete reinforcement
- (xix) IS: 1852 - Specification for rolling and cutting tolerances for hot rolled steel products
- (xx) IS: 1948 - Specification for aluminium doors, windows and ventilators
- (xxi) IS: 1977 - Specification for structural steel (ordinary quality)
- (xxii) IS: 2062 - Specification for steel for general structural purposes
- (xxiii) IS: 2185 - Specification for concrete masonry units (Parts 1 & 2)
- (xxiv) IS: 2202 - Specification for wooden flush door shutters (Parts 1 & 2)
- (xxv) IS: 2645 - Specification for integral cement water proofing compounds
- (xxvi) IS: 2750 - Specification for steel scaffoldings
- (xxvii) IS: 2835 - Specification for flat transparent sheet glass
- (xxviii) IS: 3384 - Specification for bitumen primer for use in waterproofing and damp proofing
- (xxix) IS: 3502 - Specification for steel chequered plates
- (xxx) IS: 4021 - Specification for timber door, window and ventilator frames
- (xxxi) IS: 4350 - Specification for concrete porous pipes for under drainage
- (xxxii) IS: 4351 - Specification for steel door frames
- (xxxiii) IS: 4990 - Specification for plywood for concrete shuttering work
- (xxxiv) IS: 8112 - Specification for 43 grade ordinary Portland cement

- (xxxv) IS: 9862 - Ready mixed paint, brushing, bituminous, black, lead free, acid, alkali, water and chlorine resisting
- (xxxvi) IS: 10262 - Recommended guidelines for concrete mix design
- (xxxvii) IS: 12269 - Specification for 53 grade ordinary Portland cement
- (xxxviii) IS: 12330 - Specification for sulphate resisting Portland cement

3.17 Standards for Tests

- (viii) IS: 516 - Method of test for strength of concrete
- (ix) IS: 1182 - Recommended practice for radiographic examination of fusion - welded butt joints in steel plates
- (x) IS: 1199 - Methods of sampling and analysis of concrete
- (xi) IS: 2386 - Methods of test for aggregates for concrete (Parts 1 to 8)
- (xii) IS: 2720 - Methods of test for soils (Parts 1 to 39)
- (xiii) IS: 3025 - Methods for sampling and test (physical and chemical) for water and wastewater (Parts 1 to 59)
- (xiv) IS: 3495 - Method of test for burnt clay building bricks (Parts 1 to 4)
- (xv) IS: 3613 - Acceptance tests for wire flux combination for submerged arc welding
- (xvi) IS: 4020 - Methods of tests for wooden flush doors shutters: Type tests
- (xvii) IS: 4031 - Methods of physical tests for hydraulic cement (Parts 1 to 15)
- (xviii) IS: 5807 - Method of test for clear finishes for wooden furniture (Parts 1 to 6)
- (xix) IS: 7318 - Approval tests for welders when welding procedure approval is not required (Parts 1 and 2)
- (xx) IS: 13311 - Methods of Non-destructive testing of Concrete- Part 1 & Part 2

3.18 Standards for Codes of Practice

- (i) IS: 456 - Code of practice for plain and reinforced concrete
- (ii) IS: 783 - Code of practice for laying of concrete pipes
- (iii) IS: 800 - Code of practice for general construction in steel
- (iv) IS: 806 - Code of practice for use of steel tubes in general building construction
- (v) IS: 816 - Code of practice for use of metal arc welding for general construction in mild steel
- (vi) IS: 817 - Code of practice for training and testing of metal arc welders
- (vii) IS: 875 - Code of practice for design loads (other than earthquake) for building structures (Parts 1 to 5)
- (viii) IS: 1081 - Code of practice for fixing and glazing of metal (steel and aluminium) doors, windows and ventilators
- (ix) IS: 1172 - Code of practice for basic requirements for water supply, drainage and sanitation
- (x) IS: 1477 - Code of practice for painting of ferrous metals in buildings (Parts 1 & 2)

- (xi) IS: 1597 - Code of practice for construction of stone masonry (Parts 1 & 2)
- (xii) IS: 1742 - Code of practice for building drainage
- (xiii) IS: 1893 - Criteria for earthquake resistant design of structures
- (xiv) IS: 1904 - Code of Practice for Design and Construction of Foundation in Soils:

3.19 General Requirements

- (i) IS: 2065 - Code of practice for water supply in buildings
- (ii) IS: 2212 - Code of practice for brickwork
- (iii) IS: 2338 - Code of practice for finishing of wood and wood based materials (Parts 1 & 2)
- (iv) IS: 2394 - Code of practice for application of lime plaster finish
- (v) IS: 2395 - Code of practice for painting, concrete, masonry and plaster surfaces (Parts 1 & 2)
- (vi) IS: 2470 - Code of practice for installation of septic tanks (Parts 1 & 2)
- (vii) IS: 2502 - Code of practice for bending and fixing of bars for concrete reinforcement
- (viii) IS: 2571 - Code of practice for laying in-situ cement concrete flooring
- (ix) IS: 2595 - Code of practice for radiographic testing
- (x) IS: 2751 - Recommended practice for welding of mild steel plain and deformed bars for reinforced construction
- (xi) IS: 2974 - Code of practice for design and construction of machine foundations (Parts 1 to 4)
- (xii) IS: 3114 - Code of practice for laying of Cast Iron pipes
- (xiii) IS: 3370 - Code of practice for concrete structures for the storage of liquids (Parts 1 to 4)
- (xiv) IS: 3414 - Code of practice for design and installation of joints in buildings
- (xv) IS: 3558 - Code of practice for use of immersion vibrators for consolidating concrete
- (xvi) IS: 3658 - Code of practice for liquid penetrant flaw detection
- (xvii) IS: 3935 - Code of practice for composite construction
- (xviii) IS: 4000 - Code of practice for High strength bolts in steel structures
- (xix) IS: 4014 - Code of practice for steel tubular scaffolding (Parts 1 & 2)
- (xx) IS: 4111 - Code of practice for ancillary structures in sewerage system (Parts 1 to 4)
- (xxi) IS: 4127 - Code of practice for laying of glazed stoneware pipes
- (xxii) IS: 4326 - Code of practice for Earthquake Resistant Design and Construction of Buildings
- (xxiii) IS: 4353 - Recommendations for submerged arc welding of mild steel and low alloy steels
- (xxiv) IS: 5329 - Code of practice for sanitary pipe work above ground for buildings
- (xxv) IS: 5334 - Code of practice for magnetic particle flaw detection of welds
- (xxvi) IS: 5822 - Code of practice for laying of welded steel pipes for water supply
- (xxvii) IS: 7215 - Tolerances for fabrication of steel structures

(xxviii) IS: 9595 - Recommendations for metal arc welding of carbon and carbon manganese steels

(xxix) IS: 10005 - SI units and recommendations for the use of their multiples and of certain other units

3.20 Standards for Construction Safety

(i) IS: 3696 - Safety code for scaffolds and ladder (Parts 1 & 2)

(ii) IS: 3764 - Safety code for Excavation work

(iii) IS: 7205 - Safety code for erection of structural steel work

Chapter -4

Specifications for Mechanical Works

4.1 Submersible Pumps

Pumps and drives shall be rated for continuous duty and shall be capable of pumping the flow range specified in the specifications without surging, cavitations or excessive vibration to the limits specified. The pumps shall conform to IS code 8030-1996 (latest version). The pump shall meet maximum allowable shut off head. The pumps shall not overload the motors at any point on the maximum pump speed performance characteristic curve and the pump operating range within the limits of stable pump operation. The total head capacity curve shall be continuously rising towards the shut off as flow decreases throughout the entire curve from run out to shut off head with the highest at shut off.

Its total head capacity curve shall be continuously rising towards shut off with the highest at shut off, and its capacity shall be meeting to handling sludge volume.

- a) Submersible pumps shall be provided with 100% standby and equipped and variable frequency drivers to be provided wherever required as per process operation. Pumps shall be suitable for single as well as parallel efficient operation at any point in between the maximum and minimum system resistances.
- b) The pumps shall be designed to handle solid sizes of up to 100 mm for the raw sewage application. Specific gravity of sewage is 1.02.
- c) Pumps shall run smooth without undue noise and vibration, cavitations, oil or water leaks over the range of operation. To ensure vibration free operation, all rotating components of pump shall be statically and dynamically balanced to BS 6861/.as per zones A& B of ISO 10816 -1.
- d) Vibration levels shall not exceed the levels given in BS 4675.
- e) The pump set shall be suitable for starting with discharge valve open and/or closed.
- f) The pump set shall be capable of withstanding the accidental rotation in reverse direction.

The critical speed of the rotor shall be at least 30% above the operating speed. Pump-sets shall have double bearings. Bearings shall be of the anti-friction type. Bearings shall be capable of taking the static weight of the rotating parts and any thrust generated by the operation of the pump. The bearing life shall be minimum 40,000 hrs of operation.

Each pump shall be complete with a cast iron delivery connection arrangement for fixing to the concrete floor of the suction well. The joint between the pump discharge flange and the delivery piping shall be made by merely lowering the pump into guide rails / rope from access level. It shall be provided with all necessary fixings for guiding the pumps during lifting/lowering. Each pump shall be provided with a SS 316 lifting chain conforming to BS 1663 and BS 4942.

Each pump shall be provided with an automatic coupling device for attaching the crane hook to the pump at low level, even whilst the pump is submerged, without the need for personnel to enter the well. This automatic coupling device shall easily and automatically couple and uncouple the hoist hook and be complete with necessary accessories. All links and cables shall be multi-stranded stainless steel.

The materials of construction for submersible pumps shall be as follows:

Component	Material
Impeller *	Stainless Steel : ASTM A 743 CF8M
Casing *	Cast Iron to IS:210 Gr FG 200 with 1.5 to 2% Nickel
Mechanical seal (Motor side and Pump side)*	oil-lubricated with tungsten carbide or silicon-carbide faces
Shaft*	Stainless Steel : BS:970 Gr 316
Bush*	Bronze IS 318 Gr. LT B2
Guide rail pipe	Stainless Steel : BS:970 Gr 304
Lifting Chain	Stainless Steel : AISI 316
Fasteners and Foundation Bolts	Stainless Steel AISI 316

* Material test certificates from Government approved metallurgical laboratory shall be furnished by the Contractor

Each pump shall be tested at the manufacturers premises for the full operating range of the pump to BS 5316 Part 1 .Pump performance shall be within the tolerance limits specified in the above said BS.

4.2 Chemical Dosing Pumps

- i. Chemical dosing pumps shall be piston, piston diaphragm or mechanical diaphragm type as specified. Pumps may be simplex or duplex arrangements to suit the capacity or process requirements. The pump design shall incorporate positive stroke return. The maximum stroking speed shall not exceed 100 strokes per minute (spm). Pump, motor and driving arrangement shall be mounted on a robust combined base plate.
- ii. Pump liquid ends shall be selected for compatibility with the pumped liquid. Suction and discharge valves shall be the single ball type allowing a free flow selfcleaning action. Ball and seat materials shall be resistant to abrasion.
- iii. Pumps shall incorporate a variable stroke mechanism to allow the output to be varied while the pump is running. Stroke adjustment shall be manual or where specified by electrical or pneumatically controlled stroke positioner. A stroke length indicator and digital stroke counter shall be fitted. Pumps shall be driven by a flange mounted IP 55 motor, via an oil bath reduction gearbox and variable stroke mechanism giving step less adjustment between zero and maximum stroke length. Where flow proportional dosing is required the variation of output shall be achieved by varying the speed of the pump motor and not the pump stroke length.
- iv. The normal operating range of dosing pump shall be not less than 6:1.

Mechanical Diaphragm	Diaphragm rigidly coupled to the drive train. Single suction Pumps and discharge valves. Glandless. Accuracy: +/- 3% of stoke.
Piston Pumps	Cylinder and piston with packed gland. Double suction and discharge valves can be fitted for greater accuracy at high pressure. Accuracy: +/- 1% of stroke
Piston Diaphragm Pumps	Diaphragm hydraulically operated by liquid displaced by a plunger and protected from excess pressure via a relief valve. Accuracy: +/- 2% of stroke.

- v. Materials shall be selected to suit the chemicals being pumped. Liquid ends shall be polypropylene, 316 stainless steel, glass, or Hastelloy C. Diaphragm materials shall be butyl rubber, PTFE, or Hypalon and glands shall be PTFE or Neoprene.

- vi. Each pump shall be provided with inlet and outlet isolating valves and where necessary, with pressure relief and non-return valves. Dosing pumps shall be provided with back pressure loading valves and pulsation dampeners in the delivery lines depending on the downstream conditions.
- vii. A relief valve shall be incorporated in the delivery lines under conditions where the pump discharge pipe can be shut off or where pressure may rise to an excessive point. The relief valve shall be sized to handle the system pressure and to discharge maximum pump output freely, and shall be located in the discharge line between the pump and the first downstream isolating valve or in the case of dosing pumps the back pressure loading valve. Relief valves when used on pumps handling non-hazardous chemicals shall discharge the vented liquid to waste. When used on hazardous chemicals the valve outlet shall be piped back to the suction supply tank or bunded area. The open end of the return pipe shall be located where it is visible, so that any relief valve leakage/operation can be detected. Pump transferring/dosing chemicals to systems under pressure shall incorporate a pressure gauge on the pump delivery. Air cocks shall be provided for release of air where necessary.
- viii. Unless otherwise specified flushing connections shall be provided at each pump inlet and flushing shall be manual. When flushing, water shall be discharged either locally through a drain valve or to the point of application of the chemical. Facilities shall also be provided for flushing chemical pump suction and delivery manifolds and delivery lines to point of application.
- ix. Dosing pumps and motors shall preferably incorporate an integral reduction gearbox drive which shall be totally enclosed and oil bath lubricated. The gear box shall incorporate the cams for the diaphragm drive and shall be provided with filling and drain connections and visible oil level indication.
- x. All dosing pumps shall have facility/terminals for pulse input & output (4- 20 mA) to facilitate online control via plant PLC & SCADA

4.3 Chemical Tank and Mixer

These tanks shall be used to dissolve the chemicals to a constant concentration and feed the solution for dosing. It shall be a vertical tank and shall be composed of tank main body, mixer, manhole, electrical level gauges, direct reading level gage, ladder, air exhaust pipe etc.

The tank shall be made of corrosion resistant material, it shall be provided with a removable cover to prevent chemical scattering, and also with a vent pipe.

The tank shall be provided with necessary mounting seats for overflow pipe, etc.

The motor-driven mixer shall be vertical speed reducer, direct-coupled type of 2-stage propeller type, as a rule and shall be constructed to endure continuous operation free

from vibration, etc. The mixer shall be at the center or at a position off the center according as the tank being angular or circular.

The mixer shall be protected by electrical prevention of dry operation.

The tank shall be constructed to seal gas and splash from below at the area where the mixer shaft drive portion passes through.

4.4 Induction Motor (Submersible Pump)

The submersible motor shall conform to IS: 9283:1979 and the submersible cable shall conform to clause no. 4.4 of the IS: 9283:1979. The motors shall be suitable for operating on a 415 V, 50 Hz, 3 phase, Ac supply. Pump motor shall be of the squirrel cage submersible type, protected to IP 68. Motor for submersible pump shall be capable of start-up and operation in the event of a completely flooded wet well. Motor cooling for submersible pump must be achieved by a cooling jacket, using the pumped media to cool the motor. The pump impeller must be equipped with a system to ensure a pumped flow of liquid through the cooling jacket and also incorporate a device to prevent the liquid channels from blocking with hair and foreign material. This motor shall be capable of starting 10 times per hour. The insulation class of motor winding shall conform to class F. Additionally the specific requirements mentioned in the following clauses shall also be met.

Motors shall be capable of giving rated output without reduction in the expected life span when operated continuously under the following supply conditions:

Variation of supply voltage from rated motor voltage; $\pm 10\%$

Variation of supply frequency from rated frequency; $\pm 5\%$

Combined voltage and frequency variation; $\pm 10\%$

The starting current of motor shall not exceed; 200% of rated full load current for star/delta starting and 600% of rated full load current for DOL starting, under any circumstances.

Motors shall be suitable for full voltage direct-on-line starting or star-delta starting.

Motors shall be capable of starting and accelerating the load with the applicable method of starting, without exceeding acceptable winding temperatures, when the supply voltage is in the range 85% of the rated motor voltage to maximum permissible voltage.

The locked rotor current of the motor shall not exceed 600% of full load current (subject to tolerance as per the applicable standard) unless otherwise specified.

Motors shall be designed to withstand 120% of rated speed for two minutes without any mechanical damage, in either direction of rotation. The motor vibrations shall be within the limits specified in applicable standard unless otherwise specified for the driven equipment.

Except as mentioned herein, the guaranteed performances of the motor shall be met with tolerances specified in applicable standard, IS: 9283-1979.

Motor insulation shall conform to Class F and the maximum temperature rise shall not exceed 95deg C, when measured by winding resistance method and 85 deg C , when measured by thermometer method for an ambient temperature of 45 deg C. The motor windings shall be protected with a waterproof material and shall incorporate a thermal sensor in each phase to safe guard against high winding temperatures. The thermal sensor shall be connected into the control circuit of the starter and signals taken for continuous monitoring of winding temperatures. The motor shall incorporate a cut out device to detect the presence of any liquid in the motor enclosure, in the form of non-resetting moisture switch. The terminal connections for the power and protective circuits shall be housed in a completely sealed and water proof junction box, complete with all external corrosion resistant cable glands. The pump units shall be provided with power and protection circuit cables of sufficient length to reach from the motor junction box to the local isolator located at the panel floor level.

Protection against increase in stator winding temperature (150°C) bearing temperature, leakage in stator housing and terminal box shall be provided. Minimum three number thermistors in series are to be provided to sense the stator winding temperature. Sensors are to be provided to detect if leakage of sewage into the oil housing is above 30 % concentration.

Bimetallic thermal switch to trip the motor against increase in temperature shall be provided.

The power rating of the motor shall be larger of the following:

115% of the power input to the pump at duty point at a speed corresponding to the frequency of 48.5 Hz. Maximum Power input while operating single pump corresponding to the speed of 50 Hz.

Motor shall be offered for routine and type tests in accordance with IS: 4029 and IS: 325 at the manufacturer's works.

4.5 Mechanically Raked Coarse Bar Screen

4.5.1 General

The screen shall be installed in raw sewage inlet channel, and the screen shall be of the front raking type.

The screen shall be capable of performing the duties set out in this Specification. All the materials and sub-assemblies used shall be suitable for outdoor application. They shall be constructed so that maintenance is kept to a minimum.

There shall not be any moving part, sprocket, bearings, etc. continuously immersed in sewage. All lubricating points shall be conveniently accessible from the deck level.

The screen shall be suitable for discharging 75% of the screened material lifted from the screen into the chute.

The screen shall be designed such that in case of heavy accumulation of solids the same is to be removed gradually without overloading or damaging the screen bars or mechanism.

4.5.2 Frame work

The frame work of the screen shall be of robust construction with intermediate cross bracing. The lower ends and sides of the frame shall be grouted in concrete. Each screen shall have an independent canopy at the top for weather protection.

4.5.3 Screen bar assembly

Screen bar assembly shall be fitted across the screen chamber. Screen shall have a series of vertically oriented bars spanning the inlet channel and spaced as specified. Bars shall be sufficiently rigid to prevent vibrations in stream wise and lateral modes and to withstand the maximum differential head that will occur with the screen totally blinded. Bars shall have tapered cross section to prevent jamming of screenings between bars. Bars shall have supports only at both ends. The bar spacing shall be 20 mm.

4.5.4 Rack Carriage

The rake carriage shall comprise a stiffened frame work to which is attached replaceable rake tines. The rake tines shall be suitable to accommodate bulky screenings. Rake carriage shall incorporate suitable devices to enable the rake to ride over any small obstacles wedged in the screen and automatically stop the drive motor in the event of the rake jamming against a large obstruction. There shall not be any mechanical damage resulting from obstruction wedged in the screen bars. The rake carriage shall always come to rest in a parked position with the rake above the sewage level.

The screen shall be cleaned automatically through an adjustable timer. The rake lowered will clear screen bars at the beginning of a cycle and accurately engage with the screen bars at the bottom of the channel. The tine profile and rake motion shall be designed to elevate screenings to the discharge chute at deck level without debris falling back or being forced through the screen. The rake shall be suitable for levating debris encountered at any level. Rake tines shall be replaceable.

The screenings shall be discharged from the unit by a wiper mechanism down to a discharge chute leading to a conveyor belt. Arrangement shall be such as to ensure that screenings are discharged to the discharge chute leading to the conveyor. The rake tines shall then be retracted and the unit ready for the next cycle.

4.5.5 Rake Lifting Mechanism

Lifting mechanism shall consist of a SS 316 wire rope or chain and C.I. sprocket.

4.5.6 Control System

The screening operation shall be carried out through adjustable timers which are adjustable at site for 0-60 minutes for interval between two operations.

Control system for the conveyor shall be designed to achieve the following: Conveyor shall be started when any of the rakes starts its upwards travel.

Conveyor shall be stopped with a time delay (by adjustable timer) after rake is stopped.

Weatherproof, lockable, emergency mushroom headed stop push buttons shall be provided near each motor for screen and conveyor belt, operation of stop push button, and overload prevention for screen and belt conveyor shall be included in the control scheme.

4.5.7 Portable Screenings Container

Portable screenings containers made of galvanized steel shall be provided to store the screenings until time of pick up. The container shall have capacity of approximate 2.0 cu.m and shall be of a convenient height to permit the discharge of screenings directly into the container without having to transfer the screenings manually. The containers shall have hinged covers and their design shall permit their being lifted by an overhead hoist or packer truck. The container will have four wheels each of about 20 cm diameter and two of which shall be swivel castors. The maximum height of container including wheels shall be 66 cms. The sides shall be constructed of 12 gauge steel. The bottom of container shall be made of 5 mm plate steel. The containers shall be reinforced with 50 mm x 50 mm x 5 mm angle.

The material of construction of Mechanical Raked Screen shall be as follows:

S. No.	Component	Material
(i)	Screen Bar	Stainless steel SS316L
(ii)	Frame (Side and Bottom Portion)	Stainless steel SS316L
(iii)	Raked tines	Stainless steel SS316L
(iv)	Fasteners including Anchor bolts	Stainless Steel : ASTM A 276-Type 316
(v)	Screen canopy	Stainless Steel: BS:970 Gr 304
(vi)	Chutes	Mild Steel - Galvanized

4.6 Mechanical Fine Bar Screen

The screen shall be installed in inlet channel to grit chamber, and the screen, shall consist of continuously moving perforated stainless steel SS316 L panels.

OR inclined Bar screen at 45 degree and the minimum bar thickness shall be 8mm. Other specification shall be same as above clause 7.9 except for bar spacing of 6 mm.

The aperture size of the screen shall be 6 mm.

The screenings compactor shall consist of a feed hopper inlet chamber, pressing and dewatering cylinder, resilient cone section, discharge pipe friction cylinder, hydraulic pressing ram, and hydraulic power pack. A local control panel and equipment supports shall also be provided.

The screenings compactor shall be designed to receive screenings conveyed from the bar screen and shall reduce the volume and water content by means of a pressing action. Solids to be pressed shall be gravity fed to an inlet hopper and pressing zone where a hydraulically powered ram presses the screening into the resilient cone and friction cylinder. Water drainage shall be piped back to the sump.

Cylinder: The pressing zone and hydraulic ram housing shall consist of a 10-inch I.D. heavy duty Type 316 stainless steel cylinder. The cylinder shall be horizontally mounted. A rectangular solids inlet hopper shall be top mounted in the cylinder casing. The cylinder shall be supported by a fixed rear foot assembly and an adjustable front leg assembly allowing a 25 centimetre adjustment range for the purposes of press inclination.

Local Control Panel;

The screenings compactor shall be provided with a Local Unit Control Panel (U.C.P.) consisting of required circuitry and devices enclosed in a corrosion resistant (i.e. stainless steel, plastic, or fiberglass) NEMA 4X or IP68 enclosure and located adjacent to the compactor unit. The local control panel shall house the compactor controls, main circuit breaker, motor starter, control transformer and other devices as specified or required for a complete and operable system. Identified terminal strips shall be provided for the connection of external conductors. All control devices on individual equipment items shall be interconnected to an equipment base-mounted junction terminal box. All equipment shall be ready for service after connection of conductors to equipment, controls, and local control panel.

The control panel shall, as a minimum include the following: On/off switch for "hand" compactor operation.

Lockout/stop switch.

Panel mounted run status light and individual alarm lights for high hydraulic pressure, low hydraulic pressure, early ram return and delayed ram return.

Alarm reset button (common).

Dry contacts for future common alarm output and connections for remote on/off input. Audible alarm horn rated for 85 dB at a distance of 10 feet minimum.

4.7 Trolley and Chain Pulley Block

The chain pulley block shall be operated on the lower flange of the bridge girder.

The load chain shall be made of alloy steel as per IS:3109. It shall be heat treated to give ductility and toughness so that it will stretch before breaking. It shall be of welded construction with a factor of safety not less than 5.

The hand chains, SS 316, for the hoisting and traverse mechanism shall hang well clear of the hook and both the chains shall be on the same side. The hand chain wheel shall be made from pressed sheet steel and shall be provided with roller type guarding to prevent snagging and fouling of the chain.

All the gearing shall be totally encased. Proper lubricating arrangements shall be provided for bearings and pinions. Gears shall be cut from forged steel blanks. Pinions shall be of heat treated alloy steel. Gears shall be as per BS 436/IS:4460.

The trolley track wheels shall be rim toughened, heat treated carbon steel or low alloy steel or

C.I. and shall be single flanged and shall have antifriction ball bearings. The wheels shall be machined on their treads to match the flanges of the track joints.

The travelling trolley frame shall be made of rolled steel conforming to IS:2062. The side plates of trolley frame shall extend beyond wheel flanges, thus providing bumper

protection for the wheels. The two side plates shall be connected by means of an equalizing pin.

Axles and shafts shall be made of carbon steel and shall be accurately machined and properly supported.

The lifting hooks shall be forged, heat treated alloy or carbon steel of rugged construction. They shall be of single hook type provided with a standard depress type safety latch. They shall swivel and operate on antifriction bearings with hardened races. Locks to prevent hooks from swiveling shall be provided. Hook shall be as per BS:2903/IS:3815

The brake for the lifting gear shall be automatic and always in action. It shall be of screw and friction disc type self-actuating load pressure brake. Brakes shall offer no resistance during hoisting.

4.8 Hand Operated Hoists and Trolleys

Manual hoists shall be complete with hand-chain, trolley, pulley block, hook, hand and load chains, brake and other accessories. They shall comply with the latest applicable standards, regulations and safety codes in the locality where equipment will be installed.

Each hoist shall be operated on a monorail (I-Beam). The factor of safety shall not be less than 5. The load chain may be heat-treated to give ductility, toughness and conforming to I.S. 3109/B.S.1663/B.S.3114. The load wheel is to be made from heavy duty malleable castings. The hand chain is to Conform with B.S. 6405:1984 and hand chain wheel may be made from pressed sheet steel with roller type guarding. Gears shall be cut from solid cast or forged steel blanks or shall be stress – relieved welded steel construction.

Pinions shall be of forged carbon or heat treated alloy steel. Strength, Quality of Steel, heat treatment, face, pitch of teeth and design shall conform to BS-436, BS-545 and BS-721. Spur and helical gears must comply with B.S. 436 and worm with B.S. 721. Bearing must be ball and roller type conforming to I.S. 2513/B.S., 2525-32:1954.

Proper lubricating arrangements are to be provided for bearings and pinions. The brake for the lifting gear shall be automatic and always in action.

The proof testing of each chain pulley block is to be carried out as per latest applicable standards. The safe working load is to be marked in such way that is clearly visible from the operating level.

4.9 Membrane Diffusers

4.10.1 Fine Bubble tubular Membrane Diffusers

- (i) Provide a removable header arrangement that provides complete mixing of basin contents. Space diffusers evenly along each header to provide full floor coverage.
- (ii) Field Oxygen transfer efficiency: minimum 18.0 %. Non-clog, tubular design with inverted air reservoir.
- (iii) Bottom deflector to prevent debris from entering diffuser assembly. Full profile end caps to prevent air blow off.
- (iv) Stainless Steel 316 L construction,
- (v) Provide orifice flow control to ensure orifice head loss is at least 2.5 times the head loss in the air header at all air flow rates in the diffuser's design operating range.

4.10.2 Disc Fine Bubble Aeration System

The Disc type membrane diffuser shall be developed specifically for Releases 1~3mm fine bubble in the wastewater treatment plant. All materials have been selected for their ability to withstand the effects of the chemical, bio-chemical agents and 0~100°C used in wastewater tank. The diffuser can be placed in an evenly distributed grid system over the entire aeration tank bottom. Air can be easily through the air orifice and integrated non-return valve into the wastewater. The air orifice design to maintain the diffuser standard airflow input prevented the max. Air enters to damage diffuser membrane. The membrane shall be secured onto the support dish with a constrict flex rim and retaining ring designed to increase the tension on the point of engagement as the diffuser air rate increases.

4.10 Air Blowers

Compressor blowers shall be of the tri/twin lobe Roots type, each provided with inlet filter and silencer, pressure reducing valve, pressure gauges, pressure relief valve, drain, air flow indicator and acoustic bend or silencer in the delivery branch. Bearing housings and gear boxes shall be separated from the blower housings by air spaces. The units shall be complete with a self-contained oil cooling system for the bearings. The blowers shall be housed in a separate sound proof room to reduce the noise level or inside acoustic enclosure. The noise level shall not exceed 85 dBA at 1 meter from the Blower.

The capacity of blower shall be as per the air requirement of incoming sewage. The blowers shall be supplied with Variable Frequency Control. Directly coupled design shall be preferred. VFD motors shall be suitably derated.

The bearings shall be generously designed to give long operational life. Bearings at the drive end may be oil or grease lubricated. The gears and bearings at the non-drive end shall be oil lubricated. Bearings shall be provided with oil throwers to prevent

leakage of oil. The blower shall be arranged for horizontal inlet and vertical outlet, delivery velocity not exceeding 25 m/s and each blower shall be provided with following components but not limited to;

- Common base frame for Blower & Motor.
- Inlet silencer and filter.
- Discharge Silencer & non-return valve in delivery branch.
- Butterfly valves in both inlet and delivery branches.
- Pressure relief valve or excess pressure safety device.
- Bellows type couplings on inlet and delivery branches.
- Acoustics Enclosure.
- V-Belt drive arrangement with Belt Guard.
- Isolating valves, Pressure reducing valves & Pressure gauges Air Flow meters, Temperature gauges.
- Water trap.

4.11.1 Acoustical Enclosure

Provide a factory assembled acoustical enclosure around the entire blower. Disassemble the enclosure as necessary for shipment. Provide either removable or hinged doors for access to all blower parts and components for servicing and maintenance. Size access panels to allow easy access by a single operator. Hinges, fasteners and appurtenances shall be stainless steel.

Provide clear, transparent Lexan or plastic windows to visually observe gauges and lever arms of the variable guide vanes and diffusers.

Mount an auxiliary exhaust fan and thermostat on the acoustical enclosure to provide air circulation after blower shutdown or when the temperature inside the enclosure exceeds 40oC.

The free field A-weighted sound pressure level measured in four quadrants at 1 metre distance from the enclosure shall average 85 dBA, or less. Measure with a Type 1 instrument suited for checking compliance with Environmental and Occupational Noise Rating Recommendations.

4.11 Mechanical Submersible Mixer

Mechanical floating mixer and related equipment accessories shall consist of a motor, direct- drive impeller driven at a constant speed, an integral flotation unit, and impeller volute.

4.11.1 Performance

Each mixer shall have a zone of complete mix and a direct pumping with a recirculation. Complete mix shall be defined as maintaining biological suspension of

- all mixed liquor suspended solids with design MLSS or less without the introduction of air.
- **Mixer Drive Motor**

The motor shall be rated for 415 volt, 50 hertz, three-phase service. The motor shall be standard efficiency, vertical P base design, totally enclosed fan cooled TEFC, and generally rated for severe duty. The motor shall in all cases equal or exceed standard NEMA specifications. A minimum service factor of 1.15 shall be furnished.

The motor winding shall be nonhygroscopic, and insulation shall equal or exceed NEMA Class "F". A labyrinth seal shall be provided below the bottom bearing to prevent moisture from penetrating around the motor shaft. A condensate drain shall be located at the lowest point in the lower-end bell housing. Unit shall have a one-piece motor shaft continuous from the top motor bearing, through the lower bearing and down to and through the propeller. The shaft shall be manufactured from high quality stainless steel. Motor bearings shall be regreasable. Sealed bearings are not acceptable.
 - **Motor Mounting Base**

The motor shall be securely mounted onto a solid 304 stainless steel base which is integral with the motor base extension. All submersed wetted motor mounting base components shall be constructed of 304 stainless steel.
 - **Floatation**

Each unit shall be equipped with a modular float constructed of fiber reinforced polyester skin FRP or equivalent with a central float passage of a size to allow installation and removal of the pump impeller. The float shall be foamed full of polyurethane foam of the closed cell type, and shall be totally sealed to prevent the foam from being in contact with the external environment.
 - **Impeller**

The impeller shall be designed to pump the liquid from near the surface and direct it down toward the vessel/basin bottom. The impeller shall be a two-blade marine type precision casting of 316 stainless steel and shall be specifically designed for the application intended. It shall be dynamically and hydraulically balanced. The propeller must be attached to the motor shaft with a hardened stainless steel pin and set screw. Impeller shall be capable of being reversed to cause back flow liquid movement without causing damage to the mixer chassis and without causing upflow liquid damage to the motor bearing and windings. No liquid spray or other liquid leakage upward onto the surface of the motor support surface or floatation chassis will be allowed

- Intake Volute Assembly
The impeller shall operate in a volute made of 304 stainless steel plate

- Vibration
The entire rotating assembly including the motor rotor, shaft, shaft accessories, and impeller shall be dynamically balanced within 2.0 mils peak-to-peak horizontal displacement measured at the upper and lower motor bearing. Measurements shall be taken at a frequency equivalent to the motor RPM. Measurements shall be taken with the motor in a vertical, shaft down position with the entire power section mounted on resilient pads.

- Cable Mooring System
Each unit shall be provided with a maintenance cable mooring system complete with mooring cable, clips, thimbles, quick disconnects, anchors, and extension springs as shown on the drawings. Mooring cable, anchors, and hardware shall be 304 stainless steel. Field attachment of mooring points to the tank shall be the responsibility of the installing contractor.

- Cable Mooring Electrical Service Cable
Each unit shall include conductor power cable wired into the motor conduit box and terminating at the basin wall. Electrical cable shall be supplied with kellems grips at the motor and basin wall terminations. Electrical cable floats for flotation of electrical service cable shall be provided. Attachment of cable and supply of junction box/disconnect at the basin wall shall be the responsibility of the installing contractor. 304 stainless steel adhesive anchors for attachment of mooring system components to the basin wall shall be provided.

4.12 Progressing –Cavity Pumps

Pumps shall be of the type in which a pumping action is generated by a helical rotating eccentrically within a resilient stator in the form of a double internal helix. The eccentric motion of the rotor shall maintain a constant seal across the stator as it travels through the pump to give a uniform positive displacement.

Pumps shall be arranged generally with a single shaft seal at the suction end. Mechanical seals shall be used. If a flexible shaft is used to accommodate the eccentric motion, a corrosion resistant shroud shall be fitted to prevent fiber build-up on the shaft. Enlarged inspection access holes shall be fitted to the suction chambers of all pumps for periodic removal of accumulated debris. The shaft bearing shall be positively isolated from the fluid being pumped.

The rotor material shall be selected for corrosion and abrasion resistance for the fluid being pumped, and for prolonged service life. Hard chrome or other approved

coatings shall be not less than 250 micron thickness and shall be diffused in to the base material. The rotor shall

Generally be single-stage and shall incorporate not less than 3600 of twist, but for high-head applications, it may be necessary to use more than a single-stage. The stator shall be of a resilient material selected for chemical and abrasion resistance for the fluid being pumped. Pump speed shall suit the application, where variable delivery output is needed; the pump shall be provided with a variable-speed drive. The size and speed range of the pump shall ensure that the highest expected duty point shall lie within the available speed range.

Pumps shall normally be driven by a fixed-speed electric motor through reduction gearing and the combined drive shall be continuously rated. Pump and motor shall preferably be mounted in- line on a common base plate. Alternatively, the drive motor may be top-mounted above the pump to minimize floor area, and shall be connected by external V-belts and pulleys. V-belt drives shall have full guards of the type that allow the belts observed without removal of the guard. Facilities shall be provided for ready adjustment of belt tension.

Coupling guards shall be provided, which shall be rigid, securely fixed, and designed so that removal is not necessary during normal operation, routine maintenance and routine inspections.

All motor enclosures shall be provided with ingress protection to IP55. Motor anti-condensation heaters shall be provided and shall be suitable for use on a 220V single-phase, 50Hz supply. All bearing shall have a B10 design life of not less than 40,000 running hours and shall be designed for loading 20% in excess of calculated maximum loading.

Pumps shall be fitted with individual dry-running protection to initiate pump trip. Dry-running protection by ‘under-current’ monitoring or ‘pipeline-intrusive’ device shall not be used.

Material of Construction;

S. No.	Component	Material
1	Pump Housing	CI IS210 Grade220 or 260
2	Rotor	SS AISI 316(HCP)
3	Shaft	SS AISI 316(HCP)
4	Stator	Nitrite black
5	Type of drive	V belt & Pulleys

6	Base plate	MS fabricated
7	Seal type	Gland packing

Pumps models (handling water) shall be selected such that when handling sludge it meets the required duties of the viscous liquid. Pumps shall be selected which gives the required duties close to best efficiency point

4.13 Drainage Pump Set

- The total head capacity curve shall be continuously rising towards the shutoff with the highest at shut off.
- The pump shall run without undue noise and vibration.
- The power rating of the pump motor shall not be less than the power required for start-up.
- Pump shall be submersible type with double mechanical seals.
- Motor shall be of IP 68 protection.
- It shall be suitable for handling turbid water. Pump and motor shall have common shaft.
- Delivery pipe of drainage pump sets shall be of size 40 NB and as per IS 1239, heavy class. Required length of pipes and fittings shall be provided. Pumping main shall be common for two pumps.
- Level switch to start and stop the pump automatically shall be supplied with the pump. A level indicator shall also be provided.
- The capacity, total head and range of operating head of drainage pump set shall be as specified in particular mechanical requirements.

S. No.	Component	Material
(i)	Impeller	Stainless Steel :ASTM743CF8M
(ii)	Casing	Cast Iron : IS 210 Gr. FG 200
(iii)	Shaft	Stainless Steel: BS:970 GR 410

4.14 Fire Extinguishers

Portable fire extinguishers are to be provided for all units/buildings as per the requirement of Tariff Advisory Committee (TAC) or meeting the requirement of local regulations whichever is more stringent. All the extinguishers shall be of TAC approved.

4.15 Propeller Exhaust Fan

- The fan should comply with IS 2312.

- The blades shall be of mild steel and properly balanced so as to avoid noise and vibration.
- The blade and blade carriers shall be securely fixed so that they do not loosen in operation. The means provided for securing the fan mounting or fan casing to the wall partition or window shall be such as to provide a secure fixing without damage to the fan or wall.
- Suitably designed guards shall be fitted to the inlet and the outlet side to prevent accidental contact. No flammable material shall be used in the construction of fan. Moulded parts, if used, shall be of such materials as to withstand the maximum temperature attained in the adjacent component parts.
- The fan shall have protective insulation or be capable of being earthed. A fan with protective insulation may be of all insulated construction or have either double insulation or reinforced insulation. Each fan should be provided with a 10 sq.mm mesh bird screen. The sheet used for the cowl should be 14 G.

4.16 Air-conditioning Equipment

The air conditioning units shall be of split type, with the outdoor condensing unit mounted on the terrace of the room or grouted on external side of the wall with suitable brackets.

4.17 Valves

Valves shall be as per internationally recognized standards. Flanges shall be machined on faces and edges. Flanges shall conform to ISO 7005, IS 6392 ,BS EN 1092-1/ BS 4504.

Valves shall be double flanged type and the faces shall be parallel to each other. The flange face should be at right angles to the valve centreline. Back side of valve flanges shall be machined or spot faced for proper seating of the head and nut.

Valves buried or installed in underground chamber, where access to a handwheel would be impractical, shall be operated by means of extension spindle and/or keys. Wherever extension spindle is provided, the valve shall also be provided with suitable headstock. Valve of diameter 450 mm and above shall be provided with lifting eyes and shall have detachable bolted covers for inspection, cleaning and servicing.

Valve shall be suitable for frequent operation as well as operation after long periods of idleness in either open or closed position. The valve stem, thrust washers, screws, nuts and all other components exposed to the water shall be of a corrosion resistant grade of stainless steel. Valves shall be free from sharp projections which are likely to catch and hold stringy material. All the valves on the suction and delivery side of the Intermediate sewage pumping station shall be of Knife gate type.

All the valves on the suction and delivery side of the Return activated sludge pumping station and for sludge application shall be of Knife gate type.

All the valves provided at the delivery side of the Intermediate pumping station shall be motor operated. Two sets of ladders shall be provided in the raw sewage pumping station to facilitate access of valves.

Telescopic valves shall be provided in sludge storage tanks for sludge withdrawal purpose.

4.18 Pipelines, Pipe work and Fittings

The following codes and standards unless specified herein shall be referred to, or equivalent to the approval of Employer’s Representative

IS :	210	Specification for grey iron casting
IS :	290	Specification for coal tar black paint
IS :	456	Code of practice for plain and reinforced concrete
IS :	458	Specification for pre cast concrete pipes (with and without reinforcement)
IS :	516	Method of test for strength of concrete
IS :	638	Specification for sheet rubber jointing and rubber insertion jointing
IS :	783	Code of practice for laying of concrete pipes
IS :	816	Code of practice for use of metal arc welding for general construction in mild steel
IS :	1367	Technical supply conditions for threaded steel fasteners
IS :	1387	General requirements for the supply of metallurgical materials
IS :	1500	Method for Brinell hardness test for metallic materials

IS :	1536	Specification for centrifugally cast (spun) iron pressure pipes for water, gas and sewage
IS :	1537	Specification for vertically cast iron pressure pipes for water, gas and sewage
IS :	1538	Specification for cast iron fittings for pressure pipes for water, gas and sewage
IS :	1916	Specification for steel cylinder pipes with concrete lining and coating
IS :	2078	Method for tensile testing of grey cast iron
IS :	3597	Method of tests for concrete pipes
IS :	3658	Code of practice for liquid penetrant flow detection
IS :	5382	Specification for rubber sealing rings for gas mains, water mains and sewers
IS :	5504	Specification for spiral welded pipes
IS :	3589	Specification for Steel pipes for water and sewage
IS :	6587	Specification for spun hemp yarn
IS :	7322	Specification for specials for steel cylinder reinforced concrete pipes
IS :	4984	Specifications for HDPE pipes for water supplies and sewerage
IS :	14333	Specifications for HDPE pipes for sewerage Application
IS :	8329	Specifications for DI pipes
IS :	9523	Specification for ductile iron fittings for pressure pipes for water, gas and sewage

IS :	11906	Recommendations for cement mortar lining for cast iron, mild steel and ductile iron pipes and fittings for transportation of water
IS :	12820	Specification for dimensional requirements of rubber gaskets for mechanical joints and push-on joints for use with cast iron pipes and fittings for carrying water, gas and sewage

Code of Practice

IS :	783	Code of practice for laying of concrete pipes
IS :	3114	Code of practice for laying of cast iron pipes
IS :	3764	Excavation work - Code of Safety
IS :	4127	Code of practice for laying of glazed stoneware pipes
IS :	5822	Code of practice for laying of electrically welded steel pipes for water supply.
IS :	12288	Code of practice for laying of ductile iron pipes

4.19 Pipelines and Valve Materials

Application / Location	Material
Chlorine: Drum connections Chlorine gas or liquid	cadmium plated 70/30 copper nickel CN 107, BS 2871 : Part 1 flanged or welded carbon steel, CAF flanged joints

<p>Chlorine gas lines below atmospheric pressure</p> <p>Chlorine solution</p>	<p>Poly vinylidene fluoride (PVDF) with solvent welded or flanged joints/ Class E UPVC in concrete covered ducts outside building.</p> <p>Inside building and in exposed areas, rubber lined carbon steel</p> <p>Valves shall be globe type with forged steel bodies, monel spindles, stainless steel seats and PTFE gland packing or carbon steel, monel plug, PTFE sleeved plug UPVC/HDPE</p>
<p>Water:</p> <p>Service water</p>	<p>GI (below 80mm), ductile iron (80mm and above)</p>
<p>Air: Process Air</p>	<p>Mild steel Galvanised, for exposed or buried service and Stainless steel AISI 316 for submerged service.</p>

4.20 Built-in Pipe work and other Plant

The pipes and other Plant in water retaining structures shall, wherever possible, be built in as the work on the structure proceeds. The Contractor shall ensure that delivery of the requisite pipe work and other Plant is in accordance with the requirements of the programme.

Where a pipe subject to thrust passes through a concrete structure or where an external seal is required, a puddle flange shall be used. The puddle flange dimensions shall be to BS EN 1092- 1/BS 4504 but shall be undrilled. The exterior of the pipe shall be cement washed symmetrically about the puddle flange by the manufacturer for a length at least equivalent to the thickness of the wall through which it passes.

The Contractor shall be responsible through every stage of the Works for checking the correctness of the setting of built-in Plant and shall satisfy himself they are positioned in accordance with his approved drawings.

Chapter-5

Specifications for Electrical

5.1 ACSR Conductor

5.2.1. Codes and Standards

The design, material, construction, manufacture, inspection and testing of conductors shall comply with all currently applicable statutes, regulations and safety codes in the locality where the conductors will be installed. The equipment shall also conform to the latest applicable standards. Nothing in this Specification shall be construed to relieve the VENDOR of this responsibility.

5.2.2. Material

Aluminium strands of ACSR conductor shall be hard drawn from 99.5% pure electrolyte aluminium rods with 60% IACS conductivity. The VENDOR shall specify the guaranteed minimum and average values of conductivity.

Chemical composition of the material shall comply with the requirements of relevant Standards.

The surface of conductor shall be clean and dry and free from any excess grease that may be used in its fabrication. The surface strands shall be smooth and free from burrs and other projections which may be cause for increasing corona losses when the conductor is used on extra high voltage lines.

The conductor shall be of heavy duty type and designed to operate within set temperature limits and to withstand thermal and electromechanical forces developed due to short circuits.

5.2.3. Galvanising

The steel wire strands of ACSR conductor shall be hot dip galvanised. Zinc coating shall be evenly and uniformly coated complying with relevant standards for heavily coated wires.

The zinc used for galvanizing shall be electrolytic high grade zinc of not less than 99.95% purity.

5.2.4. Greasing

The steel core and the inner layer of aluminium wires, (where more than one aluminium layer exists), shall be protected with a special grease in order to provide additional protection against corrosion due to saline pollution. The grease shall fill the whole space between wires within circumscribed cylinder at inner aluminium layer or at steel core, if the conductor has only one aluminium layer

5.2 Distribution Transformer

Transformers shall operate without injurious heating at the rated kVA at any voltage within + 10 percent of the rated voltage of that particular tap.

Transformers shall be designed for 110% continuous overfluxing withstand capability. Overloads shall be allowed within the conditions defined in the loading guide of the applicable standard. Under these conditions, no limitations by terminal bushings, tap/changers or other auxiliary equipment shall apply. Noise level of transformers shall be as per latest NEMA standard.

5.6.1. Codes and Standards

The design, manufacture and performance of equipment shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be construed to relieve the VENDOR of his responsibility.

The equipment shall conform to the latest edition of applicable standards and code of practice. In case of conflict between the applicable standards and this specification, this specification shall govern.

5.6.2. General Constructional Features

All material used shall be of best quality and of the class, most suitable for working-under the conditions specified and shall withstand the variations of temperature and atmospheric conditions, overloads, over-excitation, short-circuits as per specified standards, without distortion or deterioration or the setting up of undue stresses in any part, and also without affecting the strength and suitability of the various parts for the work which they have to perform.

The transformer construction shall be suitable for seismic data as specified in these specifications.

5.3 Low Voltage Switchboard

The switchgear shall be metal enclosed, modular type suitable for indoor floor mounting and shall have following features

- Height shall not exceed 2450 mm.
- Shall be easily extensible at both ends.
- Shall be in single or double front execution and fixed or draw out type.
- Shall have designation labels both on front and rear sides.
- Shall be provided with proper gasketing for removable covers, doors, between panels & base frame and all around the perimeter of panels.

Switchgear shall be divided into distinct vertical sections each comprising:

- A completely enclosed busbar compartment running horizontally
- Enclosed vertical busbars serving all modules in vertical section
- A separate horizontal enclosure for all auxiliary power and control buses, if required
- Vertical cable alley of minimum 250 mm wide covering entire height

Operating devices shall be incorporated only in the front of switchgear. Each shipping section shall have metal sheets at both ends.

Cable alley shall be provided with suitable hinged doors.

Rear of single front switchgear shall be provided with either door or removable covers with captive screws.

All doors shall be with concealed type hinges and captive screws.

Each vertical section shall be equipped with a space heater controlled by thermostat.

For draw out modules, only handles of control and selector switches, push buttons, knobs and cutouts for lamps and meters shall be put on front door of respective compartments. All other components shall be on withdrawable chassis.

In fixed type construction, all power connections to the equipment mounted on withdrawable chassis shall be of bolted type.

5.4 Low Voltage Induction Motor

The design, material, construction, manufacture, inspection, testing and performance of induction motors shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. The equipment shall also conform to the applicable standards. Nothing in this specification shall be construed to relieve the VENDOR of this responsibility. In case of conflict between the standards and this specification, this specification shall govern.

The minimum permissible voltage shall be 85% of the rated voltage during motor starting.

Motors shall be capable of starting and accelerating the load with the applicable method of starting, without winding temperatures reaching injurious levels, when the

supply voltage is in the range of 85% of the rated motor voltage to maximum permissible voltage.

The locked rotor current of the motor shall not exceed 600% of full load current (subject to tolerances as per the applicable standard) unless otherwise specified. The locked rotor current of VFD controlled motor shall be within the limit of IS12615 / IEC.

Motors shall be capable of developing the rated full load torque even if the supply voltage drops to 70% of the rated voltage. The pull out torque of the motor shall be at least 205% of full load torque.

Motors when started with the driven equipment coupled shall be capable of withstanding at least two successive starts from cold conditions & one start from hot condition without injurious heating of windings. The motors shall also be suitable for three equally spread starts per hour under the above referred supply conditions. Motors shall be of Energy Efficient type.

5.5 Specific Requirements of VFD Driven Motors

The Motor shall be designed to operate continuously at any speed over the range 10-100 % of rated speed.

The permitted voltage variation should take into account the steady state voltage drop across the starter and all other system components upstream of the motor.

The motor shall be constructed to withstand torque pulsations resulting from harmonics generated by the solid-state power supply.

The driven equipment manufacturer shall be solely responsible for proper selection of the motor for the given load application and the output characteristics of the driven equipment.

5.6 Cables

5.6.1. Conductor

Aluminium conductor, circular, compacted stranded, grade H4, Class 2 as per IS 8130 for power cables. Annealed, stranded Copper Conductor, Class 2 as per IS 8130 for control cables and designated by alphabet 'C'.

5.6.2. Insulation

Insulation for cables shall be XLPE for power cable and PVC for control / lighting / instrumentation and communication cable as per requirement indicated herein and shall conform to the properties covered in the following applicable standard.

- (a) IS 5831 - PVC insulation and sheath for electric cables
- (b) IS 7098- Specification for cross linked Polyethylene insulated PVC sheathed cables

5.6.3. Core Identification

Colour coding shall be acceptable for all cables upto 5 cores. Cables with more than 5 cores shall have printed numerals every 50mm on each core.

5.6.4. Inner Sheath

Inner sheath when specified shall be extruded type and shall be compatible with the insulation provided for the cables.

5.6.5. Armour

Armouring for the cables shall comprise galvanised steel or hard drawn aluminium, in the form of round wires or strips.

5.6.6. Outer Sheath

The outer sheath shall be of an extruded layer of suitable synthetic material compatible with the specified ambient and operating temperature of the cables. The sheath shall be heat resistant, resistant to water, ultra violet radiation, fungus, termite and rodent attacks. The colour of the outer sheath shall be black unless otherwise specified. PVC sheath shall meet the requirements of standards covered above. Requirement of special sheath with Fire Survival (FS) and Flame Retardant Low Smoke (FRLS) characteristics shall be as per requirement. Requirement of Fire Protective Paint on outer sheath of the cable

5.6.7. Cable Drums

Cables shall be supplied in non-returnable wooden and steel drums as applicable. The wood used for construction of the drum shall be properly seasoned and free from defects and wood preservative shall be applied to the entire drum. All ferrous parts shall be treated with a suitable rust preventive coating to avoid rusting during transit or storage. Cable drums shall conform to IS 10418 (Specification for drums of electric cables).

The BIDDER shall indicate in the offer, the maximum length for each size of cable, which can be supplied on one drum. The actual length supplied on each drum shall be within tolerance limit of 5 % with an overall ceiling of +5% on total ordered quantity of each size of cable. However, before winding the cables on drums, VENDOR shall obtain PURCHASER's approval for the drum lengths so as to minimise the number of

joints to the extent possible. Cable ends shall be sealed by non-hygroscopic sealing caps

5.7 H T POWER CABLES

System cables shall be 11kV (UE) grade suitable for use in medium resistance earthed system, stranded & compacted aluminium conductor, extruded semi conducting screen over conductor, XLPE insulated, semi-conducting followed by copper tape screened, extruded PVC Type ST – 2 inner sheathed, aluminium/GS wire armoured, overall FRLS PVC outer sheathed, conforming to IS 7098 (Part II), IEC-502 for constructional details and tests.

Power & Control Cables, 1100 V Grade XLPE Insulated

The cable shall be extruded XLPE insulated. The inner sheath over laid up cores and outer sheath over the armour shall be extruded PVC compound type ST-2. Core identification shall be by printed numerals.

Cables for low and medium voltage (from 25 sq.mm onwards size), industrial heavy application shall be of Al conductor, XLPE insulated, un-armoured, suitable for 1100 V earthed system while 16 sq.mm & below the same shall be of Cu conductor, XLPE insulated, XLPE sheathed and armoured, of voltage grade 1100 V.

The following abbreviations are applicable to these cables

- A Aluminium conductor, stranded, grade H4, class 2 as per IS
- C Copper conductor, stranded, class 2 as per IS 8130
- W Galvanised single steel wire
- F Galvanised single steel strip
- AW/AS Hard drawn aluminium single wire/strip

The construction, performance and testing of cable shall comply with relevant IS.

1100 V Grade Lighting / Misc. / Light duty armoured cables

Cables shall be insulated with extruded PVC type-A. Outer sheath shall be extruded black PVC type ST-1.

The following abbreviations are applicable to these cables.

- A Aluminium conductor, stranded, grade H2, class 2 as per IS.
- C Copper conductor, stranded, class 2 as per IS.

The construction, performance and testing of cable shall comply with relevant IS.

5.8 Diesel Generator

All material, equipment and construction shall conform to the Indian Electricity Act and Rules and following Standards with latest revisions

a) Diesel Engine: BS 5514 (six (6) parts)

b) Alternator: BS 5000, IS 4722, IS 5422, IEC - 60034

The emergency power system shall provide a source of power to essential loads required to permit a safe shut down of the substation in the event of failure of normal supply.

In addition, emergency power is provided for auxiliaries and services required for equipment and personnel safety and minimum plant maintenance during the blackout.

The DG shall be capable of black start. The DG shall also be capable of continuous base load operation up to 90% of the output rating at site conditions.

The DG shall be complete with common base frame for mounting on a foundation block and shall include adequate number of foundation bolts and anti-vibration pads, if required. Alignment shims, as required shall also be provided.

The DG set shall be started automatically in case of AC power loss. Manual starting facility from Control room hall shall also be provided. The starting time period shall be limited to thirty (30) sec

The diesel engine shall be of stationary type and directly coupled to the generator. The engine shall be capable of driving the generator at 10% overload at the rated speed for one hour.

The engine shall be air cooled / water cooled with separately / machine mounted radiator fans.

Electrical starting arrangement complete with starting DC motor, starter, batteries and battery charger shall be provided. The electric starting system suitable for minimum six (6) starts shall be used. No external power shall be used for starting of the engine.

The generator shall be rated for 415 V, 3 phase, 50 Hz supply. The power factor shall be 0.8 (lag). It shall be mounted on a common base frame together with the prime mover.

The generator shall be totally enclosed air-cooled type.

In the stator winding six nos. resistor temperature detectors shall be provided. Space heaters suitable for operation on 1 phase, 240V AC shall also be provided.

The generator shall be provided with complete excitation system with automatic voltage regulator (AVR).

The generator shall be provided with two (2) grounding terminals with clamps suitable for connection to the PURCHASER'S grounding grid

Auto Mains Failure (AMF) Panel

The DG set shall have its own AMF panel. This panel shall comprise of AVR, protection & metering equipment, indicating instruments and start / stop interlocking hardware. The panel shall be free standing type; CRCA sheet steel enclosed having a degree of protection of IP 55. All auxiliary devices for control, indication, measurement, protection and alarm shall be mounted on the front door of the panel.

DG set shall have automatic starting sequence from the manually initiated command from local. It shall also have auto initiation through a 'no volt relay'. DG sets are required to start-up and come into operation whenever a remote starting impulse is received in the event of failure of normal supply.

5.9 Lighting Installation

All receptacles and switches to be installed in offices and control rooms shall be flush mounted within the wall and those in other areas shall be wall or column mounted.

Ceiling roses shall not embody fuse terminals as an integral part. For voltages exceeding 250 volts, a ceiling rose or any similar attachment shall not be used.

A socket outlet shall not embody fuse terminals as an integral part of it. The switch controlling the socket outlet shall be on the live side of the line.

All exposed metal parts of the plug, when the plug is in complete engagement with the socket outlet, shall be in effective electrical connection with the earthing pin.

Chapter-6

Specifications for Instrumentation

6.1 General Technical & Particular Requirements for Instrumentation & Control Equipment's / Systems

6.2.1. List of Measurements and Control:

The plant shall be provided with required instrumentation equipment for measurement & control functions, indicated below as a minimum, but not limited to the following:

- a) Flow measurement and online monitoring system at inlet and outlet of treatment plant
- b) Flow measurement at common header of pumps and blowers
- c) Pressure measurement at discharge of each pump/ blowers & common header
- d) Level measurement of each sump & tank
- e) Differential Level measurement across the screen
- f) pH measurement at inlet and outlet of treatment plant
- g) Dissolved oxygen measurement at Aeration tank/ Biological reactor
- h) Residual chlorine at outlet of CCT
- i) Total suspended solids (TSS), BOD & COD at inlet & outlet of treatment plant
- j) Bidder may propose additional instruments & control equipments for safe, reliable & efficient operation of treatment process proposed by him.
- k) Required quantities and application of the above instruments shall be provided as per approved P&ID to meet the requirement of the process.

- l) Necessary alarms, status signals along with the measurements of process parameters etc. shall be displayed in HMI.
- m) GPS tracking system to be installed in all the vacuum trucks for proper tracking of vehicles and traffic management. Provision for display shall be made at the office of Employer.

6.2 Fields Instruments / Process Analyzers required as applicable

6.2.1. Full bore Electromagnetic flow meter:

- (i) Full bore type Electromagnetic flow meter shall be provided as per approved P&IDs. The flow meter shall consist of flow sensor (i.e., flow tube), flow transmitter/ flow computing unit and remote flow indicator cum integrator.
- (ii) The electromagnetic flow meter shall be manufactured as per BS EN ISO 6817 standard- measurement of conductive liquid flow in closed conduits, method using electromagnetic flow meters
- (iii) The flow tube flanges and transmitter housing shall be properly earthed.
- (iv) Flow tube shall have waterproof construction (IP 68) and shall be suitable for installation on underground pipe lines buried directly in the soil and also suitable for above ground pipelines.
- (v) The transmitter of the flow meter shall be SMART type microprocessor based using digital technology having facilities for configuration of engineering units, flow range and features of memory and self-diagnosis.
- (vi) The transmitter shall be mounted separate from the flow tube, connected by a cable.
- (vii) The flow transmitter and flow computation/ evaluation unit shall be mounted in a field mounted metallic field enclosure / cabinet.
- (viii) The electromagnetic flow meter shall have bi-directional measurement feature and with accuracy better or equal to + 0.5% of measured value inclusive of linearity, repeatability, pressure effect etc.
- (ix) Flow transmitter/ flow computing unit should be microprocessor based having digital display with flow-rate indications and integrated flow values with the configuration facility from the front face.
- (x) Material of construction of the wetted parts of flow meters shall be suitable for functioning on treated / raw and chlorinated water applications.
- (xi) Flow tube shall be rugged in construction and shall be suitable for continuous operation.
- (xii) Flow meters shall be suitable for the water turbidity at site during various seasons.
- (xiii) The flow meter shall be installed in such a way that it always remains filled with water.

- (xiv) To avoid the effects of disturbances in the velocity profile, a straight and uninterrupted run, upstream as well as downstream from the location of the flow meter shall be provided, as required by the flow meter manufacturer.
- (xv) The flow tube shall be installed at a location free from flow turbulence. In order to achieve the same, the flow tubes shall be installed in the pipe section such that straight lengths of pipe without bends or tee connection shall be minimum 5 diameters on upstream and 2 diameters on downstream side.
- (xvi) The Contractor shall finalize the exact location of flow transducers in consultation with Purchaser/ Engineer In-Charge.
- (xvii) The flow meter output signals shall contain the data for flow-rate and integrated flow readings
- (xviii) The output signal of the flow meter will be connected to panel mounted Flow Indicator & integrator and PLC.

Sr. No.	Description	Particulars
1	General	
1.1	Make	As per approved vendor list
1.2	Item	Full Bore Electromagnetic Flow Meter
1.3	Service	Common Header of Pump Discharge
1.4	Fluid	Sewage Water
1.5	Area Classification	Non Hazardous
2	Flow Sensor	
2.1	Type	DC pulsed
2.2	Electrode / Sensor MOC	Hast alloy C
2.3	Flow Tube MOC	SS304
2.4	Coil Housing MOC	Non corrosive (SS 304) or Die cast aluminium with anti-corrosive grade paint suitable for application
2.5	Grounding Ring MOC	SS 304
2.6	Liner MOC	PTFE
2.7	Process Connection	Flanged
2.8	Flange MOC	CS
2.9	Housing Protection	IP 68
2.10	Pressure Rating	16 Kg/cm ²

2.11	Temperature	50°C Ambient
2.12	Size(mm)	To suit mains flow parameters, with pipe reducer / expander provided as necessary
3	Flow Indicator and Transmitter	
3.1	Type	Microprocessor Based, Remote Mounted
3.2	Power Supply	230 VAC (UPS)
3.3	Accuracy	± 0.5 % of measured value
3.4	Repeatability	± 0.1%
3.5	Transmitter Protection	IP67
3.6	Transmitter MOC	Dia-cast Aluminium with PU finish / Polycarbonate
3.7	Output	One Current – 4 to 20 mA (isolated) proposanal to flow rate Hart (version 6 or above) One Scalable Pulse One Status Output
3.8	Communication	Modbus RS485
3.9	Display	2 Line Backlit LCD, Programmable
3.10	Maximum Digit Display	8 Digit
3.11	Indication on Display	<ul style="list-style-type: none"> • Actual Flow Rate / Instantaneous Flow Rate • Cumulative Forward Flow • Cumulative Reverse Flow • Cumulative Flow / Sum / Totalizers • Alarm
		<ul style="list-style-type: none"> • Five (5) digit backlit/Normal LCD, for flow rate in m³/hr. • Eight (8) digit backlit/Normal LCD for totalized flow in ML
		Display with 8 digits for main information. Index, menu and status symbols for dedicated information
		Key for toggling through the information and reset customer totalizers and call-up function
		Selectable default information and accessible menus:

		<ul style="list-style-type: none"> • Operator • Meter • Service • Data Logger
3.12	Zero and Span adjustment	Factory set Password protection of all parameters and hardware protection of calibration and revenue parameters.
3.13	Facility for on line diagnosis	Required as following:
		Diagnostic
		<ul style="list-style-type: none"> • Continuous self test shall include <ul style="list-style-type: none"> • Coil current to drive the magnetic field • Signal input circuit • Data calculation, handling and storing
		Features <ul style="list-style-type: none"> • Alarm statistics and logging for fault analyzing • Electrode impedance to check actual media contact • Flow simulation to check pulse and communication signal chain for correct scaling • Number of sensor measurements (excitations) • Transmitter temperature • Low impedance alarm for change in media • Flow alarm when defined high flow exceeds • Verification mode for fast measure performance check • Statistic flow and consumption data
3.14	Cable Gland	Required
3.15	Cable Length (sensor to transmitter)	10 Meter minimum or suit to site

3.16	Data Protection:	<ul style="list-style-type: none"> • All data shall be stored in an EEPROM. • Totalized statistic shall be backed up every 10 min • Power consumption and temperature Measurement statistic at every 4 hour • Minimum 30 days of data shall be stored in EEPROM. • Password protection of all parameters and hardware protection of calibration and revenue parameters.
3.17	Power Supply in case of Raw power is not available (Remote Area)	Battery power / Solar power operated
4	Flow Indicator and Totalizer (Panel Mounted)	
4.1	Type	Electronic, Microprocessor based, single unit for flow indicator and integrator.
4.2	Display	Digital, LED display
4.3	Digit Height	14 mm or Higher
4.4	No. of Digits a) Flow indicator b) Flow integrator	4 Digits 8 Digits
4.4	Input	4-20 mA DC (Isolated)
4.5	Zero and span adjustment	Required
4.6	Manual Reset Facility for flow integrator	Required (shall be protected)
4.7	Engineering Units for Flow rate indicator	m ³ /hr
4.8	Battery backup for flow integrator	Required
4.9	Retransmitted output	Required

6.2.2. Pressure Gauge:

- a) Pressure Gauges shall be bourdon tube with diaphragm seal type with dial size of minimum 150 mm in diameter and calibrated for the required range. The colour of dial shall be white. The pointer shall be adjustable & micrometer type. The indicator shall be incorporating with damper and shall have external zero setting mechanism and safety blow out mechanism. The glass shall be shatter proof. The over range protection shall be 25% above maximum pressure. All wetted parts material shall be SS 316. The pressure gauges shall have an accuracy of $\pm 1\%$ full scale and weather protection class IP 65.
- b) The gauge shall be supplied complete with sensing diaphragm unit, sealing liquid, a pressure indicator and an armored capillary connecting the diaphragm to the pressure indicator.
- c) The pressure indicator shall be supported on a rigid support and the capillary shall be well supported to prevent physical damage.
- d) Pressure gauges shall comply with IS 3624. Where the gauge is subject to pressure pulsations and/or vibration, it shall be provided with snubber or glycerine filled dial.
- e) Unless and otherwise specified the measuring range shall be from 0 to 20 kg/cm² with accuracy of $\pm 1\%$ of maximum scale confirming to the IS 3624. The vendor shall submit test calibration certificate along with the pressure indicators.

Sr. No.	Description	Particulars
1	General	
1.1	Make	As per approved vendor list
1.2	Item	Pressure Gauge
1.3	Service	Pump/Blower Discharge, Pump/Blower Discharge Common Header
1.4	Fluid	Sewage Water, Air
1.5	Area Classification	Non Hazardous / Hazardous
2	Pressure Gauge	
2.1	Type	Bourdon
2.2	Sensor and other wetted parts M.O.C	SS 316
2.3	Process connection	½” NPT (M)
2.4	Dial size	150 mm

2.5	Material of dial	Aluminium with white back ground and black numerals
2.6	Glass	Shatterproof
2.7	Housing material	Die cast aluminium with epoxy coating
2.8	Accuracy	±1% of full scale or better
2.9	Over range protection	125% of maximum pressure
2.10	Gauge Protection	IP65
2.11	Temperature	50°C Ambient
2.12	Range	As per pump design (Range to be finalised during detailed engineering without any cost implication)
2.13	Accessories	<ul style="list-style-type: none"> • Snubber • 3 way isolation valve • Impulse tubing, fittings • All other installation hardware
2.14	Diaphragm Seal M.O.C	SS316
2.15	3 Way Isolation Valve M.O.C	SS316
2.16	Impulse Tube Fitting M.O.C	SS316

6.2.3. Pressure Transmitter

- a) Pressure Transmitter shall consist of a pressure sensor/transducer/ transmitter and panel mounted digital pressure indicator and any other items required for completing the measuring system. Where the transmitter is subject to pressure pulsations and/or vibration, it shall be provided with snubber.
- b) The pressure transmitters shall be designed for operation over 130 % of full range.

Sr. No.	Description	Particulars
1	General	
1.1	Make	As per approved vendor list
1.2	Item	Pressure Transmitter
1.3	Service	Pump/ Blower Discharge Common Header
1.4	Fluid	Sewage Water
1.5	Area Classification	Non Hazardous / Hazardous
2	Pressure Sensor	

2.1	Type	Diaphragm / piezoelectric
2.2	Sensor and other wetted parts M.O.C	SS 316
2.3	Process connection	½” NPT (F)
2.4	Sensor Fill Fluid	Silicon Oil
2.5	Temperature	50°C Ambient
2.6	Range	As per pump design (Range to be finalised during detailed engineering without any cost implication)
3	Pressure Transmitter	
3.1	Type	SMART Type / Microprocessor Based, Head Mounted
3.2	Power Supply	230 VAC Line Power / 24 VDC
3.3	Accuracy	± 0.1 % of measured value
3.4	Response Time	100 ms
3.5	Transmitter Protection	IP67
3.6	Transmitter MOC	SS316 /Diacast Aluminium with PU finish
3.7	Output	One Current – 4 to 20 mA (isolated) proposanal to pressure Hart (version 6 or above)
3.8	Display	Alphanumeric LCD Type, Programmable
3.9	Over range protection	125% of maximum pressure
3.10	Zero and span adjustment	Required
3.11	Cable Gland	Required
3.12	Accessories	<ul style="list-style-type: none"> • Snubber • 3 way isolation valve • Impulse tubing, fittings • Mounting Bracket • Tag Plate • All other installation hardware
3.13	Diaphragm Seal M.O.C	SS316
3.14	3 Way Isolation Valve M.O.C	SS316
3.15	Impulse Tube Fitting M.O.C	SS316
4	Digital Pressure Indicator (Panel Mounted)	
4.1	Type	Electronic, Microprocessor based

4.2	Display	Digital, LED display
4.3	Digit Height	14 mm or Higher
4.4	No. of Digits - Pressure indicator	8 Digits
4.5	Input	4-20 mA DC (Isolated)
4.6	Zero and span adjustment	Required
4.7	Engineering Units for - Pressure indicator	Kg / Cm ²
4.8	Battery backup for flow integrator	Required
4.9	Retransmitted output	Required

6.2.4. Pressure Switches;

Sr. No.	Description	Particulars
1	General	
1.1	Make	As per approved vendor list
1.2	Item	Pressure Switch
1.3	Fluid	Sewage Water
1.4	Area Classification	Non Hazardous / Hazardous
2	Pressure Sensor	
2.1	Type	Diaphragm / piezoelectric
2.2	Sensor and other wetted parts M.O.C	SS 316
2.3	Process connection	½" NPT (F)
2.4	Temperature	50 °C Ambient
2.5	Range	As per pump design (Range to be finalised during detailed engineering without any cost implication)
2.6	Accuracy	± 1% of full scale or better
2.7	Range	As per pump design, Adjustable setting over full span and as per P&ID.
2.8	Over range Protection	125% of range
2.9	Body Material of casing	Die Cast Aluminium / non-corrosive
2.10	Set point adjusting scale	Required

2.11	Accessories	<ul style="list-style-type: none"> • Snubber • 3 way isolation valve • Impulse tubing, fittings • All other installation hardware
2.12	Diaphragm Seal M.O.C	SS316
2.13	3 Way Isolation Valve M.O.C	SS316
2.14	Impulse Tube Fitting M.O.C	SS316

6.2.5. Ultrasonic Level Transmitter;

- a) Ultrasonic Level Transmitter shall consist of a level sensor, level transmitter cum computing unit, prefabricated cable connecting the sensor and transmitter, panel mounted digital level indicator and any other item required for completing the level measurement system.
- b) The level sensor shall be suitable for flange or bracket mounting as required and have a minimum protection conforming to IP 67. It shall have ambient temperature compensation and adjustable datum setting facilities.
- c) The level transmitter cum computing unit shall be provided in an enclosure conforming to IP 67. It shall be programmable with an integral programming keyboard, LCD display, relays for alarm, control and system fault and shall provide an isolated 4 to 20mA DC output signal proportional to the level
- d) The design and application of ultrasonic level meters shall take into account the vessel or channel construction, the material, size, shape, environment, process fluid or material, the presence of foam, granules, size etc.
- e) The installation shall avoid any degradation of performance from spurious reflections, absorption, sound velocity variations, sensor detection area, temperature fluctuations, specific gravity changes and condensation. For applications where spurious reflections are unavoidable the control unit shall be provided with facilities for spurious reflection rejection.
- f) If turbulence exists, shielding, stilling tubes or other measures shall be provided to avoid effects on the measurement.

Sr. No.	Description	Particulars
1	General	
1.1	Make	As per approved vendor list
1.2	Item	Level Transmitter
1.3	Service	Sump / Tank

1.4	Fluid	Sewage Water, Chemical Water
1.5	Area Classification	Non Hazardous / Hazardous
2	Level Sensor	
2.1	Type	Ultrasonic
2.2	Sensor MOC	PP / PVDF
2.3	Seal MOC	EPDM
2.4	Sensor Housing MOC	Diacast Aluminium with PU finish / Polycarbonate
2.5	Process Connection	Flanged
2.6	Flange MOC	PP / CS
2.7	Housing Protection	IP 68
2.8	Temperature compensation	Required
2.9	Swirling arm arrangement for mounting of sensor	Required for access during maintenance
Sr. No.	Description	Particulars
2.10	Size(mm)	To suit Sump / Tank Height
2.11	Pressure Rating (Kg/cm ²)	Atmospheric
2.12	Temperature	50 °C Ambient
3	Level Transmitter	
3.1	Type	Microprocessor Based, Remote Mounted
3.2	Power Supply	230 VAC Line Power
3.3	Accuracy	± 0.1 % of measured value
3.4	Repeatability	± 0.1%
3.5	Transmitter Protection	IP67
3.6	Transmitter MOC	Diacast Aluminium with PU finish / Polycarbonate
3.7	Output	One Current – 4 to 20 mA (isolated) proposanal to Level Hart (version 6 or above)
3.8	Display	2 Line Backlit LCD, Programmable
3.9	Maximum Digit Display	8 Digit
3.10	Indication on Display	Actual Sump / Tank Level Alarm

3.11	Zero and Span adjustment	Factory set Password protection of all parameters and hardware protection of calibration and revenue parameters.
3.12	Cable Gland	Required
3.13	Cable Length (sensor to transmitter)	10 Meter minimum or suit to site
4	Digital Level indicator (Panel Mounted)	
4.1	Type	Microprocessor based
4.2	Display	Digital LED display
4.3	Digit Height	14 mm or higher
4.4	No. of Digits	3 ½
4.5	Input	4-20 mA DC with HART protocol (version 6 or above)
4.6	Zero & Span Adjustment	Required
4.7	Engineering Units for display	Meters and %.
4.8	Accuracy	±0.1 % of span
4.9	Enclosure Material	Non corrosive
4.10	Retransmission output	Isolated 4-20 mA DC-2nos.
4.11	Power supply to Transmitter	24 V DC
4.12	Alarm outputs	1NO+1NC for high and Low-Low alarms (adjustable)

6.2.6. Displacer Type Level Switch

- (i) Level switch shall be displacer type with flexible rope, non-corrosive displacer, 2 set point micro switch, flange connection, spring housing and shall have external cage.
- (ii) Level switch shall be supplied complete with mounting bracket and associated accessories.
- (iii) Perforated still well is required for tanks with excessive turbulent liquids.
- (iv) The micro switch contacts being rated for 5A at 230 VAC can be directly wired to control devices through instrument cable.
- (v) Level switch range shall be suitable to sump and tank height.

6.3 Laboratory Instruments

The treatment plant shall be provided an administrative building that will house the laboratory.

The laboratory shall be equipped with instruments, equipment, chemicals and other infrastructure that is necessary to perform the routine analysis for the parameters as detailed in table below.

Contractor shall submit the complete list of lab equipments required for full analysis of parameters to the employer’s representative for approval.

Contractor shall include in his offer supply of chemicals required for analysis along with proposed lab instruments and associated equipment, including for the O&M period as specified elsewhere in the bid document.

Typical Laboratory equipments to be provided are detailed as below;

Sr. No.	Description	Unit	Quantity
1	Comparator test set for residual chlorine or chloroscope	No.	1
2	Multi parameter (pH & Conductivity Meter)	No.	1
3	Mains operated pH meter completed with one calomel electrode and glass electrode	No.	1
4	Photoelectric calorimeter / Spectrophotometer	No.	1
5	Water bath with 6 to 8 concentric holes and discs, electrically heated	No.	1
6	Hot plates	No.	25
7	Distilled water plant	No.	1
8	Demineraliser	No.	1
9	Refrigerator (280 litres capacity) double door	No.	1
10	Muffle furnace	No.	1
11	Electric oven	No.	1
12	Magnetic’ stirrer	No.	1
13	Analytical balance with weight box	No.	1
14	Jar-Test apparatus (Phipps & Bird)	No.	1
15	Centrifuge	No.	1
16	Gas cylinder if gas supply is not available	No.	1
17	Fume cupboard	No.	2
18	Depth Sampler	No.	2
19	Total Organic Analyser	No.	1
20	Sieve shaker with standard sieves and two pan balance weighing up to 200gm samples	No.	1

21	Equipment Needed For Bacteriological Examination		
22	Hot Air Oven	No.	1
23	Autoclave	No.	1
24	Incubator 37°C or 44°C (Water/Air-Jacketed)	No.	1
25	Binocular microscope	No.	1
26	pH Meter	No.	1
27	Pipette Box (Stainless Steel)	No.	10
28	Wooden Racks/Aluminium Racks	No.	5
29	Wire Baskets	No.	10
30	Cotton/ Aluminium Foils	No.	10
31	Burners (Bunsen) With Pilot Lamp	No.	3
32	Suction Flask (1 Litre Cap)	No.	2
33	Suction Pump	No.	1
34	Sampling Bottles	No.	10
35	Measuring Cylinders (1000 MI, 500 MI, 200 MI, 100 MI, 50 MI, 25 MI)	Set	3
36	Vacuum pump	No.	1
37	Soxhlet extraction unit	No.	1
38	Kjeldhal digestion unit	No.	1
39	Weighing Balance (max 10kg)	No.	1
40	Laminar Air Flow chamber	No.	1
41	Bacteriological Media	No.	1
42	M. Endo Broth (dehydrated)	No.	1
43	Lactose or Lauryl Tryptose broth	No.	1
44	Mac Conkey broth	No.	1
45	Brilliant Green Bile Lactose Broth	No.	1
46	Total Plate Count Agar	No.	1
47	Peptone/Tryptone Water	No.	1

The equipment shall be supplied with all the accessories that are necessary to make the equipment functional for analyzing parameters.

Contractor shall provide additional Equipment if necessary for the performance of the plant without extra cost to the Employer.

6.4 Work Tables and Benches;

- (i) Minimum of 1set of work table and chair per staff shall be provided for the laboratory and office staff.
- (ii) The furniture and chairs shall be of ergonomic design so that staff can work most efficiently and safely.
- (iii) The work tables shall be along the wall and shall be provided with adequate storage capacity and open glass shelves on the top to provide additional space for storage of chemicals and stock solutions.
- (iv) A fume cupboard with ventilation hood shall be provided to prevent spreading of toxic and irritant fumes and odours into other parts of the laboratory.
- (v) Forced ventilation with exhaust fans shall be provided. The wall space and offsets shall be convenient to locate cabinet, benches, hoods, incubators alongside without any loss of floor space.

Chapter -7

Process Requirements

7.1 General

Process requirements for the following Faecal Sludge & Septage Treatment Plant is included in this contract and is described herein Part 6 – “Process Requirements”

No.	Design Capacity	Treatment Process
1	42 kLD	<p>Pretreatment followed by Mechanical Dewatering of Septage and anaerobic digestion of faecal sludge;</p> <p>Package treatment plant* for centrate to meet desired effluent characteristics for proper reuse.</p> <p>Stabilization of dewatered sludge for proper disposal / sale.</p>

*The design of this package treatment plant is left open for Bidders to meet the specified plant effluent quality. For the purpose of DPR, a package treatment plant with MBBR followed by Tube Settler, and media filtration was considered.

Bidders wishing to offer technical alternatives to the requirements of the Bid documents must provide all information necessary for a complete evaluation of the alternatives by the Employer, including drawings, design calculations technical specifications, proposed installation methodology and other relevant details.

Alternative Bids must satisfy the Employer’s performance requirements as set out in the Bid documents. Bidder shall include with their Bid evidence acceptable to the Employer of satisfactory past performance of alternative designs and the associated equipment and processes offered and full details of similar plant capacities called for to enable proper evaluation of such alternative designs.

Bidders should note that they must submit a Bid based on the Employer’s Requirements for their alternative Bid to be considered. Bidder may propose alternate dewatering equipment with all technical documents for approval of Employer.

7.2 Influent Characteristics

The typical influent septage characteristics used as the basis of design are listed in below Table. However, bidder should carry out sampling on his own to establish the actual characteristics. After award of work, it is mandatory for contractor to conduct tests on at least 3 samples to establish the raw septage and faecal sludge characteristics, before proceeding for design stage.

(i) Typical characteristics of Influent Septage

No.	Source	Septage
	Characteristics	Faecal Sludge of low concentration, usually stored for several years, more stabilized than Type- "A"
1	COD (mg/L)	<15000
2	COD / BOD	5:1 to 10:1
3	NH ₄ N (mg/L)	< 1000
4	TS (%)	< 3%
5	SS (mg/L)	7,000 (approx.)
6	Helminth Eggs	4,000 (approx.)

Source: CPHEEO, 2013

7.3 Effluent Quality Requirements

The effluent quality requirements (Treated Effluent Characteristics) to be met are listed in below Table;

Sl. No.	Parameters	Tolerance Limits (Inland Surface Water)
1	BOD (3 days at 27°C) (mg/l)	≤10
2	COD (mg/l)	≤50
3	TSS (mg/l)	≤10
4	Total Kjeldahl Nitrogen, TKN (mg/l)	≤10
5	pH	6.5-7.5
6	Residual Chlorine, mg/L	≤1.0
7	Oil and grease, mg/L	≤10
8	Faecal Coliform	230 MPN/100 ml

All other parameters shall be as per State Pollution Control Board/ Central Pollution Control Board / MoEF guidelines.

7.4 Dewatered Sludge Quality Requirements

The dewatered sludge quality requirement to be met is listed below:

Minimum sludge TSS (dry solids)	% w/w	20%
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7.5 Process and Facilities Description

This Process and Facilities description is intended to provide a general indication of the processes and types of facilities that the Contractor shall be required to design, construct, operate & maintain and applies in this contract unless specifically indicated otherwise. The Contractor shall use this description together with other specific information provided elsewhere in bid document, including but not limited to, Part 1- “Project Requirements”, and “Drawings”, all of which are integral to this Process and Facilities Description and are incorporated herein by reference. The Contractor may propose alternate treatment process and implementation details such as detailed site layouts and elevations of specific components. However, the Contractor shall strictly comply with the performance requirements (such as effluent and sludge quality and equipment efficiencies).

7.5.1 Receiving Station

An FSS receiving station is proposed before the screens at the FSTP site. The receiving station will have three truck bays. Each truck bay will have an inlet point i.e. a pipe with a locking mechanism which locks onto the outlet of the truck. Thus, thee trucks can be emptied simultaneously. All the three pipes will be connected to, a channel which will hold the screens. Each truck bay will be provided with a water hose for cleaning and washing of trucks and any spillage. The water used here will be treated water from liquid treatment scheme

7.5.2 Screens

Two receiving channels and screens will be installed at the initial stage of FSTP, The septage collected from the containment system of individual households will be transported through the dedicated receiving channel and screen whereas the collected faecal sludge or wastewater from CT/PT or Hotels/Resorts will be transported through another dedicated channel and screen. Screens will be installed in the channel of width 0.45 m having slope 1:20. The height and total length of the channel will be 0.60 m and 4.5 m respectively. The velocity of the FSS in the channel should be between 0.3-1.0 m/s. This ensures no deposition of solids takes place in the channel.

The first screen will have bar spacing of 15 mm followed by second screen with the bar spacing of 6 mm.

Manual raking is proposed since not much solid waste is expected. The raked out solid waste will be collected in the pan behind the screen and sent to the land fill for disposal. After the screens, the Feecal Sludge and Septage will directed to the settling thickening tank and the anaerobic digester through the screens separately.

After disposal of Feecal Sludge and Septage at receiving station on site, the suction trucks will be washed at the receiving station platform. The washing facility with compressor and jet system will be provided at the receiving station. A 10 KLD storage tank will be provided for the storage of water pumped from the treated water tank at liquid treatment scheme.

7.5.3 Settling thickening tank

The settling thickening tank has three sections, inlet section, sedimentation section, outlet section. The inlet section is designed in a way that, (1) no dead zones are created at the corners of the tank and (2) the velocity of the incoming septage is gradually reduced. A baffle wall helps to separate out the inlet section from the sedimentation section.

In the sedimentation section the velocity of the septage is reduced adequately so as to allow separation of oils-grease-fats and solids particles. The sedimentation section has a slope towards the inlet section where a small sump is created for fixing the sludge pump. This sump ensures that only thick compressed sludge is pumped out of the settling thickening tank. In normal working conditions, approximately 3 m³/d of thickened sludge needs to be pumped out of the settling thickening tank and sent to belt press for dewatering.

The outlet section is separated from the sedimentation section using another baffle wall. The outlet pipe is an inverted elbow which facilitates removal of only top layer of the water

7.5.4 Anaerobic Digester

The anaerobic digester consists of two sections; (1) anaerobic settler and (2) anaerobic stabilizer. The settler ensures bigger solid are separated from the liquid stream. These solids they settle to the bottom of the settler and are digested anaerobically. The liquid portion with difficult to settle solids enter the stabilizer where the incoming sludge (faecal sludge/wastewater sludge) will be brought in

contact with the activated sludge. The incoming sludge has to pass through the activated sludge blanket which helps to bring down the BOD, COD and TSS of the liquid component. The sludge retention time of 3 months is provided and the hydraulic retention time of more than 30 hours is provided.

After stabilization, the liquid component is collected in a separate tank from where it will be pumped into the Liquid Treatment Scheme. The 3 m³ of digested sludge needs to be removed every week from the digester and sent to belt press for dewatering.

7.5.5 Belt Press

The thickened sludge from the settling thickening tank and the digested sludge from the anaerobic settlers will be fed into the belt press. The belt press is integrated with a drum thickener. A polyelectrolyte (coagulant) is added to the incoming stream and passed through drum thickener, resulting in a good consistency sludge. Polyelectrolyte consumption is between 2.5-4 kg/ton of dry solids and depends on the concentration of the solids in the thickened sludge. The conditioned sludge falls on the belt and is pressed between series of rollers to remove the bulk water from the sludge.

The resultant sludge contains only bound water in the moisture form. This sludge is further sent to rotary dryer in batches.

7.5.6 Rotary dryer

The dewatered sludge from the belt press is fed into the rotary dryer in batches and dried with moisture content between 10-40% depending on the operation time of the dryer. The dryer consists of the arrangement where the drum is heated and rotated and the moisture laden air exists the system. The dried, sterilised sludge comes out of the system. The treated solids are proposed to be stored in the ware house for further reuse.

7.5.7 Equalization Tank

An equalization tank shall be provided to store and homogenize the collected septage. Lime dosing may be provided here if required.

Design Considerations:

Holding time: 6 hours minimum

Mixing arrangement: Submersible mixers

Material of Construction: RCC

7.5.8 MBBR System

The MBBR consists of tank filled with special media. These media are made of specially developed material of control density such that they can be fluidised using an aeration device. A bio film develops on the media which moves along with the effluent in the reactor. The movement within the reactor is generated by providing aeration with the help of air grids placed at the bottom of the reactor. The thin bio film on the media enables the bacteria to act upon the bio degradable matter in the effluent and reduce the BOD and COD content in the presence of oxygen from the air that is used for fluidization.

The aerated liquid will overflow to Tube Settler for separation of solids from liquid. The settled sewage will be collected in intermediate storage tank.

Aeration;

The recommended dissolved oxygen concentration in the aeration tank is in the range 0.5 to 1 mg/l for conventional ASP and above 2 mg/l when nitrification is required in the ASP.

The specifications of the aeration equipment depend on various parameters. Few parameters are size of the tanks, oxygen requirement for removal of carbonaceous BOD removal and nitrification, type of aerators etc. The compressor capacity needed for ensuring adequate mixing energy is also important. In actual design, the power requirements are calculated separately for aeration & mixing and the higher of the two is chosen. Mostly, the power required for mixing is always higher.

The oxygen transfer capacities of fine and coarse diffused air systems under standard conditions lie between 1.2 to 2 and 0.6 to 1.2 kg O₂/kWh respectively. However, it is necessary to secure the test certificates for the same from the diffused air system vendor before deciding on the tendered offers.

7.5.9 Pressurised filter and Disinfection

The liquid from the intermediate storage tank will be passed through the sand filter and activated charcoal filter under pressure. These processes reduce the colour, odour and TSS content and provide further clarification to the water. After clarification the treated water passes through the UVGI for disinfection and is stored in the treated water storage tank.

7.6 Disposal / Reuse of treated effluent and sludge

The selected treatment technology shall be able to produce the high-quality effluent, suitable for reuse applications. The purpose of these processes is water conservation and sustainability, rather than discharging the treated water. Reusing water for

beneficial use involves using treated wastewater effluent in place of or to supplement non-drinking water requirements. It may be reused for various purposes such as:

- toilet flushing,
- fish culture,
- gardening,
- sustainable landscape irrigation,
- washing of vehicles
- road washing,
- horticulture

Table below gives the recommended norms of treated sewage quality for using it for the specified activities. In this case, the treated water can be safely used for all the above listed applications.

Recommended norms of treated sewage quality for specified activities at point of use

Sl. No.	Parameter	Toilet flushing	Fire protection	Vehicle Exterior washing	Non-contact impoundments	Landscaping, Horticulture & Agriculture			
						Horticulture, Golf course	Non edible crops	crops which are eaten	
								raw	cooked
1	Turbidity (NTU)	<2	<2	<2	<2	< 2	AA	< 2	AA
2	SS	nil	nil	nil	nil	nil	30	nil	30
3	TDS	2100							
4	pH	6.5 to 8.3							
5	Temperature °C	Ambient							
6	Oil & Grease	10	nil	nil	nil	10	10	nil	Nil
7	Minimum Residual Chlorine	1	1	1	0.5	1	nil	nil	nil
8	Total Kjeldahl Nitrogen as N	10	10	10	10	10	10	10	10
9	BOD	10	10	10	10	10	20	10	20
10	COD	AA	AA	AA	AA	AA	30	AA	30
11	Dissolved Phosphorous as P	1	1	1	1	2	5	2	5
12	Nitrate Nitrogen as N	10	10	10	5	10	10	10	10
13	Faecal Coliform in 100 ml	Nil	Nil	Nil	Nil	Nil	230	Nil	230
14	Helminthic Eggs / litre	AA	AA	AA	AA	AA	<1	<1	<1
15	Colour	Colourless	Colourless	Colourless	Colourless	Colourless	AA	Colourless	Colourless
16	Odour	Aseptic which means not septic and no foul odour							

All units in mg/l unless specified; AA-as arising when other parameters are satisfied; A tolerance of plus 5% is allowable when yearly average values are considered.

Source: CPHEEO, 2013

7.7 Sludge Disposal

Dewatered septage/sludge can be used as fertilizer in agriculture application.

Composting is the stabilization of organic waste through aerobic biological decomposition. The humus is produced after composting that can be used as a soil conditioner. The process can be accomplished in various configurations. The different types of composting include two open- area methods: windrow and static pile composting and in-vessel mechanical composting.

Compost products can be sold or given away. Operational parameters for septage composting are presented in Table below.

7.8 Operational parameters for dewatered septage composting;

Parameter	Optimum range	Control mechanisms
Moisture content of compost mixture	40-60%	Dewatering of septage to 10 to 20% solids followed by addition of bulking material (amendments such as sawdust and woodchips), 3:1 by volume amendment: dewatered septage.
Oxygen	5-15%	Periodic turning (windrow), forced aeration (static pile), mechanical agitation with compressed air (mechanical).
Temperature (compost must reach)	55-65°C	Natural result of biological activity in piles. Too much aeration will reduce temperature.
pH	5-8	Septage is generally within this pH range, adjustments not normally necessary.
Carbon/nitrogen ratio	20:1 to 30:1	Addition of bulking material.

Excess Sludge shall be disposed off by the Contractor by transporting to designated landfill site.

7.9 Indicative Datasheets of Electro-Mechanical Equipment

7.9.1 Belt Press

No.	Details of equipment	Unit	Value/Description
1.	Dimensions	Mm	3350 x 1350 x 1700
2.	Dry weight	Kg	1020
3.	J Belt Width	Mm	600
4.	Installed power	kW	2.75
5.	Wash water flow rate		4.5 m ³ /h @ 6 bar
6.	Pneumatic air		0/1 m ³ /h @ 7 bar
7.	Belt tracking system		Pneumatic
8.	Belt tensioning system		Pneumatic
9.	Back was water pump		Double Impeller Centrifugal
Drum Thickener			
1.	Belt		Polyester
2.	Screw flight		SS 304

3.	Screw Shaft	SS 304		
4.	Wash Water header	SS 304		
5.	Filtrate tank	SS 304		
6.	Sludge discharge Chute	SS 304		
7.	Hardware	SS 304		
Belt Press				
8.1	Belt	Polyester		
8.2	Frame and structure	SS 304		
8.3	Filtrate collection tank	SS 304		
8.4	Belt guide gasket	Neoprene		
8.5	Washing nozzles	SS 304		
8.6	Scraper blade	Teflon		
8.7	Hardware	SS 304		
Rollers				
No.	Component	Quantity	Dimension	Make / Coating
1.	Belt tensioning roller	1	275 mm	SS 304
2.	Belt alignment roller	1	173 mm	MS; suitable non-corrosive Coating
3.	Perforated drum	1	600 mm	SS 304
4.	Belt transmission roller	3	173 mm	MS; suitable non-corrosive Coating
5.	Tubes	3	60 mm	SS 304
No.	Component	Description		
Electrical Drives				
1	Drum thickener	0.25 kW; IP55, 415v, 50hZ		
2	Belt press	0.25 kW; IP55, 415v, 50hZ		
3	Wash water pump	0.25 kW; IP55, 415v, 50hZ		
Instrumentation				
1	Pneumatic group	2 No. FRL with gauge, 1 no. solenoid valve, 1 no. pressure switch, 2 no. air bellows, 1 no. pneumatic cylinder		
2	Electrical group	1 No. inductive sensor, control panel- PLC operated with display and alarm included.		

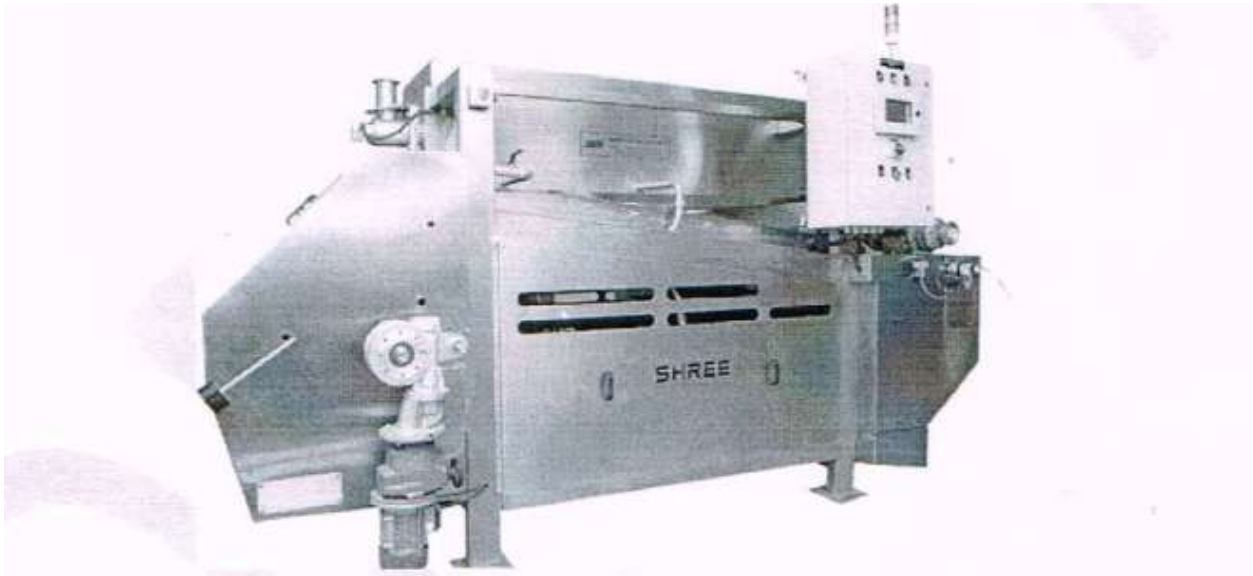


Figure 1 : Diagram of belt press (for representation purpose only: not to the scale)

7.9.2 Specification of Rotary Drier

Table 2: Specification of Rotary Drier

No.	Component	Description
Rotary dryer		
1.	Batch volume	500 litres
2.	Capacity	250-300 kg @ 0.6 gm/cm ³ bulk density
3.	Make	Contact parts and drum in SS 304
4.	Drum size	600 mm diameter and I200 mm length
5.	Electrical	36I<W
6.	Operational temperature	130 to 160 °C
7.	Maximum temperature	200 °C
8.	Voltage	415 v AC 3 phase
9.	Insulation	100 mm 96 kg/m Cu Rockwool
10.	Motor	AC geared 3 HP
11.	Control panel	Automatic temperature controlled by PID controller, heater control, speed control by AC frequency drive, Safety controller, ammeter indicating light emergency stop, completed wired electrical cum instrumentation.
12.	Loading	SS 304 top Silo 200 litres
13.	Discharge	Ss 304 bottom discharge

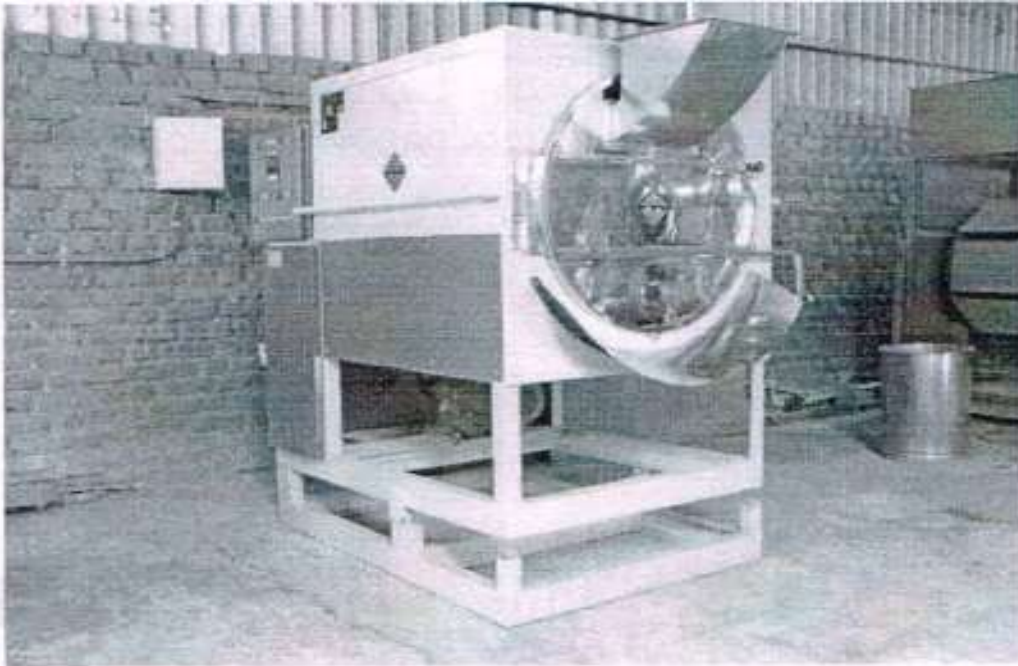


Figure 2: Picture of rotary dryer (for representation purpose only; not to the scale)

7.9.3 Electro-Mechanical Requirement of MBBR

Table 3: Electro-Mechanical requirement of MBBR

No.	Details of equipment	Unit	Value/Description
Sewage pump: Equalization tank to MBBR reactor			
1.	Type		2 nos. (1 W + 1 S) Horizontal centrifugal, self-priming, non-clog
2.	Solid handling	mm	7
3.	Capacity	m ³ /h	2
4.	Head	M	10
5.	Make		CI body and impeller
Filter feed pump: Intermediate storage tank to pressurized filters			
1.	Type		2 nos. (1 W + 1 S) Horizontal Mono-block, closed impeller, gland packing
2.	Capacity	m ³ /h	2
3.	Head	M	26
4.	Make		CI body and impeller
Electrical Panel			
10.1.	Type		LT, cubical type, non-compartmentalized

10.2.	Protection		Indoor type, IP42
10.3.	Mounting		Floor / wall
10.4.	Cable Entry		Top / bottom
10.5.	Incomer Switch		Incoming power control switches SFU
10.6.	Starters		Individual MCB and starter
10.7.	Operations		Level switch-based operation of pumps
10.8.	Cable		Power and control copper / Aluminium cable
10.9.	Cable tray and conduit		Suitable make
Instrumentation			
1	Pressure gauge		On pump discharge header and blower discharge header
2	Level switch		For on-off of pumps

7.9.4 Specifications of aeration equipment

Table 4: Specification of Aeration Equipment

No.	Details of equipment	Unit	Value/Description
Air Blower			
	Type		2 nos. (1 W + 1 S) Twin Lobe rotary
	Operating pressure	mm	0.50
	Operating discharge	m ³ /h	80
	Make	M	Casting CI, Shaft EN 19
	Air for agitation in tanks		Equalization and Intermediate storage tank
	Air for activated sludge process		MBBR reactor
	Motor		Suitable for blower
	Type		IP55, foot mounted, IE2
	Acoustic hood		Suitable size
	Noise level at 3 m		85 +/- 5%
Fine Bubble diffusers			
Filter feed pump: Intermediate storage tank to pressurized filters			
	Type		Fine bubble diffuser, non-clog type
	Make		EPDM
	Location		MBBR reactor
	Assembly		Retrievable

7.9.5 Requirements of pressurized filters

Table 5: Requirement of pressurized filters

No.	Details of equipment	Unit	Value/Description
Dual Media Filter			
1	Make		MS with internal EP and external enamel paint
2	Diameter	mm	500
3	Height on straight	mm	1000
4	Capacity	m ³ /h	2
5	Working pressure	kg/cm ²	2.4
6	Shell thickness	mm	6
7	Type of media		Pebbles, gravels, sand & anthracite
Activated Carbon Filter			
1	Make		MS with internal EP and external enamel paint
2	Diameter	mm	600
3	Height on straight	mm	1000
4	Capacity	m ³ /h	2.0
5	Working pressure	kg/cm ²	2.4
6	Shell thickness	mm	6
7	Type of media		Pebbles, gravels, sand & activated carbon
8	Activated carbon		900 IV
Chlorine dosing			
1	Pump capacity	Lph	0 – 6
2	Lid tank	L	50

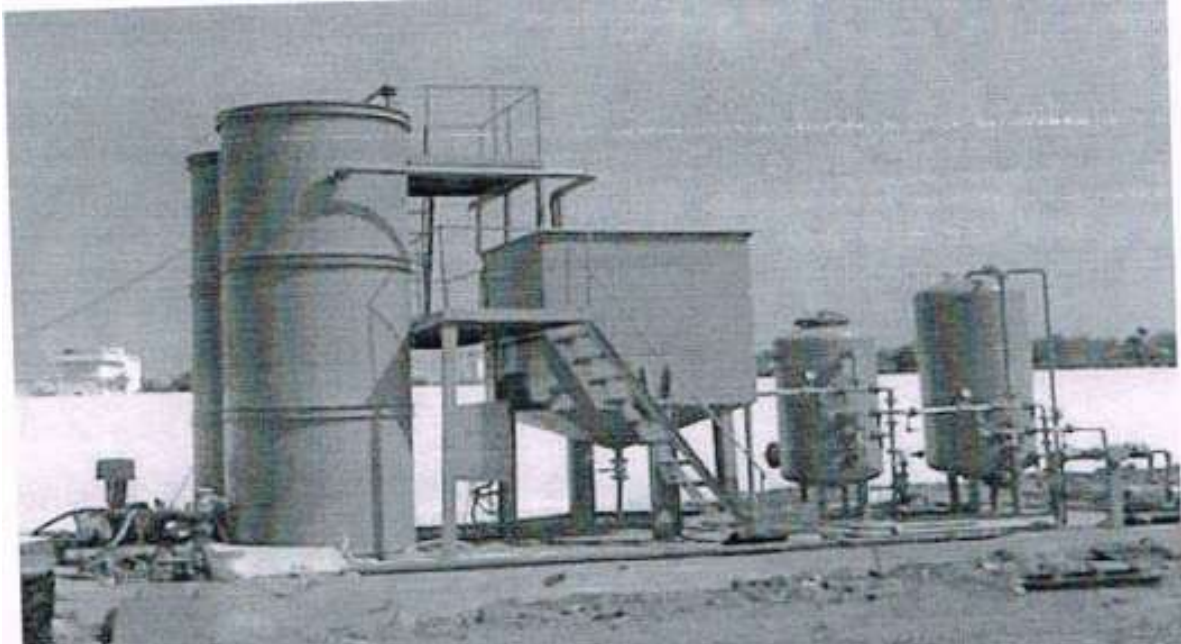


Figure 3: Picture of a MBBR wastewater treatment plant (for representation purpose only; not to the scale)

7.9.6 TECHNICAL SPECIFICATIONS OF VACUUM TRUCK

Table 6: Technical Specifications of Vacuum Truck

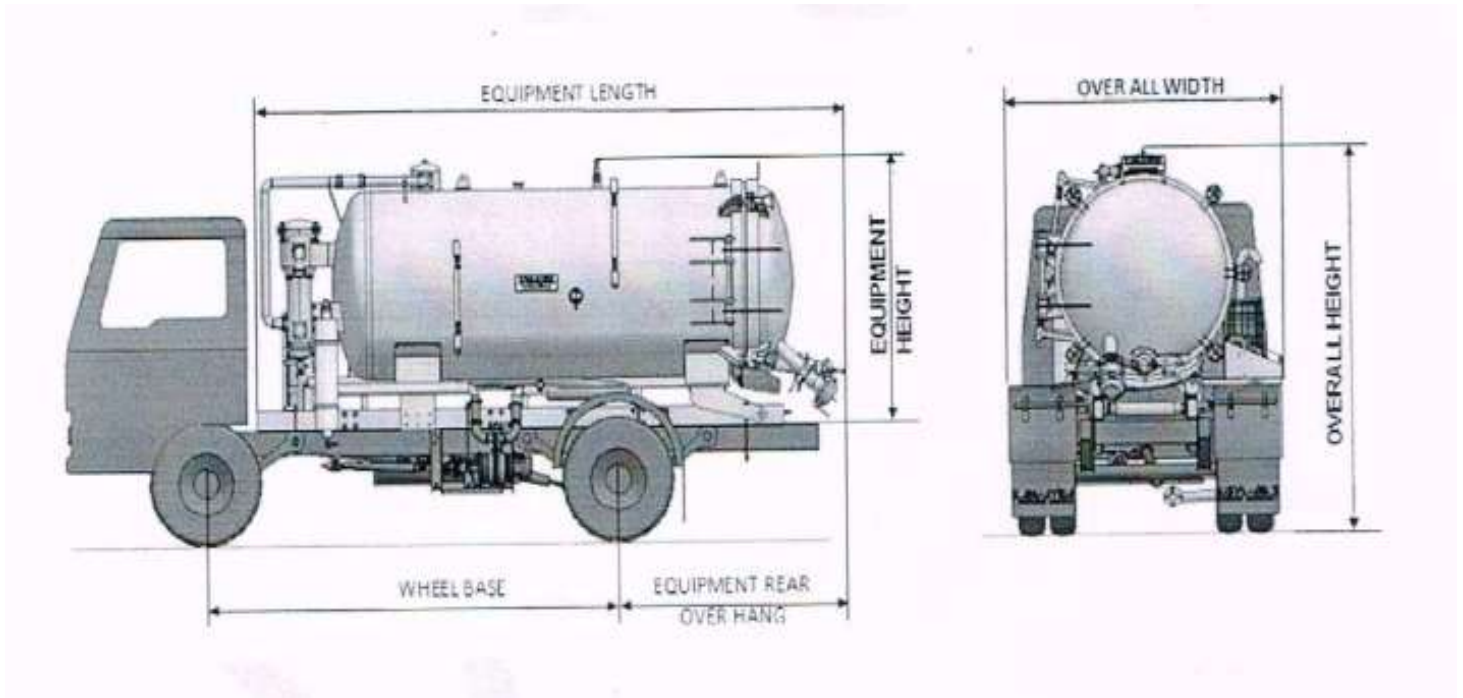
No.	Specifications	Units	Values
1	Sludge Collection Tanks		
	Type		Cylindrical design manufactured from IS 2062 structural grade steel
	Volumetric capacity	Litres	40000
	Features		a) Cylindrical designs ensure complete and fast offloading of the material b) Fully open-able type rear dished end
2	Vacuum Pump (Exhauster / compressor)		
	Type		Air-cooled, asbestos free, heat-resistant, rotary sliding vane type
	Operating vacuum	%	80
	Max blank-off vacuum	%	92
	Max pressure	Bar	105
	Free Air Displacement (FAD)	LPM	6,500
	Drive		Vehicle's auxiliary PTO and Articulated

No.	Specifications	Units	Values
			shaft with belt and pulley drive configuration
3	Equipment Features		
	Safety		a) Vacuum and pressure relief valves, b) Check valve, c) Pump safety filter, d) Primary Shut-off, e) Cyclone cum Secondary Shut-off, f) Exhaust silencer cum oil separator
	Standard supply		VHose end Suction Nozzle and Strainer
	Optional Supply		a) Combined clean water and sludge tank with wash down system, b) Suction Derrick Arm, Hydraulic / Spring Loaded c) Continuous duty, Water cooled, Rotary Sliding Vane, Vacuum Pump, d) Tri-lobe, Exhauster / compressor - oil free Zero wear and zero maintenance pumps

Table 7: Technical Specification of Vacuum Truck Chassis

No.	Particulars	Specifications
1.	Performance	
	Engine	Tata 3.8 SGI NA Engine
	Emission Norms	BS - IV
	Displacement (cc)	3800
	Max Power	83.8bhp @ 2500rpm
	Max Torque	270Nm @ 1500-1800 rpm
	Transmission	Manual
	Clutch	Single Plate dry Friction Type (280 mm)
	Gearbox	5-S peed
	Fuel Tank (Litres)	430
	Gradeability (%)	18
	Turning Radius (mm)	6750
	Max Speed (km/h)	84
2.	Design and Build	

No.	Particulars	Specifications
	Body Option	Half Body
	Chassis Type	Chassis with Cabin
	Cabin Type	Day Cabin
	Axle Configuration	4 X 2
	Front Tyre	8.25x I6-I6 PR
	Rear Tyre	8.25x I6-I6 PR
	Wheelbase (mm)	3800
	Ground Clearance (mm)	217
	GVW / GCW (Kgs)	10550
3.	Comfort	
	Steering	Manual Steering
	Seat type	Standard
4.	Safety	
	Brakes	Air Brakes
	Front Suspension	Semi elliptical Leaf spring
	Rear Suspension	Semi elliptical Leaf spring
5.	Others	
	Length mm (ft.)	5050 (16.56)
	Width mm (ft.)	2042 (6.7)



7.9.7 Solar Power System

Photovoltaic (PV) modules make electricity from sunlight, and are simple, effective, and durable. They sit in the sun and, with no moving parts, can run your appliances, charge your batteries. To use the energy from the array, one needs other components, such as inverters, charge controllers and batteries, which make up a solar-electric system. The components required are dependent on the system type designed. These systems require a battery bank to store the solar electricity for use during night time or cloudy weather, a charge controller to protect the battery bank from overcharge, an inverter to convert the DC PV array power to AC for use with AC household appliances, and all the required disconnects, monitoring, and associated electrical safety gear.

- Fabricated panels consisting of four solar panels of capacity 320 W, thus the capacity of one fabricated panel 1.1 kW,
- Online inverter of 1.5 kW,
- Internal wiring with junction boxes DCDB / SCDB.

TECHNICAL SPECIFICATION OF THE DIESEL POWER GENERATOR

DG Set Model	Rating (kVA)	Canopy Size (LxWxH)	Starling System	Weight (Kg)
--	62.5	2800x1100x1595	12V DC	1420
No. of Cylinders	Bore (mm)	Stroke (mm)	Total Displacement (CC)	Lube oil Sump Capacity (Ltrs)
4	96	112	3240	10
Fuel Tank Capacity (Ltrs.)	Engine Model	Engine Make	Engine Power (bhp)	Rated Speed
150	4R1040TA G1	Kirloskar Green/ KOEL	83	1500
Aspiration	Cooling System	Type	Frequency	Voltage
-- TA	WATER	Brushless, H Class insulation	50	230/ 415

7.9.8 General Specifications of Water Tanker Trucks (5 Kl Capacity)

Wheelbase (mm)	3335	Capacity (Liters)	5 KL
GVW (Kg)	6180/ 8720/ 10250/12990	Body Material Options	Mild Steel/ Stainless Steel
Max. Engine Output	BSIII Mech - 75 Kw @3000 rpm. BSIV CRDI - 75 Kw @2800 rpm	Fuel Tank (Liters)	90
Max. Torque	BSIII Mech - 315 Nm@1500-1750 rpm ; BS-IV CRDI – 296 Nm@ 1500 ± 50 rpm	Brakes	Hydraulic Vacuum assisted / Air Brake
No. of Tyres	4 + 1	Tyres Size	7.50” x 16”- 16 PR/ 8.25”x 16/20”- 16 PR
Displacement (cc)	3455	Steering	Mechanical / Power Steering (Optional)

Drive Type	Left Hand Drive	Customize Option	With Filtration System
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Figure 4 ; Schematic Representation of Water Tanker

7.9.9 Specifications of Pumps To Be Installed at Anaerobic Digester

Table 8; Specifications of Pumps to be installed at Anaerobic Digester

No.	Details of equipment	Unit	Value/ Description
Sludge pump: From anaerobic digester to feeder of belt press			
1	Type		2 nos. (1 W + 1 S) Horizontal centrifugal, self-priming, non-clog
2	Solid Handling	Mm	7
3	Capacity	m ³ /h	< 1
4	Head	M	10
5	Make		CI body and impeller

Part-8

Testing, Erection and Commissioning Trial Run of the Plant

This part deals with specifications for Erection, testing, re-commissioning, commissioning and acceptance.

8.1 Test Instruments:

The contractor shall satisfy the Engineer as to the accuracy of all the instruments used for tests and if required shall produce recent calibration tests, otherwise have them calibrated at his own expense by an independent authority.

8.2 Test Certificate:

Copies of certificates of all works hydraulic tests shall be provided as detailed. The contractor shall obtain and submit to the Engineer and to other parties as may be directed, certificates of test of all times, certifying that they have been satisfactorily tested and giving full particulars of such tests.

8.3 Hydraulic Test:

All equipment subject to water/wastewater pressure including casting, pressure vessels, pumps, pipes, fittings, and valves, shall be hydraulically tested to the pressure specified or in accordance with the applicable standard or to at least 1.5 times the maximum working pressure, whichever shall be the greater. Hydraulic test shall be given at the manufacturer's works. Any of the hydraulically tested items shall be subject to the Engineer's / inspector's random item proof re-test and notice of testing dates shall be submitted to the engineer. Unless otherwise specified, hydraulic tests to 1.5 times the maximum working pressure shall also be applied at site to all pipework installed by the contractor.

8.4 Manufacturer's works inspection tests and guarantees:

All schedules of particulars shall be completed and the guaranteed particulars and the efficiencies of the equipment offered at the duties specified will be binding and may not be varied except with the consent in writing of the Engineer. The Engineer shall be provided with the facility for inspection of all equipment and material and shall be given at least 30 days' notice when such equipment or material is ready for inspection of works test.

Full witness testing to the relevant standards and to prove guarantees given will be required for the following items:

- a) All pumps
- b) Electric motors
- c) All control panels
- d) All circuit breakers
- e) All transformers;

- f) All lifting equipment
- g) Cables
- h) All process control and indicating instruments
- i) All electrical measuring instruments and meters
- j) Flow measuring equipment and gauges.

In addition, all other items of equipment not subject to witness testing shall be temporarily erected at the manufacturer's works and tested for satisfactory operation and shall be offered for inspection. Copies of manufacturer's test readings shall be submitted to the Engineer, all prior to packing for shipment. Such inspection, examination, or testing, shall not release the contractor, manufacturers or supplier of any item from any obligation under the contract.

Certified copies of manufacturer's test readings of all items shall be submitted to the engineer within 7 days of the satisfactory completion of the test.

Whilst the engineer shall be provided with facilities for witness testing and/or inspection of all items of equipment at the manufacturer's works. He may at his discretion advise that the test shall proceed in his absence. These test shall be made as if in his presence, and duly certified copies of test readings shall be submitted.

Where items of equipment are of identical sizes and duty it may be required, at the Engineer's discretion, that a reduced number of the items be subjected to witness test; however, this shall not relieve the manufacturer from the requirement of carrying out the performance tests on all items prior to offering a witness testing.

If after inspecting, examining or testing any material or equipment, the Engineer shall decide that such items or any part thereof is defective, or not in accordance with the specification or performance requirements, he may reject the said items or part thereof, giving to the manufacturer within a reasonable time, notice in writing of such rejection, stating therein the ground upon which the said decision is based. All re-testing shall be at the contractor's expense.

8.5 Site Testing:

The Contractor shall arrange for the full site testing of all items of equipment and shall include Provision of:

- (i) All skilled and qualified operating and test staff for the testing of all equipment.
- (ii) Provision and disposal of all services, lubricants, and fuels other than electricity
- (iii) All measuring and testing instruments to demonstrate equipment operates to the fulfilment of the works test.
- (iv) All loading weights for the load testing of all lifting equipment All test shall be carried out by the contractor to the approval of the Engineer.

The Contractor shall be responsible for coordinating the programme of site testing of all items and to ensure that all parties concerned are present during any tests to obligate their responsibilities.

8.6 Manufacturer's Works Tests

8.6.1 Pumping Plant:

Pumping plant shall be tested as follows:

- a) Each pump shall be tested individually in accordance with part I of BS 5316. Site conditions shall be simulated as near as possible particularly the minimum site NPSH condition.
- b) Each pump shall be tested complete with all shaft bearings, thrust bearings and directly driven auxiliaries or, where this is impracticable, the contractor shall state what allowances shall be made for losses incurred by these items, and shall demonstrate the accuracy of these allowances to the satisfaction of the Engineer.
- c) Each pump shall be tested with its own motor wherever feasible. It shall be tested particularly at the guarantee performance duty point and over its full working range where possible from its closed value condition to 30% in excess of the guaranteed quantity or minimum head. Head/quantity curves and overall efficiency/quantity curves shall be plotted to demonstrate that the plant will be capable of meeting the full range of operating conditions at site.
- d) Pump casings shall be subject to pressure test at 1.5 times the maximum pressure obtained with the delivery valve closed. The positive suction head shall be taken into account in determining this pressure.

8.6.2 Cranes:

All cranes lings and lifting beams shall be tested at the manufacturer's works with a load 25% in excess of the rated load. Tests shall include measurement of deflection and speed of lifting etc. The test shall be repeated at site when erection is complete using test weights to be provided under the contract. Certificates shall be provided for both tests.

8.6.3 Valves:

All valve bodies shall be hydraulically tested closed ended to 1.5 times the rated pressure. Isolating valve gate shall be tested to the maximum working pressure, at which pressure they shall be drop tight

8.6.4 Motors:

Motors over 22 KW site rating shall be subject to full performance test which may be witnessed by the engineer at the motor manufacturer's works. Motors of 5.5 KW to 22KW site rating shall be subject to performance tests but will not be witnessed. Motors under 5.5 KW site rating shall be subject to type test standards. Type test certificates which shall include the following shall be provided for all motors;

- i. Manufacture to BIS/IS.
- ii. Class of insulation
- iii. Type of cable fittings.
- iv. Type of bearing size and lubricant.

- v. Type of and rating of motor heaters. Motor testing shall be carried out in accordance with the requirements of BIS.
- 8.6.5 Instruments and Meters:
Tests to ensure operation of all ammeters, voltmeters and transducers and checks for correct calibration. Kwh meter shall be changed for correct rotation and creep test shall be carried out to ensure that the meter is inoperative with voltage along, of the secondary of the current transformer is left connected with the primary Corinthian erupted.
- 8.6.6 Process Control and Indicating Instruments
All flow, level process measurement controllers, transmitters, recorders, indicators, vacuum and pressure gauges shall be subject to routine in accordance with BIS. Test certificate shall be provided against each item of equipment.
- 8.6.7 Electrical Measuring Meters
Test to ensure accurate operation of all meters, voltmeters and kwh. Meter shall be undertaken in accordance with IS:9319.

8.7 General

- a. The contractor's staff shall include at least one competent erection engineer with previous, suitable, privacies experience on similar contracts to supervise the erection of the works and sufficient skilled, semiskilled and unskilled labor to ensure completion of the works in time. The contractor shall not remove any representative, erector or skilled labor from the site without the prior approval of the Engineer's Representative.
- b. One erection engineer who shall be deemed to be the contractor's representative shall be conversant with the erection and commissioning of the complete works. Should there be more than one erector, one shall be in charge and contractor shall inform the Engineer's Representative in writing which erector is designated as his representative and he is in charge. Erection engineer is to report to Project manager.
- c. The contractor's erection staff shall arrive on the site on date to be agreed by the engineer's Representative before the proceed to the site, however, the contractor shall first satisfy himself, as necessary, that sufficient plant of his (or his subcontractor's) supply has arrived on site so that there will be no delay on this account.
- d. The contractor shall be responsible for setting up and erecting the plant to the line and Levels of reference given by the engineer in writing, and for the correctness (subject as above mentioned) of the positions, levels dimensions and alignment of all parts of the works and for provision of all necessary instruments, appliances and labor in connection therewith. The checking of setting out of any line or level by the

engineer or engineer's representative shall not in any way relive the contractor of his responsibility for the correctness thereof.

e. Erection of plant shall be phased in such a manner to as not to obstruct the work being done by other contractors or operating staff who may be present at the time. Before commencing any erection works the contractor shall check the dimension of structures where the various items of plant are to be installed and shall bring any deviations from the required positions, lines or dimensions to the notice of the Engineer. Plant shall be erected in a neat and workmanlike manner on the foundations and at the locations shown on the approved drawings. Unless otherwise directed by the Engineer, the contractor shall adhere strictly to the aforesaid approved drawings. If any damage is caused by the contractor during the course of erection to new or existing plant or buildings or any part thereof, the contractor shall, at no additional cost to the employer, make good, repair or replace the damage, promptly and effectively as directed by the Engineer and to the engineer's satisfaction.

f. During erection of the Plant the Engineer will inspect the installation from time to time in the presence of the contractor's site representative to establish conformity with the requirements of the Specification. Any deviation and deficiencies found or evidence or unsatisfactory workmanship shall be corrected at instructed by the Engineer

1.14 Leveling and Grouting of Machinery:

a) Contractor shall check the civil works, where the plant is to be installed sufficiently in advance. For their conformity to the approved drawings for installing the plant with respect to lines, levels and accuracies of position embedment, anchorage pockets, cut outs etc. and he shall record all measurements and deviation in prescribed control formats. He shall proceed with the works, with the Engineer's approval of civil works for undertaking of installation of the plant consequent to such preparatory inspection or work.

b) Contractor shall mark precisely the centerline and datum reference on the civil works. Where the plant is to be installed with reference to bench marks, using indelible means of marking.

c) He shall undertake sufficiently in advance chipping of any unevenness of concrete on foundations, anchor bolt pockets, cutouts etc. to achieve uniform level of reference for erection.

d) All concrete surfaces receiving grout shall be hacked at 35 required to ensure better bonding with grouting.

e) Contractor shall undertake the inspection of all components to be erected sufficiently in advance to check their soundness and conformity to drawings and the inspection records shall be signed by the engineer as approval for undertaking the installation of the components. Any damage, shortfalls etc shall be made good to the satisfaction of the engineer.

f) All grout for equipment shall be carried out using non-shrinkable continuous grout materials with suitable from work of at least 12 mm thickness. Surfaces to receive the grout are hacked and roughened and laitance shall be removed by wire brushing or blast of air. Concrete surface shall be blown off by compressed air before commencing grouting. Grouting shall be done in one continuous operation from one side such that grout flows in a single ware until grout reaches all confined spaces with no air pockets and air from all confined spaces is expelled. A hydrostatic head of 150 mm shall be maintained during grouting operations. All grouting shall be carried out in the presence of the Engineer's Representative. All manufacturers' recommendations. All lines levels shall be checked up after grout is set, block outs shall be closed using cement concrete of the same grade as that of the parent structure.

8.8 1.15 Completion of Erection;

a) The completion of plant under erection by the contractor shall be deemed to occur, if all the units of the plant are structurally and electro-mechanically complete and will include amount other such responsibilities the following;

i. Plant in the scope of the contractor has been erected, installed and grouped as per specification.

ii. Installation checks are completed and approved by the engineer.

iii. The erected plants are totally ready for commissioning checks.

b) At the stage of completion of reaction, the contractor shall ensure that all the physical, aesthetic and workmanship aspects are totally complete and the plant is fit and sound to underage commissioning check/test on completion.

8.9 Commissioning and Trail Run

The following measures are to be taken essentially by the contractor Necessary maintenance crew with supervisory staff shall be deployed as specified. The entire strength of maintenance crew with the supervisory personnel should be available from the first day of the Trial run period. The staff to be deployed shall be adequately qualified for the performance of the job and trained in operation of electrical equipment, pumps, etc. and also capable of identifying and managing trouble shooting of faults and attend minor repairs.

The contractor should keep all spares required for replacements at treatment plant, etc. as recommended by the respective manufactures readily available to ensure proper functioning of the system.

All the equipment that go out of order during the course of the Trial run period shall be rectified/ replaced within a week's time or such longer time as approved by the employer, to ensure uninterrupted operation of me plant. The contractor is responsible for the incidence of any theft; malpractice etc. within the project area during the Trial run period and the contractor shall keep the Employer indemnified.

One set of as laid plans of all the components of the project - Architectural, mechanical, instrumentation, piping drawings, sections details charts etc., with modifications as carried out (with the approval of employer) shall be supplied. Operating and maintenance manuals supplied by manufacturer and Step by step procedures for all operation requirements and adjustments required shall be given.

The contractor shall carry out the works observing all safety precautions. The owner shall be indemnified for any accidents that may occur at the site. The contractor shall follow all the rules and regulations of statutory authorities Government agencies etc. The owner shall be indemnified against any failure. The contractor shall take necessary insurances for the properly and labour etc., The owner shall be indemnified against any failure. The contractor shall pay all the fines, penalties etc., imposed by various agencies for non-performance / non adherence to rules in connection with his work. The owner shall be indemnified.

8.10 2.1 Energy;

Electricity charges including diesel in case of power failure required for operation & maintenance of the Plant shall have to be borne by the Contractor.

8.11 2.2 Consumable, etc.

All other consumables like polyelectrolyte, chlorine, oil & grease etc. All the formalities to all Government authorities for factory, electrical, etc. for obtaining no objection certificate, water consent, hazardous waste concern, approval etc. shall be done by the Contractor.

8.12 SAFETY PRECAUTIONS

Traffic Control;

- a. Place easily readable and clear warning signs well ahead of work area.
- b. Barricade the space around the manhole / ditches for placing equipment and deposition of silt removed.
- c. Place barricades or signs to channelize the traffic, if possible.
- d. Use a flagman at the two ends for controlling flow of traffic from each, direction and to avoid a traffic jam, if the road is narrow and only one lane of traffic is possible.

Safety Equipment;

The various safety equipment that are normally required in sewer maintenance work are gas masks, oxygen breathing, apparatus, portable lighting equipment, non-sparking tools, portable air blowers, safety belts, inhalators and diver's suit.

The use of the particular safety equipment is governed by the detection of various gases and oxygen deficiency. Acknowledge of the type of gases, in the atmosphere and of the working location becomes essential for the selection of the right type of safety equipment. Simple tests for detection of various gases and oxygen deficiency should be furnished to the workmen.

Chapter-9

Operation and Maintenance Requirements

9.1 Maintenance comprises those operations which are well planned systematic programme of maintaining the Machinery and equipments by taking appropriate steps to prevent breakdown well in advance before it causes major damage. This prevents wastage of time, production loss and prolongs the life of Machine. This maintains better efficiency in the system and economizes the running cost of the Plant. It can be classified as:

- (a) Preventive Maintenance which constitutes works and precautions to be taken to prevent breakdown and
- (b) Corrective Maintenance which involves carrying out repairs after breakdown. Preventive maintenance is more economical than corrective maintenance and provides uninterrupted service which is essential to achieve the basic objectives of collection and treatment viz. protection of health of the community and prevention of nuisance.

The primary aim is the running and maintenance treatment Plant efficiently and economically so that the effluent from the Plant meets the prescribed standards in terms of pH/BOD/COD/TSS etc.

- The basic requirements of successful operation and maintenance of Faecal Sludge & Septage Treatment Plant are:
- Training of all operating Staff in proper Operating Procedures and Maintenance Practices.
- Overall supervision of Operation & Maintenance Schedules for vehicles and units of treatment plant.
- Good housekeeping.
- Proper logging of all Operation & Maintenance activities for technical and financial aspects i.e. maintain a ledger for revenue generation and expenditure receipt.
- Observation of safety precautions & procedures.

9.2 The various Units of the Plant are designed for maximum efficiency within a certain flow range and input effluent quality. Close control and co-ordination of operation of different Units are therefore, required within the limits of design so as to achieve maximum efficiency. Hence, accurate measurements of flow of raw septage, treated effluent and sludge are required. For this purpose, Flow Measuring Devices and Meters are provided to guide the Operator in his supervision and obtain data for progressive improvement. For quality control, analysis of raw effluent, sludge, digested sludge etc. as they pass through different Units of the Treatment Plant and of the treated effluent should be carried out on a regular basis. Proper recording of data

- is essential for an accurate assessment of deficiency of operation. On the chemical side, dosages must be closely and accurately proportioned to the varying rates of flow of influent and sludge based on analysis.
- 9.3 Operation and Preventive Maintenance of several treatment units and the frequency of cleaning, lubrication of mechanical equipments etc. are to be strictly adhered to if optimum results are to be expected.
- 9.4 The periods for repairs and maintenance have to be communicated to ULB at least one month in advance.
- 9.5 The Contractor has to keep reasonable stock of Spare Parts so that the downtime of equipment can be kept in the limits. The content of the stock has to be approved by Employer.
- 9.6 Building should be well ventilated and illuminated. They should be maintained and kept in good repair, white or colour washed metallic parts being painted annually. The effect of corrosive gases could be minimized by proper ventilation, proper collection and disposal of corrosive gases and painting the structures which are prone to be attacked by the gas, with anticorrosive paints. Dampness inside buildings could be reduced by proper ventilation. Wherever necessary, exhaust fans and forced ventilation should be adopted.
- 9.7 Safety in the Plant;

The work of an Operator in a treatment plant presents many hazards that must be guarded against. Common type of accident is injuries from falls, deaths from drowning and asphyxiation. Narrow walks or steps over tanks (particularly in darkness, rains and wind) ladder and spiral staircases are potential danger spots where the operator should be alert; overexertion during operation of valves, moving weights and performing other arduous tasks should be avoided. All open tanks should be provided with guard rails to prevent accidental falls. Glass parts as well as moving parts should be protected by screen or guards. Adequate lighting within the plant and around the plant should be provided which gives better working facility reducing accidents on account of slipping etc. Honeycomb grating be provided on open channels to avoid accidents on account of falling down or drowning. The staff should be trained and compelled to use helmets, gumboots, hand gloves etc. Wherever necessary, precautionary boards/danger boards/sign boards should be displayed in the plant (wherever necessary), drawing attention to the potential danger spots. Gas poisoning, asphyxiation and gas explosion are other hazards. Hence smoking or carrying open flames in and around digesters should be prohibited. Covered tanks, wet wells or pits should be well ventilated. Before entering, they should be kept open for sufficient time or preferably forced ventilated as the present problems of asphyxiation. Entry into them should be permitted only after ensuring the safety by testing for the presence of hazardous gases. Gas masks should be stored in location

where no possibility of contamination by gas exists and should be easily accessible. A first aid kit should be available readily at hand. Fire extinguishers of the proper type should be located at strategic points and maintained in good operating condition at all times by testing them.

All staff should be trained in rendering first aid and operating fire extinguishing equipment. Adequate number of toilets and bathing facilities, drinking water facilities and locker should be provided for the convenience of operating staff and protection from risk of infection.

9.8 Training of Personnel

All operating staff engaged in technical and skilled work should be trained. This plant is to be headed by a plant manager who should have the necessary training with considerable experience in effluent treatment. All junior operation staff should receive in service training. It is desirable that all components of treatment plant are run and maintained by operators who hold certificates of competency. The person who would be looking after the maintenance and operation of the plant should be preferably involved in the activities at the time of design, procurement and installation including inspection of equipment at manufacturer's place and their test and trials on completion of system. The operation and maintenance staff should undergo training from time to time as to keep them conversant with the operations, health, safety and environment. The staff should also be encouraged by sending them to other similar plants. They should also be provided with well-equipped library for references and also be sent for higher studies. The contractor would impart necessary training to the designated Employer staff for taking over and carrying out proper maintenance after the expiry of his contract. The training shall be imparted in a training institute as well as at the field. The total training shall not be less than 3 months.

9.9 All operating records of the septage management system comprising septage through vacuum suckers to various treatment units in a plant should be properly compiled on a day-to-day basis and daily, monthly and yearly reports prepared, maintained and periodically reviewed. These reports will form a valuable guide to optimise the septage collection system and better operation and serve as an important document in the event of a legal suit resulting from nuisance or danger attributed to the plant or for meeting the statutory requirements about the satisfactory performance of the plant, computers should be used for storing and compiling such voluminous information and to have easy access for prompt information when called for. This would also help in reviewing the performance of the various equipments and plant as whole.

9.10 Daily Operations of Treatment Plant

The Contractor shall carry out all facility operation and waste water disposal operations indicated below; in accordance with Good Operating Practices, as set out in this Contract. The Facility operation and waste water disposal operations shall include, but not be limited to the following:

- Operating Septage Treatment Plant to maintain the quality of treated effluent within the standards prescribed in the Tender/CPCB's norms, operate electrical equipment during power failures by operating generators, operate the Centrifuge for sludge drying and treat incoming effluent at prescribed standards through optimal dosing.
- Carrying out daily cleaning of grit channels and removal of screenings and disposal of floating matter in grit dewatered sludge out of premises. Carrying out continuous flow measurements of treated & raw effluent and recording the same as per tender requirements. Collecting samples of influent and effluent and analyzing them daily to determine the quality of effluent and performance of the treatment plant and providing security for facilities and system at all times

9.11 Repairs and Maintenance

The Contractor shall carry out preventive, routing maintenance and break down maintenance Operations for proper upkeep of collection system and plant in accordance with good operating practices and guidelines issued by local authority/state authority/ central government.

9.12 Staff & Labour

The Contractor shall employ skilled, semi-skilled and unskilled labour in sufficient numbers to carry out its operations at the required rate of progress and of quality to ensure workmanship of the degree specified in the Contract for timely fulfilling of the Contractor's obligations under the Contract and to the satisfaction of the Employer.

The Contractor shall not employ in connection with the operations any child who has not completed his/her fifteenth year of age. It shall also not employ an adolescent who has not completed his / her eighteenth year unless he/she is certified fit for carrying out operations as an adult as prescribed under clause b) of such section (2) (of Section 69 of the factories Act 1948.

9.13 Confidentiality

The Contractor shall cause the persons related to the Operator not to, without the prior written consent of the Employer, at any time, divulge or disclose to any person or use for any purpose unconnected with the operations, proprietary material under this contract. This shall not apply to information.

- Already in the public domain otherwise than by breach of this Contract.
- Already to the possession of the receiving party before it was received from the office party in connection with this Contract and which was not obtained under any obligation of confidentiality; or
- Obtained from a third person who is free to develop the same and which was not obtained under any obligation of confidentiality.

9.14 Default of Contractor

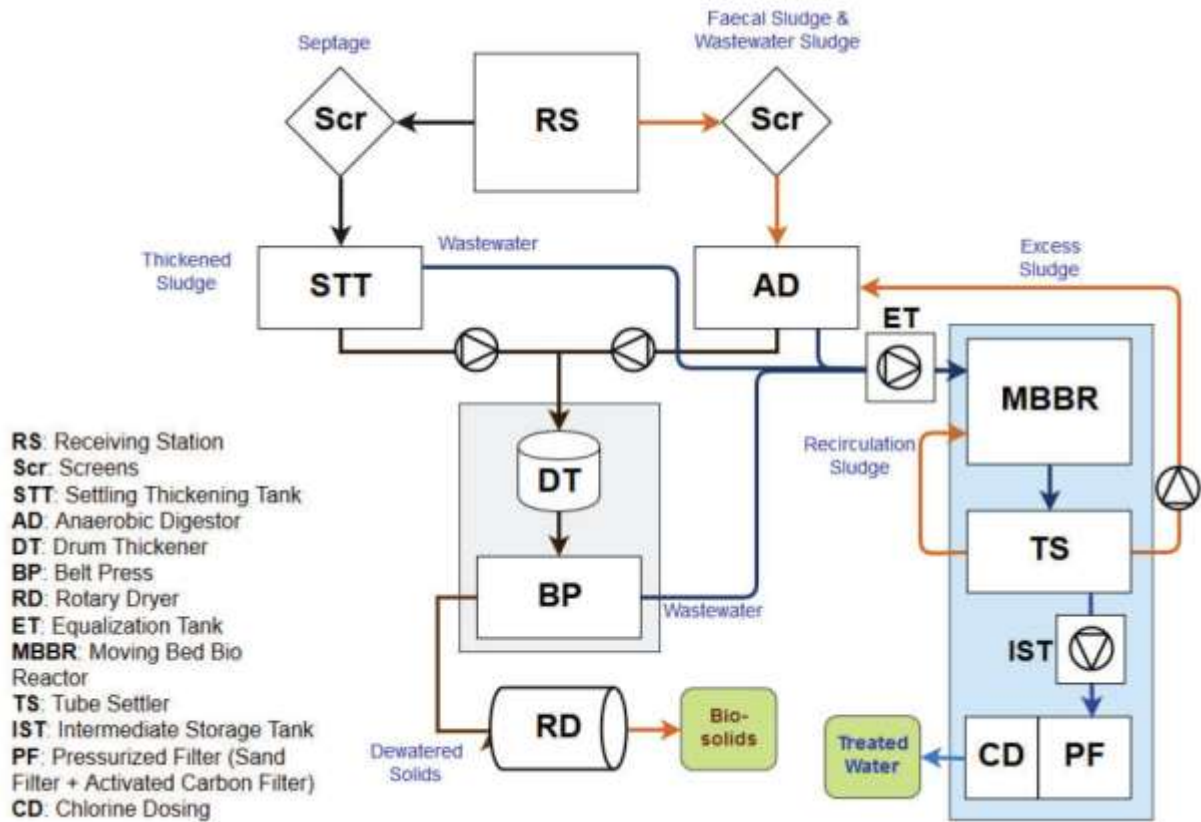
At any time after the Commencement Date, the Engineer may investigate each case where the Contractor has failed to properly perform the operations in accordance with this Contract. The Engineer shall issue a notice to the Contractor, instructing him to rectify the failure within a reasonable time.

- (i) In event of default on the part of the Contractor being unable to fulfil its services obligations under the Contract shall be deemed as a serious default and is said to have occurred due to any of the following causes.
- (ii) The Engineer certifies to the Employer with a copy to the Contractor that in its opinion the Contractor
 - Has repudiated the Contract or
 - Without reasonable excuse has failed to commence Operations in accordance with the Contract and pursuant to the Commencement date; or failed to complete the Operations within the time stipulated for completion.
- (iii) Gross misconduct of the Contractor

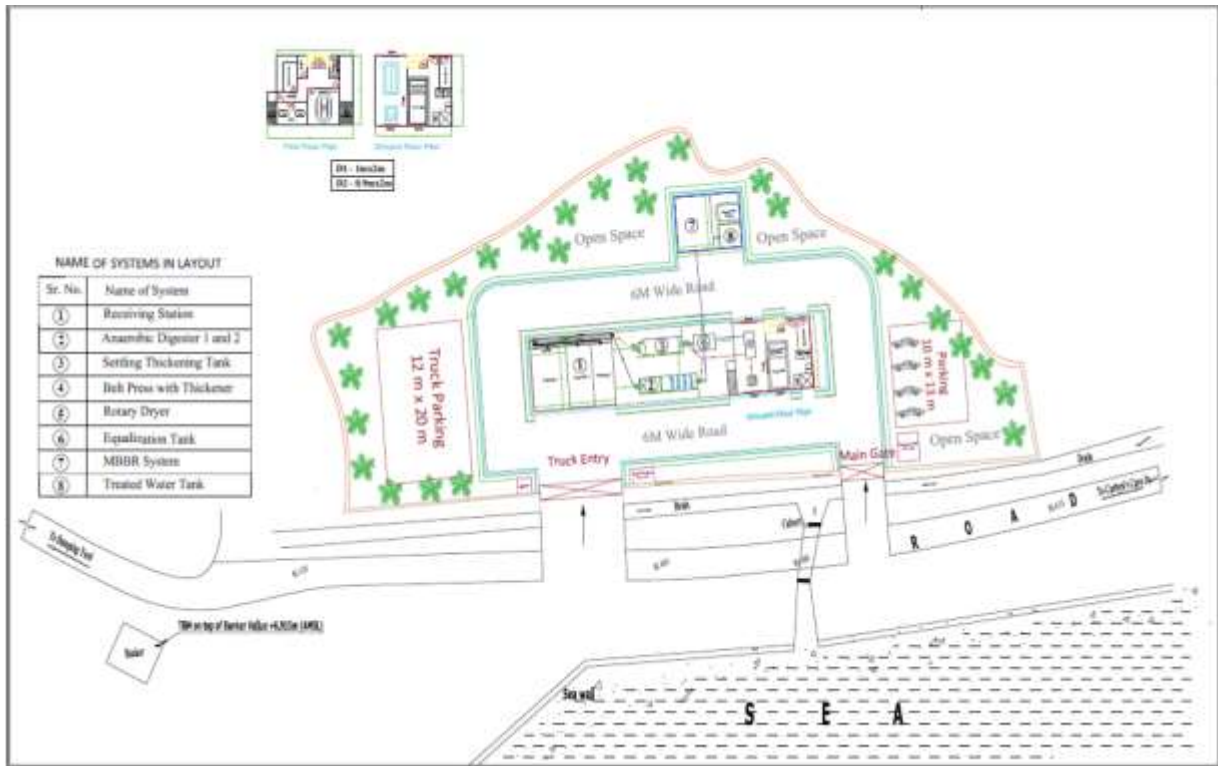
Chapter-10

Indicative Concept design drawings

10.1. Process Flow Diagram

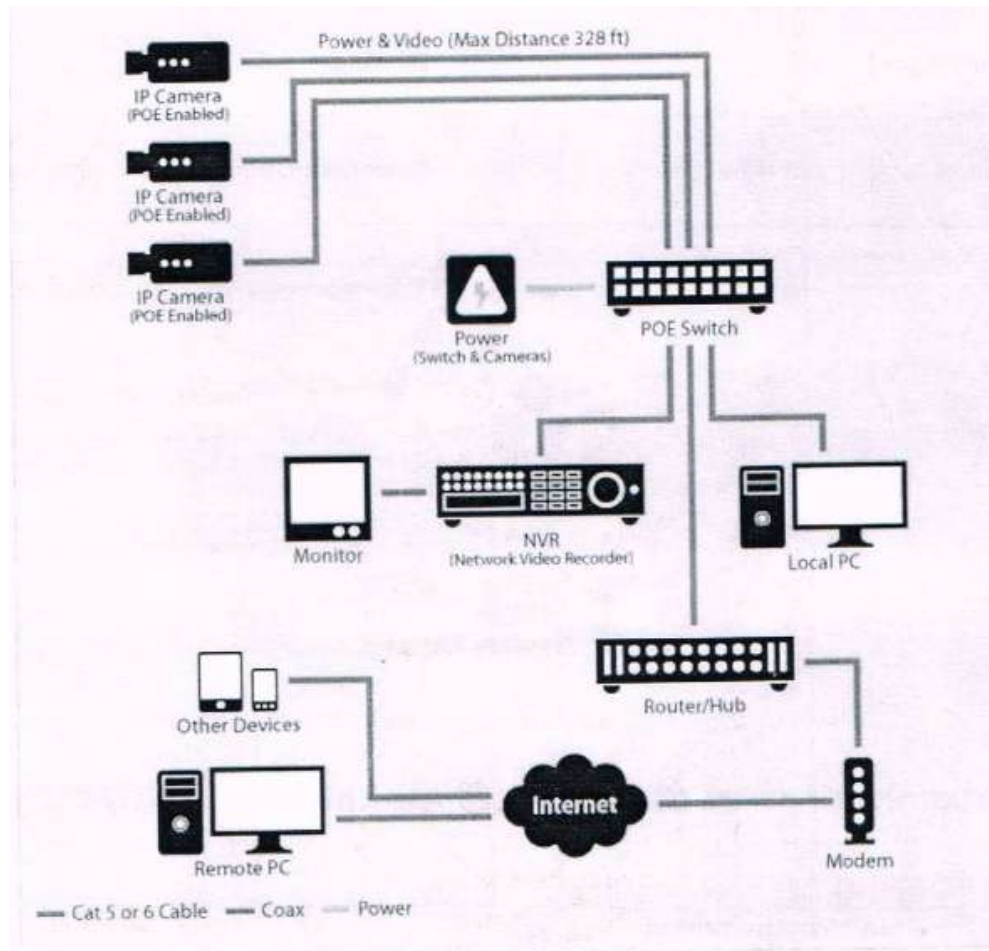


10.2. Layout





10.3. Schematic Representation of CCTV System





PART 3 – Conditions of Contract and Contract Forms



Section VIII - General Conditions of Contract

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General Conditions of Contract

A. General

<p>1. Definitions</p>	<p>1.1 Boldface type is used to identify defined terms.</p> <p>(a) The Accepted Contract Amount means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects.</p> <p>(b) The Adjudicator is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in GCC 23.</p> <p>(c) Employer means the name as specified in the PCC.</p> <p>(d) Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.</p> <p>(e) Compensation Events are those defined in GCC Clause 42 hereunder.</p> <p>(f) The Completion Date is the date of completion of the Works as certified by the Project Manager, in accordance with GCC Sub-Clause 53.1.</p> <p>(g) The Contract is the Contract between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in GCC Sub-Clause 2.3 below.</p> <p>(h) The Contractor is the party whose Bid to carry out the Works has been accepted by the Employer.</p> <p>(i) The Contractor’s Bid is the completed bidding document submitted by the Contractor to the Employer.</p> <p>(j) The Contract Price is the Accepted Contract Amount stated in the Letter of Acceptance and thereafter as adjusted in accordance with the Contract.</p> <p>(k) Days are calendar days; months are calendar months.</p> <p>(l) Dayworks are varied work inputs subject to payment on a time basis for the Contractor’s employees and Equipment, in addition to payments for associated</p>
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Materials and Plant.

- (m) A Defect is any part of the Works not completed in accordance with the Contract.
- (n) The Defects Liability Certificate is the certificate issued by Project Manager upon correction of defects by the Contractor.
- (o) The Defects Liability Period is the period **named in the PCC** pursuant to Sub-Clause 34.1 and calculated from the Completion Date.
- (p) Drawings means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in accordance with the Contract, include calculations and other information provided or approved by the Project Manager for the execution of the Contract.
- (q) The Employer is the party who employs the Contractor to carry out the Works, **as specified in the PCC**.
- (r) Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.
- (s) "In writing" or "written" means hand-written, type-written, printed or electronically made, and resulting in a permanent record;
- (t) The Initial Contract Price is the Contract Price listed in the Employer's Letter of Acceptance.
- (u) The 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 PCC**. The Intended Completion Date may be revised only by the Project Manager by issuing an extension of time or an acceleration order.
- (v) Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.
- (w) Plant is any integral part of the Works that shall have a mechanical, electrical, chemical, or biological function.

	<ul style="list-style-type: none"> (x) The Project Manager is the person named in the PCC (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract. (y) PCC means Particular Conditions of Contract. (z) The Site is the area defined as such in the PCC. (aa) Site Investigation Reports are those that were included in the bidding document and are factual and interpretative reports about the surface and subsurface conditions at the Site. (bb) Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Project Manager. (cc) The Start Date is given in the PCC. It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates. (dd) 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. (ee) Temporary Works are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works. (ff) A Variation is an instruction given by the Project Manager which varies the Works. (gg) The Works are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the PCC.
<p>2. Interpretation</p>	<p>2.1 In interpreting these GCC, words indicating one gender include all genders. Words indicating the singular also include the plural and words indicating the plural also include the singular. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically</p>

	<p>defined. The Project Manager shall provide instructions clarifying queries about these GCC.</p> <p>2.2 If sectional completion is specified in the PCC, references in the GCC 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).</p> <p>2.3 The documents forming the Contract shall be interpreted in the following order of priority:</p> <ul style="list-style-type: none"> (a) Agreement, (b) Letter of Acceptance, (c) Contractor’s Bid, (d) Particular Conditions of Contract, (e) General Conditions of Contract, including Appendices, (f) Specifications, (g) Drawings, (h) Bill of Quantities, and (i) any other document listed in the PCC as forming part of the Contract.
<p>3. Language and Law</p>	<p>3.1 The language of the Contract and the law governing the Contract are stated in the PCC.</p> <p>3.2 Throughout the execution of the Contract, the Contractor shall comply with the import of goods and services prohibitions in the Employer’s country when</p> <ul style="list-style-type: none"> (a) as a matter of law or official regulations, the Employer’s country prohibits commercial relations with that country.
<p>4. Project Manager’s Decisions</p>	<p>4.1 Except where otherwise specifically stated, the Project Manager shall decide contractual matters between the Employer and the Contractor in the role representing the Employer.</p>
<p>5. Delegation</p>	<p>5.1 Otherwise specified in the PCC, the Project Manager may delegate any of his duties and responsibilities to other people, except to the Adjudicator, after notifying the Contractor, and</p>

	may revoke any delegation after notifying the Contractor.
6. Communica-tions	6.1 Communications between parties that are referred to in the Conditions shall be effective only when in writing. A notice shall be effective only when it is delivered and receipt is obtained against the delivery of the notice.
7. Subcontracting	7.1 Sub-Contracting shall not be allowed under this contract..
8. Other Contractors	8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors, as referred to in the PCC . The Contractor shall also provide facilities and services for them as described in the Schedule. The Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.
9. Personnel and Equipment	<p>9.1 The Contractor shall employ the key personnel and use the equipment identified in its Bid, to carry out the Works or other personnel and equipment approved by the Project Manager. The Project Manager shall approve any proposed replacement of key personnel and equipment only if their relevant qualifications or characteristics are substantially equal to or better than those proposed in the Bid.</p> <p>9.2 If the Project Manager asks the Contractor to remove a person who is a member of the Contractor’s staff or 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.</p> <p>9.3 If the Employer, Project Manager or Contractor determines, that any employee of the Contractor be determined to have engaged in Fraud and Corruption during the execution of the Works, then that employee shall be removed in accordance with Clause 9.2 above.</p>
10. Employer’s and Contractor’s Risks	10.1 The Employer carries the risks which this Contract states are Employer’s risks, and the Contractor carries the risks which this Contract states are Contractor’s risks.
11. Employer’s	11.1 From the Start Date until the Defects Liability Certificate has

<p>Risks</p>	<p>been issued, the following are Employer’s risks:</p> <p>11.2 The Employer is responsible for the excepted risks which are (a) 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,(b) a cause due solely to the design of the Works, other than the Contractor’s design.</p> <p>11.3 From the Completion Date until the Defects Liability Certificate has been issued, the risk of loss of or damage to the Works, Plant, and Materials is an Employer’s risk except loss or damage due to</p> <p>(a) a Defect which existed on the Completion Date,</p> <p>(b) an event occurring before the Completion Date, which was not itself an Employer’s risk, or</p> <p>(c) the activities of the Contractor on the Site after the Completion Date.</p>
<p>12. Contractor’s Risks</p>	<p>12.1 From the Starting Date until the Defects Liability Certificate has been issued, All risks of loss of or damage of 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 referred to in clause 11.2, are the responsibility of the Contractor.</p>
<p>13. Insurance</p>	<p>13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the PCC for the following events which are due to the Contractor’s risks:</p> <p>(a) loss of or damage to the Works, Plant, and Materials;</p> <p>(b) loss of or damage to Equipment;</p> <p>(c) loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the</p>

	<p>Contract; and</p> <p>(d) personal injury or death.</p> <p>13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager’s approval before the Start Date. 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.</p> <p>13.3 If the Contractor does not provide any of the policies and certificates required, the Employer may effect the insurance which the Contractor should have provided and recover the premiums the Employer 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.</p> <p>13.4 Alterations to the terms of an insurance shall not be made without the approval of the Project Manager.</p> <p>13.5 Both parties shall comply with any conditions of the insurance policies.</p>
<p>14. Site Data</p>	<p>14.1 The Contractor shall be deemed to have examined any Site Data referred to in the PCC, supplemented by any information available to the Contractor.</p>
<p>15. Contractor to Construct the Works</p>	<p>15.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings.</p> <p>15.2 The Contractor shall be responsible for maintaining the safety of all activities on the site, including smooth flow of traffic at his own cost as per guidelines including any amendment(s) of the IRC/MORT&H/PWD/CPWD.</p> <p>15.3 In respect of all labour directly or indirectly employed in the work for the performance of the Contractor's part of this contract, the Contractor shall at his own expense arrange for the safety provisions as per Safety Code framed from time to time and shall at his own expense provide for all facilities in connection therewith. In case the Contractor fails to make arrangement and provide necessary facilities as aforesaid, the Employer shall be at liberty to make arrangement and provide facilities as aforesaid and recover the costs incurred in</p>

	that behalf from the Contractor. The decision of the Engineer in this regard shall be final and no claim on account of this shall be entertained.
16. The Works to Be Completed by the Intended Completion Date	16.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.
17. Approval by the Project Manager	<p>17.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, for his approval.</p> <p>17.2 The Contractor shall be responsible for design of Temporary Works.</p> <p>17.3 The Project Manager’s approval shall not alter the Contractor’s responsibility for design of the Temporary Works.</p> <p>17.4 The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.</p> <p>17.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Project Manager before this use.</p>
18. Safety	18.1 The Contractor shall be responsible for the safety of all activities on the Site including personnel and equipment. The contractors shall follow all the applicable rules and regulations of the Employer’s country pertaining to the safety of the personnel and material.
19. Discoveries	19.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Project Manager’s instructions for dealing with them.
20. Possession of the Site	20.1 The Employer 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 PCC , the Employer shall be deemed to have delayed the start of the relevant activities, and this shall be a

	Compensation Event.
21. Access to the Site	21.1 The Contractor shall allow the Project Manager and any person authorized by the Project Manager access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.
22. Instructions, Inspections and Audits	22.1 The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located.
	22.2 The Contractor shall keep, and shall make all reasonable efforts to cause its personnel to keep, accurate and systematic accounts and records in respect of the Works in such form and details as will clearly identify relevant time changes and costs.
	22.3 The Contractor shall permit and shall cause its personnel to permit, the Employer and/or persons appointed by the Employer to inspect the Site and/or the accounts and records relating to the performance of the Contract and the submission of the bid, and to have such accounts and records audited by auditors appointed by the Employer if requested by the Employer. The Contractor's and its 'Personnel' attention is drawn to Sub-Clause 25.1 which provides, inter alia, that acts intended to materially impede the exercise of the Employer's inspection and audit rights provided for under Sub-Clause 22.2 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Employer's prevailing sanctions procedures).
23. Appointment of the Adjudicator	23.1 The Adjudicator shall be appointed jointly by the Employer and the Contractor, at the time of the Employer's issuance of the Letter of Acceptance. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator, the Employer will request the Appointing Authority designated in the PCC , to appoint the Adjudicator within 14 days of receipt of such request.
	23.2 Should the Adjudicator resign or die, or should the Employer and the Contractor agree that the Adjudicator is not functioning in accordance with the provisions of the Contract, a new Adjudicator shall be jointly appointed by the Employer and the

	<p>Contractor. In case of disagreement between the Employer and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority designated in the PCC at the request of either party, within 14 days of receipt of such request.</p>
<p>24. Procedure for Disputes</p>	<p>24.1 If the Contractor believes that a decision taken by the Project Manager was either outside the authority given to the Project Manager by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator within 14 days of the notification of the Project Manager’s decision.</p> <p>24.2 The Adjudicator shall give a decision in writing within 28 days of receipt of a notification of a dispute.</p> <p>24.3 The Adjudicator shall be paid by the hour at the rate specified in the PCC, together with reimbursable expenses of the types specified in the PCC, and the cost shall be divided equally between the Employer and the Contractor, whatever decision is reached by the Adjudicator. Either party may refer a decision of the Adjudicator to an Arbitrator within 28 days of the Adjudicator’s written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator’s decision shall be final and binding.</p> <p>24.4 The arbitration shall be conducted in accordance with the arbitration procedures published by the institution named and in the place specified in the PCC.</p>
<p>25. Fraud and Corruption</p>	<p>25.1 The Employer requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Appendix to the GCC.</p> <p>25.2 The Employer requires the Contractor to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the bidding process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.</p>
<p>B. Time Control</p>	

<p>26. Program</p>	<p>26.1 Within the time stated in the PCC, after the date of the Letter of Acceptance, the Contractor shall submit to the Project Manager for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works. In the case of a lump-sum contract, the activities in the Program shall be consistent with those in the Activity Schedule.</p> <p>26.2 An update of the Program shall be a program 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.</p> <p>26.3 The Contractor shall submit to the Project Manager for approval an updated Program at intervals no longer than the period stated in the PCC. If the Contractor does not submit an updated Program within this period, the Project Manager may withhold the amount stated in the PCC from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted. In the case of a lump-sum contract, the Contractor shall provide an updated Activity Schedule within 14 days of being instructed to by the Project Manager.</p> <p>26.4 The Project Manager’s approval of the Program shall not alter the Contractor’s obligations. The Contractor may revise the Program and submit it to the Project Manager again at any time. A revised Program shall show the effect of Variations and Compensation Events.</p>
<p>27. Extension of the Intended Completion Date</p>	<p>27.1 The Project Manager 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, which would cause the Contractor to incur additional cost.</p> <p>27.2 The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager 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</p>

	<p>delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.</p>
28. Acceleration	<p>28.1 When the Employer wants the Contractor to finish before the Intended Completion Date, the Project Manager shall obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Employer accepts these proposals, the Intended Completion Date shall be adjusted accordingly and confirmed by both the Employer and the Contractor.</p> <p>28.2 If the Contractor’s priced proposals for acceleration are accepted by the Employer, they are incorporated in the Contract Price and treated as a Variation.</p>
29. Delays Ordered by the Project Manager	<p>29.1 The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.</p>
30. Management Meetings	<p>30.1 Either the Project Manager 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.</p> <p>30.2 The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.</p>
31. Early Warning	<p>31.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price, or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.</p> <p>31.2 The Contractor shall cooperate with the Project Manager in</p>

	<p>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 Project Manager.</p>
<p>C. Quality Control</p>	
<p>32. Identifying Defects</p>	<p>32.1 The Project Manager shall check the Contractor’s work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor’s responsibilities. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.</p>
<p>33. Tests</p>	<p>33.1 If the Project Manager 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.</p> <p>33.2 The Contractor shall constitute quality assurance system to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Project Manager shall be entitled to audit any aspect of the system.</p> <p>33.3 Details of all procedures and compliance documents shall be submitted to the Project Manager for information before each design and execution stage is commenced. When any document of a technical nature is issued to the Project Manager, evidence of the prior approval by the Contractor himself shall be apparent on the document itself.</p> <p>33.4 For carrying out mandatory tests as prescribed in the specifications, the Contractor shall establish field laboratory at the location decided by Project Manager or Conduct the tests a reputed institute in consultation with the Project Manager. If the field laboratory is established, the field laboratory will have minimum of equipment as required to conduct the tests. The contractor shall be solely responsible for:</p> <p style="padding-left: 40px;">i) Carrying out the mandatory tests prescribed in the</p>

	<p style="text-align: center;">Specifications, and</p> <p style="text-align: center;">ii) For the correctness of the test results, whether preformed in his laboratory or elsewhere.</p> <p>33.5 The Project Manager will be free to conduct surprise, random or in situ checks any time during the execution and after the completion of the work but not later than the Defect Liability Period, so as to have cross check in quality of works/projects and compliance to specifications and standards at all stages of the work.</p> <p>33.6 Nothing in this clause shall reduce the overall responsibility of the Contractor regarding quality and he shall remain liable for any defect in the execution of the Project/Works at all stages.</p>
<p>34. Correction of Defects & Operation and maintenance</p>	<p>34.1 The Project Manager 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 PCC. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.</p> <p>34.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Project Manager’s notice.</p> <p>34.3 Operation and Maintenance as specified in the P.C.C.</p>
<p>35. Uncorrected Defects</p>	<p>35.1 If the Contractor has not corrected a Defect within the time specified in the Project Manager’s notice, the Project Manager shall assess the cost of having the Defect corrected, and the Contractor shall pay this amount.</p>
<p>D. Cost Control</p>	
<p>36. Contract Price</p>	<p>36.1 The Bill of Quantities shall contain priced items for the Works to be performed by the Contractor. The Bill of Quantities is used to calculate the Contract Price. The Contractor will be paid for the quantity of the work accomplished at the rate in the Bill of Quantities for each item.</p>
<p>37. Changes in the Contract Price</p>	<p>37.1 The Engineer shall have power to make any variations, alterations omission, additions to or substitutions for the</p>

	<p>original specifications, drawings, designs and instructions that may appear to be necessary or advisable during the progress of the work, and the Contractor shall be bound to carry out the work in accordance with any instructions which may be given to him in writing, signed by the Engineer. Such alterations/additions/substitutions shall not invalidate the contract and shall be carried out by the Contractor on the same conditions in all respect on which he agreed to do the main work. The time of completion of the work shall be extended in the proportion that he altered, additional or substituted works bears to the original contract work and the certificate of the Engineer shall be conclusive as to such proportion.</p> <p>37.2 If the final quantity of the work done differs from the quantity in the Bill of Quantities for the by more than 25 percent, the Project Manager shall adjust the rate to allow for the change, duly considering:</p> <ul style="list-style-type: none"> (a) Justification for rate adjustment as furnished by the Contractor. (b) Economies resulting from increase in quantities by way of reduced plant, equipment and overhead costs. (c) Entitlement of the Contractor to compensation events where such events are caused by any additional work. (d) The revised rates will be applicable to the quantity that exceeds 25% limit and not on the entire quantity. <p>37.3 The Project Manager shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the prior approval of the Employer.</p> <p>37.4 If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bill of Quantities.</p>
<p>38. Variations</p>	<p>38.1 All Variations shall be included in updated Programs produced by the Contractor.</p> <p>38.2 The Contractor shall provide the Project Manager with a quotation for carrying out the Variation when requested to do so</p>

by the Project Manager. The Project Manager shall assess the quotation, which shall be given within seven (7) days of the request or within any longer period stated by the Project Manager and before the Variation is ordered.

38.3 If the work in the Variation corresponds to an item description in the Bill of Quantities and if, in the opinion of the Project Manager, the quantity of work above the limit stated in Sub-Clause 37.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.

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

38.5 If the Project Manager 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.

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

38.7 **Value Engineering:** The Contractor may prepare, at its own cost, a value engineering proposal at any time during the performance of the contract. The value engineering proposal shall, at a minimum, include the following;

- (a) the proposed change(s), and a description of the difference to the existing contract requirements;
- (b) a full cost/benefit analysis of the proposed change(s) including a description and estimate of costs (including life cycle cost) the Employer may incur in implementing the value engineering proposal; and
- (c) a description of any effect(s) of the change on

	<p>performance/functionality.</p> <p>The Employer may accept the value engineering proposal if the proposal demonstrates benefits that:</p> <ul style="list-style-type: none"> (a) accelerates the contract completion period; or (b) reduces the Contract Price or the life cycle costs to the Employer; or (c) improves the quality, efficiency, safety or sustainability of the Facilities; or (d) yields any other benefits to the Employer, <p>without compromising the functionality of the Works.</p> <p>If the value engineering proposal is approved by the Employer and results in:</p> <ul style="list-style-type: none"> (a) a reduction of the Contract Price; the amount to be paid to the Contractor shall be the percentage specified in the PCC of the reduction in the Contract Price; or (b) an increase in the Contract Price; but results in a reduction in life cycle costs due to any benefit described in (a) to (d) above, the amount to be paid to the Contractor shall be the full increase in the Contract Price.
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39. Cash Flow Forecasts	39.1 When the Program, is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast. The cash flow forecast shall include different currencies, as defined in the Contract, converted as necessary using the Contract exchange rates.
40. Payment Certificates	40.1 The Contractor shall submit to the Project Manager monthly statements with all requisite supporting documents of the estimated value of the work executed less the cumulative amount certified previously.

- 40.2 The requisite supporting documents shall contain, Request For Inspection (RFIs), measurements and Quantities (jointly measure by the representative of the Contractor and the Employer) of items of work done since last bill, Copies of the quality control tests in specified format covering the work done since last bill, copies of the instructions recorded in the instruction book containing the instructions and compliance made thereof, covering the work done since last bill, applicable work done/as built drawings, details of approvals (as required) obtained. The contractor shall submit all the bills on the printed/computerised forms.
- 40.3 The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor.
- 40.4 The value of work executed shall be determined by the Project Manager.
- 40.5 The value of work executed shall comprise the value of the quantities of work in the Bill of Quantities that have been completed.¹
- 40.6 The value of work executed shall include the valuation of Variations and Compensation Events.
- 40.7 The Project Manager 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.
- 40.8 Payments shall be made based on the works completed till time during the period and as certified in Running Account bill. Contractor shall claim the based on the amount of works completed during that period.
- 40.9 During the operations and maintenance period, the amount quoted in the price bid shall be paid per quarter subject to deductions if any as per the terms and conditions of the Contract.

¹ In lump-sum contracts, replace this paragraph with the following: "The value of work executed shall comprise the value of completed activities in the Activity Schedule."

<p>41. Payments</p>	<p>41.1 Payments shall be adjusted for deductions for advance payments and retention. The Employer shall pay the Contractor the amounts certified by the Project Manager within 28 days of the date of each certificate.</p> <p>41.2 If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.</p> <p>41.3 Unless otherwise stated, all payments and deductions shall be paid or charged in the proportions of currencies comprising the Contract Price.</p> <p>41.4 Items of the Works for which no rate or price has been entered in shall not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.</p>
<p>42. Compensation Events</p>	<p>42.1 The following shall be Compensation Events:</p> <ul style="list-style-type: none"> (a) The Employer does not give access to a part of the Site by the Site Possession Date pursuant to GCC Sub-Clause 20.1. (b) The Employer modifies the Schedule of Other Contractors in a way that affects the work of the Contractor under the Contract. (c) The Project Manager orders a delay or does not issue Drawings, Specifications, or instructions required for execution of the Works on time. (d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon work, which is then found to have no Defects. (e) The Project Manager unreasonably does not approve a subcontract to be let. (f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to

bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.

- (g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
- (h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
- (i) The advance payment is delayed.
- (j) The effects on the Contractor of any of the Employer's Risks.
- (k) The Project Manager unreasonably delays issuing a Certificate of Completion.

42.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be reasonably increased and/or the Intended Completion Date shall be reasonably extended. The Project Manager shall decide reasonableness of whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

42.3 As soon as information demonstrating the effect of each Compensation Event upon the Contractor's forecast cost has been provided by the Contractor, it shall be assessed by the Project Manager, and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Project Manager shall adjust the Contract Price based on the Project Manager's own forecast. The Project Manager shall assume that the Contractor shall react competently and promptly to the event.

42.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor's not having given admissible early warning or

	<p>not having admissibly cooperated with the Project Manager.</p>
<p>43. Tax</p>	<p>43.1 The rates quoted by the Contractor shall be deemed to be inclusive of all the taxes, levies, duties etc. including their variations as notified by the concerned authority from time to time, and also of all the new taxes and levies that may be imposed that the Contractor will have to pay for the performance of this Contract. The Project Manager on behalf of the Employer will perform such duties in regard to the deduction of such taxes at source as per applicable law.</p> <p>43.2 The Contractor shall comply with the proper bye-laws and legal orders of the local body or public authority, authority under the jurisdiction of which the work is executed and pay all fees and charges for which he may be liable. Nothing extra shall be payable on this account.</p>
<p>44. Currencies</p>	<p>44.1 Where payments are made in currencies other than the currency of the Employer’s country specified in the PCC, the exchange rates used for calculating the amounts to be paid shall be the exchange rates stated in the Contractor’s Bid.</p>
<p>45. Price Adjustment</p>	<p>45.1 Prices shall be adjusted for fluctuations in the cost of inputs only if provided for in the PCC. If so provided, the amounts certified in each payment certificate, before deducting for Advance Payment, shall be adjusted by applying the respective price adjustment factor to the payment amounts due in each currency. A separate formula of the type specified below applies to each Contract currency:</p> $P_c = A_c + B_c \text{ Imc/Ioc}$ <p>where:</p> <p>P_c is the adjustment factor for the portion of the Contract Price payable in a specific currency “c.”</p> <p>A_c and B_c are coefficients specified in the PCC, representing the nonadjustable and adjustable portions, respectively, of the Contract Price payable in that specific currency “c;” and</p> <p>Imc is the index prevailing at the end of the month being invoiced and Ioc is the index prevailing 28 days before Bid</p>

	<p>opening for inputs payable; both in the specific currency “c.”</p> <p>45.2 If the value of the index is changed after it has been used in a calculation, the calculation shall be corrected and an adjustment made in the next payment certificate. The applicable index value shall be deemed to take account of all changes in cost due to fluctuations in costs.</p>
<p>46. Retention</p>	<p>46.1 The Employer shall retain from each payment due to the Contractor the proportion stated in the PCC until Completion of the whole of the Works.</p> <p>46.2 Upon the issue of a Certificate of Completion of the Works by the Project Manager, in accordance with GCC 51.1, half the total amount retained shall be repaid to the Contractor and half when the Defects Liability Period has passed and the Project Manager has certified that all Defects notified by the Project Manager to the Contractor before the end of this period have been corrected. The Contractor may substitute retention money with an “on demand” Bank guarantee.</p>
<p>47. Liquidated Damages</p>	<p>47.1 The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the PCC for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount defined in the PCC. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor’s liabilities.</p> <p>47.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in GCC Sub-Clause 41.1.</p>
<p>48. Bonus</p>	<p>48.1 The Contractor shall be paid a Bonus calculated at the rate per calendar day stated in the PCC for each day (less any days for which the Contractor is paid for acceleration) that the Completion is earlier than the Intended Completion Date. The</p>

	<p>Project Manager shall certify that the Works are complete, although they may not be due to be complete.</p>
<p>49. Advance Payment</p>	<p>49.1 The Employer shall make advance payment to the Contractor of the amounts stated in the PCC by the date stated in the PCC, against provision by the Contractor of an Unconditional irrevocable Bank Guarantee in a form and by Employer acceptable to the Employer in amounts and currencies equal to the advance payment. 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. Interest shall be charged at the rate 12% per annum on the advance payment.</p> <p>49.2 The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, and mobilization expenses required specifically for execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Project Manager.</p> <p>49.3 The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis, but not later than the completion of the seventy five percent (75%) of the initial project time period. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Bonuses, or Liquidated Damages.</p> <p>49.4 Secured Advance: The contractor ,on signing an indenture in the form to be specified by the Project Manager, shall be entitled to be paid, during the execution of work, upto 75% of the estimated value of any materials, which, in the opinion of the Project Manager, are non-perishable, non-fragile, non-combustible and which have been procured and adequately stored against damage, but which have not been incorporated in the works at the time of making advance.</p> <p>This secured advance is subject to the following:</p>

	<p>a. The materials are in accordance with the specification for works;</p> <p>b. Such materials have been delivered to site, and are properly stored and protected against damage or deterioration to the satisfaction of the Project Manager. The contractor shall store the bulk material in measurable stacks;</p> <p>c. The contractor’s records of the requirements, orders, receipt and use of materials are kept in a form approved by the Project Manager and such records shall be available for inspection by the Engineer;</p> <p>d. The contractor has submitted with his monthly statement the estimated value of the materials on site together with such documents as may be required by the Project Manager for the purpose of valuation of the materials and providing evidence of ownership and payment thereof;</p> <p>e. Ownership of such materials shall be deemed to vest in the Employer for which the Contractor has submitted an Indemnity Bond in an acceptable format; and</p> <p>49.5 The quantities of materials are not excessive and shall be used within a reasonable time as determined by the Project Manager.</p>
<p>50. Securities</p>	<p>50.1 The Performance Security (including additional security for unbalanced bids) shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount specified in the PCC, by a bank acceptable to the Employer, and denominated in the types and proportions of the currencies in which the Contract Price is payable. The Performance Security shall be valid until a date 60 days from the date of expiry of Defects Liability Period and additional security for unbalanced bids shall be valid until a date 28 days from the date of issue of the certificate of completion by the Project Manager/Employer.</p>
<p>51. Dayworks</p>	<p>51.1 If applicable, the Dayworks rates in the Contractor’s Bid shall be used only when the Project Manager has given written instructions in advance for additional work to be paid for in that</p>

	<p>way.</p> <p>51.2 All work to be paid for as Dayworks shall be recorded by the Contractor on forms approved by the Project Manager. Each completed form shall be verified and signed by the Project Manager within two days of the work being done.</p> <p>51.3 The Contractor shall be paid for Dayworks subject to obtaining signed Dayworks forms.</p>
52. Cost of Repairs	<p>52.1 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.</p>
E. Finishing the Contract	
53. Completion	<p>53.1 The Contractor shall request the Project Manager to issue a Certificate of Completion of the Works, and the Project Manager shall do so upon deciding that the whole of the Works is completed.</p>
54. Taking Over	<p>54.1 The Employer shall take over the Site and the Works within seven days of the Project Manager’s issuing a certificate of Completion.</p>
55. Final Account	<p>55.1 The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor’s account if it is correct and complete. If it is not, the Project Manager shall issue within 56 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 Project Manager shall decide on the amount payable to the Contractor and issues a payment certificate.</p>
56. Operating and Maintenance	<p>56.1 If “as built” Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the</p>

<p>Manuals</p>	<p>dates stated in the PCC.</p> <p>56.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the PCC pursuant to GCC Sub-Clause 56.1, or they do not receive the Project Manager’s approval, the Project Manager shall withhold the amount stated in the PCC from payments due to the Contractor.</p>
<p>57. Termination</p>	<p>57.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.</p> <p>57.2 Fundamental breaches of Contract shall include, but shall not be limited to, the following:</p> <ul style="list-style-type: none"> a) the Contractor stops work for 28 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Project Manager; b) the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 28 days; c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation; d) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 84 days of the date of the Project Manager’s certificate; e) the Project Manager 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 Project Manager; f) the Contractor does not maintain a Security, which is required; g) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be

	<p>paid, as defined in the PCC; or</p> <p>h) if the Contractor, in the judgment of the Employer has engaged in Fraud and Corruption, as defined in paragraph 2.2 a of the Appendix A to the GCC, in competing for or in executing the Contract, then the Employer may, after giving fourteen (14) days written notice to the Contractor, terminate the Contract and expel him from the Site.</p>
	<p>57.3 Notwithstanding the above, the Employer may terminate the Contract for convenience.</p>
	<p>57.4 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.</p>
	<p>57.5 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under GCC Sub-Clause 56.2 above, the Project Manager shall decide whether the breach is fundamental or not.</p>
<p>58. Payment upon Termination</p>	<p>58.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as specified in the PCC. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer.</p> <p>58.2 If the Contract is terminated for the Employer’s convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of 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, and less advance payments received up to the date of the</p>

	certificate.
59. Property	59.1 All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Employer if the Contract is terminated because of the Contractor's default.
60. Release from Performance	60.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager 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 a commitment was made.
61. Suspension of Grant by GOI and/or any State Government	<p>61.1 In the event that the Government of India (GoI) and/or any State Government suspends the grant to the Employer, from which part of the payments to the Contractor are being made:</p> <ul style="list-style-type: none"> (a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the GoI and/or any State Government suspension notice. (b) If the Contractor has not received sums due to it within the 28 days for payment provided for in Sub-Clause 40.1, the Contractor may immediately issue a 14-day termination notice.

Section IX - Particular Conditions of Contract

A. General	
GCC 1.1 (c)	The financing institution is: Government of India
GCC 1.1 (q)	The Employer is <i>The CEO, Port Blair Smart Projects Limited</i>
GCC 1.1 (u)	The In-tended Completion Date for the whole of the Works shall be Six (06) Months
GCC 1.1 (x)	The Project Manager is <i>[as nominated by PBSPL]</i>
GCC 1.1 (z)	The Site is located at ward Number 22
GCC 1.1 (cc)	The Start Date shall be <i>As mentioned in LoA.</i>
GCC 1.1 (gg)	The work consists of “SETTING UP OF 42.0 KLD FAECAL SLUDGE TREATMENT PLANT (FSTP) FOR PORT BLAIR CITY, ANDAMAN & NICOBAR”
GCC 2.2	Sectional Completions are: <i>Not Applicable</i>
GCC 2.3(i)	The following documents also form part of the Contract: Construction Schedule.
GCC 3.1	The language of the contract is <i>English.</i> The law that applies to the Contract is the law of <i>India</i>
GCC 5.1	The Project manager <i>may</i> delegate any of his duties and responsibilities.
GCC 8.1	Schedule of other contractors: <i>None</i> , if obtained during the implementation period, the same shall be provided to the Contractor.
GCC 9.1	Key Personnel GCC 9.1 is replaced with the following: Key Personnel are the Contractor’s personnel named in this GCC 9.1 of the Particular Conditions of Contract. The Contractor shall employ the Key Personnel and use the equipment identified in its Bid, to carry out the Works or other personnel and equipment

	<p>approved by the Project Manager. The Project Manager shall approve any proposed replacement of Key Personnel and equipment only if their relevant qualifications or characteristics are substantially equal to or better than those proposed in the Bid.</p> <p>[insert the name/s of each Key Personnel agreed by the Employer prior to Contract signature.]</p>
GCC 9.2	<p>Code of Conduct (ESHS)</p> <p>The following is inserted at the end of GCC 9.2:</p> <p>“The reasons to remove a person include behavior which breaches the Code of Conduct (EHS) (e.g. spreading communicable diseases, sexual harassment, gender based violence, illicit activity or crime).”</p>
GCC 13.1	<p>The minimum insurance amounts and deductibles shall be:</p> <p>(a) for loss or damage to the Works, Plant and Materials: <i>Equal to the Contract Amount.</i></p> <p>(b) for personal injury or death:</p> <p>(i) of the Contractor’s employees: <i>INR 25 Lakh</i></p> <p>(ii) of other people: <i>In accordance with the statutory requirements applicable to India.</i></p>
GCC 14.1	<p>Site Data are: None</p>
GCC 20.1	<p>The Site Possession Date(s) shall be: <i>as per the approved Programme</i></p>
GCC 23.1 & GCC 23.2	<p>Appointing Authority for the Adjudicator: <i>Will be finalised later as agreed mutually.</i></p>
GCC 24.3	<p>Hourly rate and types of reimbursable expenses to be paid to the Adjudicator: shall be intimated later.</p>
GCC 24.4	<p>The place of arbitration shall be: <i>Port Blair, India</i></p> <p><i>DISPUTES RESOLUTION MECHANISM</i></p> <p>(i) If any dispute or differences of any kind what-so-ever arise between the Employer, its authorized</p>

	<p>representatives and the contractor in connection with or arising out of this contract or the execution of work, these shall be resolved as under.</p> <p>(ii) Whether before its commencement or during the progress of Project/Work or after the termination, abandonment or breach of the contract, the dispute shall, in the first instance, be referred for settlement to the Project Manager of the work and he shall, within a period of sixty (60) days after being requested in writing by the contractor to do so, convey his decision to the contractor. Such decision in respect of every matter so referred shall, subject to arbitration as hereinafter provided, be final and binding upon the Contractor. In case the work is already in process, the contractor shall proceed with the execution of the work on receipt of the decision of the Project Manager as aforesaid with all due diligence, whether any of the parties requires arbitration as hereinafter provided or not.</p> <p>(iii) If the Project Manager has conveyed his decision to the contractor and no claim for arbitration has been filed by the contractor within a period of sixty (60) days from the receipt of the latter communicating the decision, the said decision shall be final and binding upon the contractor and will not be a subject matter of arbitration at all.</p> <p>(iv) If the Project Manager fails to convey his decision within a period of sixty days from the date on which the said request was made by the contractor, he may refer the dispute for arbitration as hereinafter provided.</p> <p>(v) All disputes or differences in respect of which the decision is not final and conclusive shall, at the request of either party made in communication sent through registered A.D. post, be referred for arbitration.</p> <p>(vi) The provisions of the Arbitration and Reconciliation Act, 1996 or any other statutory there under or modification thereof and for the time being in force shall apply to the arbitration proceedings under this clause.</p>
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	<p>(vii) The Employer shall have the authority to change the arbitrator on an application by either the contractor or the Engineer requesting change of arbitrator giving reasons thereof, either before the start of the arbitration proceedings or during the course of such proceedings. The arbitration proceedings would stand suspended as soon as an application for change of Arbitrator is filed before the Employer and a notice thereof is given by the applicant to the Arbitrator. The Employer after hearing both the parties may pass a speaking order rejecting the application or accepting to change the arbitrator or simultaneously, appointing a technical officer as Arbitrator under the contract. The new arbitrator so appointed may enter upon the reference afresh or he may continue the hearings from the point these were suspended before the previous arbitrator.</p> <p>(viii) The reference to the arbitrator shall be made by the claimant party within one hundred twenty (120) days from the date of dispute of claim arises during the execution of work. If the claim pertains to rates or recoveries introduced in the final bill, the reference to the arbitrator shall be made within six calendar months from the date of payment of the final bill to the contractor or from the date a registered notice is sent to the contractor to the effect that his final bill is ready by the Engineer (whose decision in this respect shall be final and binding) whichever is earlier.</p> <p>(ix) It shall be an essential term of this contract that in order to avoid frivolous claims, the party invoking arbitration shall specify the disputes based upon facts and calculations stating the amount claimed under each claim and shall furnish a “deposit-at-call” for ten percent (10%) of the amount claimed, on a scheduled bank in the name of the Arbitrator, by his official designation who shall keep the amount in deposit till the announcement of the award. In the event of an award in favour of the claimant, the deposit shall be refunded to him in proportion to the amount awarded with respect to the amount claimed and the balance, if any, shall be forfeited</p>
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	<p>and paid to the other party.</p> <p>(x) The Arbitrator/Arbitral Tribunal shall give a reasoned award for each claim/counter claim</p> <p>(xi) The independent claims of the party other than one seeking arbitration as also the counter claims of any party shall be entertained by the arbitrator.</p> <p>(xii) The work under the contract shall continue during the arbitration proceedings.</p> <p>(xiii) The stamp fee due on the award shall be payable by the party as desired by the Arbitrator/Arbitral Tribunal and in the event of such party's default, the stamp fee shall be recoverable from another sum due to such party under this or any other contract.</p> <p>(xiv) Neither party shall be entitled to bring a claim for arbitration, if it is not filed as per the time period already specified or within six (06) months of the following:-</p> <ul style="list-style-type: none">a) of the date of completion of the work as certified by the Project manager orb) of the date of abandonment of the work or breach of contract under any of its clauses, orc) of its non-commencement or non-resumption of work within 10 days of written notice for commencement or resumption as applicable, ord) of the cancellation, termination or withdrawal of the work from the contractor in whole or in part and/or revision for closure of the contract, ore) Of receiving an intimation from the Project Manager that the final payment due or recover from the contractor had been determined, for the purpose of payment/adjustment whichever is the latest. If the matter is not referred to arbitration within the period prescribed above, all the rights and claims of either party under the contract shall be deemed to have been fortified and absolutely barred by the time for
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	<p style="text-align: center;">arbitration and even for civil litigation.</p> <p>(xv) No question relating to this contract shall be brought before any civil court without first invoking and completing the arbitration proceedings, if the issue is covered by the scope of arbitration under the contract. The pending arbitration proceedings shall not disentitle the Project Manager to terminate the contract and to make alternate arrangement for completion of the works.</p> <p>(xvi) The Arbitrator/Arbitral Tribunal shall be deemed to have entered on the reference on the day, notice is issued to the parties fixing the first date of hearing. The arbitrator/Arbitral Tribunal may, from time to time, with the consent of the parties enlarge the initial time for making and publishing the award. However, Arbitrator/Arbitral Tribunal shall make all out efforts to decide each claim within a period of 6 months from the date of initiation.</p> <p>(xvii) The expiry to the contractual time limit, whether originally fixed or extended, shall not invalidate the provisions of this clause.</p>
<p>B. Time Control</p>	
<p>GCC 26.1</p>	<p>The Contractor shall submit for approval a Program for the Works within 15 days from the date of the Letter of Acceptance.</p>
<p>GCC 26.2</p>	<p>EHS Reporting</p> <p>Inserted at the end of GCC 26.2:</p> <p>“In addition to the progress report, the Contractor shall also provide a report on the Environmental, Health and Safety (EHS) metrics. In addition to Appendix A reports, the Contractor shall also provide immediate notification to the Project Manager of incidents in the following categories. Full details of such incidents shall be provided to the Project Manager within the timeframe agreed with the Project Manager.</p> <p style="text-align: center;">(b) confirmed or likely violation of any law or international agreement;</p>

	<p>(c) any fatality or serious (lost time) injury;</p> <p>(d) significant adverse effects or damage to private property (e.g. vehicle accident, damage from fly rock, working beyond the boundary)</p> <p>(e) major pollution of drinking water aquifer or damage or destruction of rare or endangered habitat (including protected areas) or species; or</p> <p>(f) any allegation of sexual harassment or sexual misbehaviour, child abuse, defilement, or other violations involving children.</p>
<p>GCC 26.3</p>	<p>The period between Program updates is 30 days.</p> <p>The amount to be withheld for late submission of an updated Program is Indian Rupees Two lakh Fifty Thousand only (INR2,50,000/-)</p>
<p>C. Quality Control</p>	
<p>GCC 34.1</p>	<p>The Defects Liability Period is: <i>2 years from the date of issuance of Commissioning Certificate of the Project. Operation and Maintenance shall be including two years of Defect Liability Period for the Project. The Contractor shall be responsible for quality control, testing and laboratory equipment.</i></p> <p>Add the following clause after Clause 34.3</p> <p>Operation and Maintenance:</p> <p>34.4 The operation and maintenance period is 5 year from the date of completion of Works and issuance of Commissioning of the Project as per schedule mentioned in section VII - Works Requirement.</p>
<p>D. Cost Control</p>	
<p>GCC 38.2</p>	<p>At the end of 38.2 add after the first sentence:</p> <p>“The Contractor shall also provide information of any EHS risks and impacts of the Variation.”</p>

<p>GCC 38.8</p>	<p>Variation</p> <ul style="list-style-type: none"> • Extra items of work are Items, which are completely new and in addition to the items in contract. • Substituted items are items which are taken up in lieu of those already provided in the contract. These are with partial modification in items of work in the contract. If an agreement item is completely changed, the new time taken up in lieu of it is an Extra Item. • Wordings of extra/substituted items sanctioned by competent authorities should be properly formulated so as to reflect the exact mode of execution in the field. • No extra/substituted item should be executed without the prior approval of the authority who accorded the technical sanction. • Fixation of rates shall be made as per the provisions of the 38.2 38.3, 38.4 of GCC
<p>GCC 38.7</p>	<p>If the value engineering proposal is approved by the Employer the amount to be paid to the Contractor shall be 5% (<i>five percent</i>) of the reduction in the Contract Price. The amount shall be paid after the completion of the project taking the final contract amount in consideration.</p>
<p>GCC 38.7</p>	<p>In the first paragraph insert new sub-paragraph (d):</p> <p>“(d) a description of the proposed work to be performed, a programme for its execution and sufficient EHS information to enable an evaluation of EHS risks and impacts;”</p>
<p>GCC 44.1</p>	<p>The currency of the Employer’s country is: <i>Indian Rupees</i>.</p>

GCC 41	<p>Payment Schedule during Construction Stage</p> <table border="1" data-bbox="451 262 1300 772"> <thead> <tr> <th data-bbox="451 262 553 352">S.No.</th> <th data-bbox="553 262 1068 352">Item</th> <th data-bbox="1068 262 1300 352">Weightage in percentage to the contract price</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 352 553 422">1.</td> <td data-bbox="553 352 1068 422">On approval of Design & Drawings of the project.</td> <td data-bbox="1068 352 1300 422">10%</td> </tr> <tr> <td data-bbox="451 422 553 512">2.</td> <td data-bbox="553 422 1068 512">On completion of Site Clearance, Environmental Clearance, Land Development of the project.</td> <td data-bbox="1068 422 1300 512">10%</td> </tr> <tr> <td data-bbox="451 512 553 543">3.</td> <td data-bbox="553 512 1068 543">On completion of Civil works</td> <td data-bbox="1068 512 1300 543">20%</td> </tr> <tr> <td data-bbox="451 543 553 613">4.</td> <td data-bbox="553 543 1068 613">On completion of Electromechanical, Instrumentation Work</td> <td data-bbox="1068 543 1300 613">20%</td> </tr> <tr> <td data-bbox="451 613 553 682">5.</td> <td data-bbox="553 613 1068 682">On Successful trial & Run of the Treatment Plant</td> <td data-bbox="1068 613 1300 682">20%</td> </tr> <tr> <td data-bbox="451 682 553 751">6.</td> <td data-bbox="553 682 1068 751">On issuance of construction completion certificate by the client.</td> <td data-bbox="1068 682 1300 751">20%</td> </tr> <tr> <td data-bbox="451 751 553 772"></td> <td data-bbox="553 751 1068 772">TOTAL =</td> <td data-bbox="1068 751 1300 772">100%</td> </tr> </tbody> </table> <p>Payment during the Operation and Maintenance Period shall be released quarterly based upon the value quoted in the Price Bid minus any deductions due to default in performance during Operations and Maintenance.</p>	S.No.	Item	Weightage in percentage to the contract price	1.	On approval of Design & Drawings of the project.	10%	2.	On completion of Site Clearance, Environmental Clearance, Land Development of the project.	10%	3.	On completion of Civil works	20%	4.	On completion of Electromechanical, Instrumentation Work	20%	5.	On Successful trial & Run of the Treatment Plant	20%	6.	On issuance of construction completion certificate by the client.	20%		TOTAL =	100%
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GCC 45.1	<p>The Contract <i>is not</i> subject to price adjustment in accordance with GCC Clause 45.</p>																								
GCC 46.1	<p>The proportion of payments retained is: <i>5% (five Percent)</i>]</p>																								
GCC 47.1	<p>The liquidated damages for the whole of the Works are <i>0.10 %</i> (zero point one percent) per day. The maximum amount of liquidated damages for the whole of the Works is <i>10% (ten percent)</i> of the final Contract Price.</p> <p>The Contractor shall ensure due diligence to achieve progress of work not less than that indicated in the following milestones:</p> <ul style="list-style-type: none"> a) Lapse of 25% of the Contractual time- 10% b) Lapse of 50% of the Contractual time- 30% c) Lapse of 75% of the Contractual time- 65% d) Lapse of 100% of the Contractual time-100% <p>In addition to the above, the works would be carried out and the PBSPL would back charge the bidder along with a markup of 20%</p>																								

	on the actual cost incurred to carry out the said work.
GCC 47	Add New GCC 47.3 “Clause 47.3- In case of continued default or shortfall in progress, the Project Manager may go on further enhancing the levy of liquidated damages, each time limited to 1% of the amount of contract per week of further default subject to maximum limit of five (5) percent of the Contract value.
GCC 48.1	Not Applicable
GCC 49.1	The Advance Payments shall be: <i>Ten percent (10%) against the unconditional irrevocable BG of 110% of the Value.</i>
GCC 50.1	The Performance Security amount is 5% of the Contract Amount. Additional performance security of 10% for the unbalanced bid.
GCC 51	Not Applicable
E. Finishing the Contract	
GCC 56.1	The date by which operating and maintenance manuals are required is <i>30 days before the completion of the Contract period.</i> The date by which “as built” drawings are required is <i>15 days after the completion of the Contract period or with the Final Bill whichever is earlier.</i>
GCC 56.2	The amount to be withheld for failing to produce “as built” drawings and/or operating and maintenance manuals by the date required in GCC 58.1 is <i>Indian Rupees 20.00 (twenty) Lakhs.</i>
GCC 57.2 (g)	The maximum number of day’s is 100 days.
GCC 58.1	The percentage to apply to the value of the work not completed, representing the Employer’s additional cost for completing the Works, is <i>20% (twenty percent).</i>



Section X - Contract Forms

This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

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NOTIFICATION OF AWARD

Letter of Acceptance

[on letterhead paper of the Employer]

..... *[date]*

To: *[name and address of the Contractor]*

Subject: *[Notification of Award Contract No]*

This is to notify you that your Bid dated *[insert date]* for execution of the
. *[insert name of the contract and identification number, as given in the PCC]* . .
. for the Accepted Contract Amount of *[insert amount in numbers
and words and name of currency]*, as corrected and modified in accordance with the
Instructions to Bidders is hereby accepted by Port Blair Smart Projects
Limited(PBSPL)..

You are requested to furnish the Performance Security within 28 days in accordance
with the Conditions of Contract, using for that purpose the of the Performance Security
Form included in Section X - Contract Forms, of the bidding document.

[Choose one of the following statements:]

We accept that _____ *[insert the name of Adjudicator
proposed by the Bidder]* be appointed as the Adjudicator.

[or]

We do not accept that _____ *[insert the name of the Adjudicator
proposed by the Bidder]* be appointed as the Adjudicator, and by sending a copy of this
Letter of Acceptance to _____ *[insert name
of the Appointing Authority]*, the Appointing Authority, we are hereby requesting such
Authority to appoint the Adjudicator in accordance with ITB 50.1 and GCC 23.1.

Authorized Signature:

Name and Title of Signatory:

Name of Agency:



Attachment: Contract Agreement



Contract Agreement

THIS AGREEMENT made theday of,, between Port Blair Smart Projects Limited (hereinafter “the Employer”), of the one part, and *[name of the Contractor]*.(hereinafter “the Contractor”), of the other part:

WHEREAS the Employer desires that the Works known as *[name of the Contract]*.should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein,

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
 - (a) the Letter of Acceptance
 - (b) the Letter of Bid Technical and Financial Parts
 - (c) the addenda Nos _____(if any)
 - (d) the Particular Conditions of Contract
 - (e) the General Conditions of Contract, including Appendices;
 - (f) the Specification
 - (g) the Drawings
 - (h) Bill of Quantities; and
 - (i) any other document **listed in the PCC** as forming part of the Contract;
3. In consideration of the payments to be made by the Employer to the Contractor as specified in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.



IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of [India].on the day, month and year specified above.

Signed by: _____
for and on behalf of the Employer

Signed by: _____
for and on behalf the Contractor

in the
presence of: _____
Witness, Name, Signature, Address,
Date

in the
presence of: _____
Witness, Name, Signature, Address, Date

Performance Security - Bank Guarantee

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[insert name and Address of Employer]*

Date: *_ [Insert date of issue]*

PERFORMANCE GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *_ [insert name of Contractor, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the execution of *_ [insert name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (_____) *[insert amount in words]*,¹ such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the Day of, 2...², and any demand for payment under it must be received by us at this office indicated above on or before that date.

¹ *The Guarantor shall insert an amount representing the percentage of the Accepted Contract Amount specified in the Letter of Acceptance, less provisional sums, if any, and denominated either in the currency(cies) of the Contract or a freely convertible currency acceptable to the Beneficiary.*

² *Insert the date twenty-eight days after the expected completion date as described in GCC Clause 53.1. The Employer should note that in the event of an extension of this date for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][one year], in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."*



[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

Advance Payment Security

Demand Guarantee

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[Insert name and Address of Employer]*

Date: *[Insert date of issue]*

ADVANCE PAYMENT GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *[insert name of Contractor, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the execution of *[insert name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum *[insert amount in figures]* () *[insert amount in words]* is to be made against an advance payment guarantee.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]*/ (_____) *[insert amount in words]*¹ upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating either that the Applicant:

- (a) has used the advance payment for purposes other than the costs of mobilization in respect of the Works; or
- (b) has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Applicant has failed to repay.

¹ *The Guarantor shall insert an amount representing the amount of the advance payment and denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Employer.*



A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the advance payment referred to above has been credited to the Applicant on its account number *[insert number]* at *[insert name and address of Applicant's bank]*.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Applicant as specified in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety (90) percent of the Accepted Contract Amount, less provisional sums, has been certified for payment, or on the *[insert day]* day of *[insert month]*, 2 *[insert year]*,² whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

² *Insert the expected expiration date of the Time for Completion. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][one year], in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."*

Indenture for Secured Advances

(For use in cases in which the contract is for finished work and the Contractor has entered into an agreement for the execution of a certain specified quantity of work in a given time)

This indenture made the day of _____, 20 ____ BETWEEN _____ (hereinafter called the Contractor which expression shall where the context so admits or implies be deemed to include his executors, administrators and assigns) or the one part and Employer of the other part.

Whereas by an agreement dated _____ (hereinafter called the said agreement) the Contractor has agreed.

AND WHEREAS the Contractor has applied to the Employer that he may be allowed advanced on the security of materials absolutely belonging to him and brought by him to the site of the works the subject of the said agreement for use in the construction of such of the works as he has undertaken to executive at rates fixed for the finished work (inclusive of the cost of materials and labour and other charges).

AND WHEREAS the Employer has agreed to advance to the Contractor the sum of Rupees on the security of materials the quantities and other particulars of which are detailed in Accounts of Secured Advances attached to the Running Account bill for the said works signed by the Contractor on and the Employer has reserved to himself the option of making any further advance or advances on the security of other materials brought by the Contractor to the site of the said work.

NOW THIS INDENTURE WITNESSETH that in pursuance of the said agreement and in consideration of the sum of Rupees _____ on or before the execution of these presents paid to the Contractor by the Employer (the receipt where of the Contractor doth hereby acknowledge) and of such further advances (if any) as may be made to him as a for said the Contractor doth hereby covenant and agree with the President and declare as follows:

1. That the said sum of Rupees so advanced by the Employer to the Contractor as aforesaid and all or any further sum of sums advanced as aforesaid shall be employed by the Contractor in or towards expending the execution of the said works and for no other purpose whatsoever.
2. That the materials details in the said Account of Secured Advances which have been offered to and accepted by the Employer as security are absolutely the Contractor's own propriety and free from encumbrances of any kind and the Contractor will not make any application for or receive a further advance on the security of materials which are not absolutely his own property and free from encumbrances of any kind

and the Contractor indemnified the Employer against all claims to any materials in respect of which an advances has be made to him as aforesaid.

3. That the materials detailed in the said account of Secured Advances and all other materials on the security of which any further advance or advances may hereafter be made as aforesaid (hereafter called the said materials) shall be used by the Contractor solely in the execution of the said work in accordance with the directions of the project Manager.
4. That the Contractor shall make at his own cost all necessary and adequate arrangements for the proper watch, safe custody and protection against all risks of the said materials and that until used in construction as aforesaid the said materials shall remain at the site of the said works in the Contractor's custody and on his own responsibility and shall at all times be open to inspection by the Project Manager or any officer authorized by him.

In the event of the said materials or any part thereof being stolen, destroyed or damaged or becoming deteriorated in a greater degree than is due to reasonable use and wear thereof the Contractor will forthwith replace the same with other materials of like quality or repair and make good the same required by the Project Manager.

5. That the said materials shall not be any account be removed from the site of the said works except with the written permission of the Project Manager or an officer authorized by him on that behalf.
6. That the advances shall be repayable in full when or before the Contractor receives payment from the Employer of the price payable to him for the said works under the terms and provisions of the said agreement. Provided that if any intermediate payments are made to the Contractor on account of work done than on the occasion of each such payment the Employer will be a liberty to make a recovery from the Contractor's bill for such payment by deducting there from the value of the said materials than actually used in the construction and in respect of which recovery has not been made previously, the value for this purpose being determined in respect of each description of materials at the rates at which the amounts of the advances made under these presents were calculated.
7. That if the Contractor shall at any time make any default in the performance or observance in any respect of any of the terms and provisions of the said agreement or of these presents the total amount of the advance or advances that may still be owing of the Employer shall immediately on the happening of such default be repayable by the Contractor to be the Employer together with interest thereon at twelve per cent (12%) per annum from the date or respective dates of such advance or advances to the date of repayment and with all costs, charges, damages and expenses incurred by the Employer in or for the recovery thereof or the enforcement of this security or otherwise by reason of the default of the Contractor and the Contractor hereby

covenants and agrees with the Employer to reply and pay the same respectively to him accordingly.

8. That the Contractor hereby charges all the said materials with the repayment to the Employer of the said sum of Rupees and any further sum of sums advanced as aforesaid and all costs, charges, damages and expenses payable under these presents PROVIDED ALWAYS and it is hereby agreed and declared that notwithstanding anything in the said agreement and without prejudice to the power contained therein if and whenever the covenant for payment and repayment here-in- before contained shall become enforceable and the money owing shall not be paid in accordance there with the Employer may at any time thereafter adopt all or any of the following courses as he may deem best:
 - a. Seize and utilize the said materials or any part thereof in the completion of the said works on behalf of the Contractor in accordance with the provisions in that behalf contained in the said agreement debiting the Contractor with the actual cost of effecting such completion and the amount due to the Contractor with the value of work done as if he had carried it out in accordance with the said agreement and at the rates thereby provided. If the balance is against the Contractor, he is to pay same to the Employer on demand.
 - b. Remove and sell by public auction the seized materials or any part thereof and out of the moneys arising from the sale retain all the sums aforesaid repayable or payable to the Employer under these presents and pay over the surplus (if any) to the Contractor.
 - c. Deduct all or any part of the moneys owing out of the security deposit or any sum due to the Contractor under the said agreement.
9. That except in the event of such default on the part of the Contractor as aforesaid interest on the said advance shall not be payable.
10. That in the event of any conflict between the provisions of these presents and the said agreement the provisions of these presents shall prevail and in the event of any dispute or difference arising over the construction or effect of these presents the settlement of which has not been here-in-before expressly provided for the same shall be referred to the Employer whose decision shall be final and the provision of the Indian Arbitration Act for the time being in force shall apply to any such reference.

□