



WATCO
WATER CORPORATION OF ODISHA

Bid Identification No. [WATCO \(W\)- 07/2026-27, Dt.12.06.2026](#)

AGREEMENT

Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation" on Engineering, Procurement & Construction (EPC) Contract

INDICATIVE ESTIMATED COST: Rs.39502.48 LAKH

BID PROCESSING FEE: Rs.30,000.00 + GST @ 18%

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Part I
Preliminary

ENGINEERING, PROCUREMENT AND CONSTRUCTION AGREEMENT

THIS AGREEMENT¹ is entered into on this the day of, 2025.

BETWEEN

[**THE General Manager, WATCO Drainage Division, Cuttack** and having its office at **Cuttack**, representative of **the Managing Director, WATCO, Bhubaneswar, under Government of Odisha** the “**Authority**” which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns of One Part;

AND

{-----},² means the selected bidder³ having its registered office at, (hereinafter referred to as the “**Contractor**” which expression shall, unless repugnant to the context or meaning thereof, include its successors and permitted assigns) of the Other Part.

WHEREAS:

- (A) The Government of Odisha] had entrusted to the Authority for “**Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation**” on Engineering, Procurement & Construction (EPC) Contract^{4&5}.
- (B) The Authority had resolved to “**Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation**” on Engineering, Procurement, Construction (“**EPC**”) basis in accordance with the terms and conditions to be set forth in an agreement to be entered into.
- (C) The Authority had accordingly invited **single stage two-part bidding proposal** by its [Request for Proposal vide Tender ID No. **WATCO (W) - 07/2026-27, Dt.12.06.2026**] (the “**Request for Proposal**” or “**RFP**”) from bidders for EPC of the above referred Sewerage Project and had shortlisted certain bidders including, inter alia, the selected bidder.
- (D) The Authority had prescribed the technical and commercial terms and conditions, and invited bids (the “**Request for Proposals**” or “**RFP**”) from the bidders pursuant to the **RFP** for undertaking the Project.
- (E) After evaluation of the bids received, the Authority had accepted the bid of the selected bidder and issued its Letter of Acceptance No. dated (hereinafter called the “**LOA**”) to the selected bidder for the work “**Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation**” on Engineering, Procurement & Construction (EPC) Contract at the contract price specified hereinafter, requiring the selected bidder to inter alia:

¹ Serially numbered footnotes in this Agreement are for guidance of the Authority and should be omitted from the draft Agreement forming part of Bid Documents. Footnotes marked “\$” shall be retained in the draft Agreement.

² All provisions enclosed in curly parenthesis shall be retained in the Bid Documents and shall be modified as required after the selected bidder has been identified.

³ Refers to the single entity or the lead member of the consortium/joint venture, which is the selected bidder under the RFP.

⁴ All asterisks in this Model Agreement should be substituted by project-specific particulars in the draft Agreement forming part of Bid Documents.

⁵ All project-specific provisions in this Model EPC Agreement have been enclosed in square parenthesis and may be modified, as necessary, before issuing the draft Agreement forming part of Bid Documents.

- (i) deliver to the Authority a legal opinion from the legal counsel of the selected bidder with respect to the authority of the selected bidder to enter into this Agreement and the enforceability of the provisions thereof, within 10 (ten) days of the date of issue of LOA; and
 - (ii) execute this Agreement within **15 (fifteen) days** of the date of issue of LOA.
- (F) The Contractor has fulfilled the requirements specified in Recital (E) above; NOW THEREFORE in consideration of the foregoing and the respective covenants and agreements set forth in this Agreement, the sufficiency and adequacy of which is hereby acknowledged, the Authority hereby covenants to pay the Contractor, in consideration of the obligations specified herein, the Contract Price or such other sum as may become payable under the provisions of the Agreement at the times and in the manner specified by the Agreement and intending to be legally bound hereby, the Parties agree as follows:

ARTICLE 1

DEFINITIONS AND INTERPRETATION

1.1 Definitions

The words and expressions beginning with capital letters and defined in this Agreement (including those in Article 28) shall, unless the context otherwise requires, have the meaning ascribed thereto herein, and the words and expressions defined in the Schedules and used therein shall have the meaning ascribed thereto in the Schedules.

1.2 Interpretation

1.2.1 In this Agreement, unless the context otherwise requires,

- (a) references to any legislation or any provision thereof shall include amendment or re-enactment or consolidation of such legislation or any provision thereof so far as such amendment or re-enactment or consolidation applies or is capable of applying to any transaction entered into hereunder;
- (b) references to laws of Odisha/ India or Indian law or regulation having the force of law shall include the laws, acts, ordinances, rules, regulations, bye laws or notifications which have the force of law in the territory of India and as from time to time may be amended, modified, supplemented, extended or re-enacted;
- (c) references to a “person” and words denoting a natural person shall be construed as a reference to any individual, firm, company, corporation, society, trust, government, state or agency of a state or any association or partnership (whether or not having separate legal personality) of two or more of the above and shall include successors and assigns;
- (d) the table of contents, headings or sub-headings in this Agreement are for convenience of reference only and shall not be used in, and shall not affect, the construction or interpretation of this Agreement;
- (e) the words “include” and “including” are to be construed without limitation and shall be deemed to be followed by “without limitation” or “but not limited to” whether or not they are followed by such phrases;
- (f) references to “construction” or “building” include, unless the context otherwise requires, survey and investigation, design, developing, engineering, procurement, supply of plant, materials, equipment, labour, delivery, transportation, installation, processing, fabrication, testing, and commissioning of the **Box Drain Project**, and removing of defects, if any, and other activities incidental to the construction and “construct” or “build” shall be construed accordingly;
- (g) references to “development” include, unless the context otherwise requires, construction, renovation, refurbishing, augmentation, up-gradation and other activities incidental thereto during the Construction Period, and “develop” shall be construed accordingly;
- (h) any reference to any period of time shall mean a reference to that according to Indian standard time;
- (i) any reference to day shall mean a reference to a calendar day;
- (j) references to a “business day” shall be construed as a reference to a day (other than a Sunday) on which banks in [Odisha] are generally open for business;

- (k) any reference to month shall mean a reference to a calendar month as per the Gregorian calendar;
- (l) references to any date, period or Project Milestone shall mean and include such date, period or Project Milestone as may be extended pursuant to this Agreement;
- (m) any reference to any period commencing “from” a specified day or date and “till” or “until” a specified day or date shall include both such days or dates; provided that if the last day of any period computed under this Agreement is not a business day, then the period shall run until the end of the next business day;
- (n) the words importing singular shall include plural and vice versa;
- (o) references to any gender shall include the other and the neuter gender;
- (p) “lakh” means a hundred thousand (100,000) and “crore” means ten million (10,000,000);
- (q) “indebtedness” shall be construed so as to include any obligation (whether incurred as principal or surety) for the payment or repayment of money, whether present or future, actual or contingent;
- (r) references to the “winding-up”, “dissolution”, “insolvency”, or “reorganisation” of a company or corporation shall be construed so as to include any equivalent or analogous proceedings under the law of the jurisdiction in which such company or corporation is incorporated or any jurisdiction in which such company or corporation carries on business including the seeking of liquidation, winding-up, reorganisation, dissolution, arrangement, protection or relief of debtors;
- (s) save and except as otherwise provided in this Agreement, any reference, at any time, to any agreement, deed, instrument, license or document of any description shall be construed as reference to that agreement, deed, instrument, license or other document as amended, varied, supplemented, modified or suspended at the time of such reference; provided that this Clause shall not operate so as to increase liabilities or obligations of the Authority hereunder or pursuant hereto in any manner whatsoever;
- (t) any agreement, consent, approval, authorisation, notice, communication, information or report required under or pursuant to this Agreement from or by any Party or the Authority’s Engineer shall be valid and effective only if it is in writing under the hand of a duly authorised representative of such Party or the Authority’s Engineer, as the case may be, in this behalf and not otherwise;
- (u) the Schedules and Recitals to this Agreement form an integral part of this Agreement and will be in full force and effect as though they were expressly set out in the body of this Agreement;
- (v) references to Recitals, Articles, Clauses, Sub-clauses or Schedules in this Agreement shall, except where the context otherwise requires, mean references to Recitals, Articles, Clauses, Sub-clauses and Schedules of or to this Agreement, and references to a Paragraph shall, subject to any contrary indication, be construed as a reference to a Paragraph of this Agreement or of the Schedule in which such reference appears;
- (w) the damages payable by either Party to the other of them, as set forth in this Agreement, whether on per diem basis or otherwise, are mutually agreed genuine pre-estimated loss and damage likely to be suffered and incurred by the Party entitled to receive the same and are not by way of penalty (the “**Damages**”); and

- (x) time shall be of the essence in the performance of the Parties' respective obligations. If any time period specified herein is extended for the reasons specified in the Agreement, such extended time shall also be of the essence.
- 1.2.2 Unless expressly provided otherwise in this Agreement, any Documentation required to be provided or furnished by the Contractor to the Authority shall be provided free of cost and in three copies, and if the Authority is required to return any such Documentation with its comments and/or approval, it shall be entitled to retain two copies thereof.
- 1.2.3 The rule of construction, if any, that a contract should be interpreted against the parties responsible for the drafting and preparation thereof, shall not apply.
- 1.2.4 Any word or expression used in this Agreement shall, unless otherwise defined or construed in this Agreement, bear its ordinary English meaning and, for these purposes, the General Clauses Act, 1897 shall not apply.
- 1.3 Measurements and arithmetic conventions**

All measurements and calculations shall be in the metric system and calculations done to 2 (two) decimal places, with the third digit of 5 (five) or above being rounded up and below 5 (five) being rounded down.
- 1.4 Priority of agreements and errors/discrepancies**
 - 1.4.1 This Agreement, and all other agreements and documents forming part of or referred to in this Agreement are to be taken as mutually explanatory and, unless otherwise expressly provided elsewhere in this Agreement, the priority of this Agreement and other documents and agreements forming part hereof or referred to herein shall, in the event of any conflict between them, be in the following order:
 - (a) this Agreement; and
 - (b) all other agreements and documents forming part hereof or referred to herein; i.e. this Agreement at (a) above shall prevail over the agreements and documents at (b).
 - 1.4.2 Subject to the provisions of Clause 1.4.1, in case of ambiguities or discrepancies within this Agreement, the following shall apply:
 - (a) between two or more Clauses of this Agreement, the provisions of a specific Clause relevant to the issue under consideration shall prevail over those in other Clauses;
 - (b) between the Clauses of this Agreement and the Schedules, the Clauses shall prevail and between Schedules and Annexes, the Schedules shall prevail;
 - (c) between any two Schedules, the Schedule relevant to the issue shall prevail;
 - (d) between the written description on the Drawings and the Specifications and Standards, the latter shall prevail;
 - (e) between the dimension scaled from the Drawing and its specific written dimension, the latter shall prevail; and
 - (f) between any value written in numerals and that in words, the latter shall prevail.
- 1.5 Joint and several liability**
 - 1.5.1 If the Contractor has formed a Consortium of two or more persons for implementing the Project:
 - (a) these persons shall, without prejudice to the provisions of this Agreement, be deemed to be jointly and severally liable to the Authority for the performance of the Agreement; and
 - (b) the Contractor shall ensure that no change in the composition of the Consortium is effected without the prior consent of the Authority.

1.5.2 Without prejudice to the joint and several liability of all the members of the Consortium, **the Lead Member shall represent all the members** of the Consortium and shall at all times be liable and responsible for discharging the functions and obligations of the Contractor. The Contractor shall ensure that each member of the Consortium shall be bound by any decision, communication, notice, action or inaction of the Lead Member on any matter related to this Agreement and the Authority shall be entitled to rely upon any such action, decision or communication of the Lead Member. **The Authority shall have the right to release payments solely to the Lead Member** and shall not in any manner be responsible or liable for the *inter se* allocation of payments among members of the Consortium.} [§]

[§]This Clause 1.5 may be omitted if the Contractor is not a Consortium. Even if the Contractor is a Consortium, the Authority may, at its discretion, delete this provision.

Part II
Scope of Project

ARTICLE 2
SCOPE OF THE PROJECT

2.1 Scope of the Project

Under this Agreement, the scope of the Project (the “**Scope of the Project**”) shall mean and include:

- (a) **Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation” on Engineering, Procurement & Construction (EPC) Contract** set forth in Schedule-A (Project) and as specified in Schedule-B together with provision of Project Facilities as specified in Schedule-C, and in conformity with the Specifications and Standards set forth in Schedule-D;

and

- (b) Performance and fulfilment of all other obligations of the Contractor in accordance with the provisions of this Agreement and matters incidental thereto or necessary for the performance of any or all of the obligations of the Contractor under this Agreement.

ARTICLE 3

OBLIGATIONS OF THE CONTRACTOR

3.1 Obligations of the Contractor

- 3.1.1 Subject to and on the terms and conditions of this Agreement, the Contractor shall undertake the survey, investigation, design, engineering, procurement, construction, operation and maintenance of the Sewerage Project and observe, fulfil, comply with and perform all its obligations set out in this Agreement or arising hereunder.
- 3.1.2 The Contractor shall comply with all Applicable Laws and Applicable Permits (including renewals as required) in the performance of its obligations under this Agreement.
- 3.1.3 Subject to the provisions of Clauses 3.1.1 and 3.1.2, the Contractor shall discharge its obligations in accordance with Good Industry Practice and as a reasonable and prudent person.
- 3.1.4 The Contractor shall remedy any and all loss or damage to the Sewerage Project from the Appointed Date until the end of the Construction Period at the Contractor's cost, save and except to the extent that any such loss or damage shall have arisen from any default or neglect of the Authority.
- 3.1.5 The Contractor shall remedy any and all loss or damage to the Water Project during the Defects Liability Period at the Contractor's cost to the extent that such loss or damage shall have arisen out of the reasons specified in Clause 17.3.
- 3.1.6 The Contractor shall remedy any and all loss or damage to the Sewerage Project during the Operation & Maintenance Period at the Contractor's cost, including those stated in Clause 14.1.2, save and except to the extent that any such loss or damage shall have arisen on account of any default or neglect of the Authority or on account of a Force Majeure Event.
- 3.1.7 The Contractor shall, at its own cost and expense, in addition to and not in derogation of its obligations elsewhere set out in this Agreement:
- (a) make, or cause to be made, necessary applications to the relevant Government Instrumentalities with such particulars and details as may be required for obtaining Applicable Permits set forth in Schedule-F and obtain and keep in force and effect such Applicable Permits in conformity with the Applicable Laws;
 - (b) procure, as required, the appropriate proprietary rights, licenses, agreements and permissions for Materials, methods, processes and systems used or incorporated into the Sewerage Project;
 - (c) make reasonable efforts to maintain harmony and good industrial relations among the personnel employed by it or its Sub-contractors in connection with the performance of its obligations under this Agreement;
 - (d) ensure and procure that its Sub-contractors comply with all Applicable Permits and Applicable Laws in the performance by them of any of the Contractor's obligations under this Agreement;
 - (e) not do or omit to do any act, deed or thing which may in any manner be violative of any of the provisions of this Agreement;
 - (f) support, cooperate with and facilitate the Authority in the implementation and operation of the Project in accordance with the provisions of this Agreement;
 - (g) ensure that the Contractor and its Sub-contractors comply with the safety and welfare measures for labour in accordance with the Applicable Laws and Good Industry Practice;
 - (h) keep, on the Site, a copy of this Agreement, publications named in this

Agreement, the Drawings, Documents relating to the Project, and Change of Scope Orders and other communications given under this Agreement. The Authority's Engineer and its authorised personnel shall have the right of access to all these documents at all reasonable times;

- (i) cooperate with other contractors employed by the Authority and personnel of any public authority; and
- (j) not interfere unnecessarily or improperly with the convenience of the public, or the access to and use and occupation of all roads and footpaths, irrespective of whether they are public or in the possession of the Authority or of others.

3.1.8 The Contractor shall undertake all necessary superintendence to plan, arrange, direct, manage, inspect and test the Works.

3.2 Obligations relating to sub-contracts and any other agreements

3.2.1 **The Contractor shall not sub-contract the construction Works of any major structures i.e. Box Drains.** The contractor shall not sub-contract any works **excluding major structures as out lined above** in more than 50% (fifty per cent) of the Project and shall carry out Works directly under its own supervision and through its own personnel in at least 50% (fifty per cent) of the Project. Provided, however, that in respect of the Works carried out directly by the Contractor, it may enter into contracts for the supply and installation of Materials, Plant, equipment, road furniture, safety devices and labour, as the case may be, for such Works. For the avoidance of doubt, the Parties agree that the Contractor may sub-divide the aforesaid project of 50% (Fifty per cent) of the Project. The Parties further agree that all obligations and liabilities under this Agreement for the entire project shall at all times remain with the Contractor. {The Parties also agree that obligation of the Contractor to carry out Works directly in at least 50% (Fifty per cent) of the total Project shall be discharged solely by the Lead Member.} ^s

3.2.2. In the event any sub-contract for Works, or the aggregate of such sub-contracts with any Sub-contractor, exceeds **5% (five percent)** of the Contract Price, the Contractor shall communicate the name and particulars, including the relevant experience of the sub-contractor, to the Authority prior to entering into any such sub-contract. The Authority shall examine the particulars of the sub-contractor from the national security and public interest perspective and may require the Contractor, no later than 15 (fifteen) business days from the date of receiving the communication from the Contractor, not to proceed with the sub-contract, and the Contractor shall comply therewith.

3.2.3 In the event any sub-contract referred to in Clause 3.2.2 relates to a sub-contractor who has, over the preceding 3 (three) years, not undertaken at least one work of a similar nature with a contract value exceeding 40% (forty per cent) of the value of the sub-contract to be awarded hereunder and received payments in respect thereof for an amount equal to at least such 40% (forty per cent), the Authority may, no later than 15 (fifteen) business days from the date of receiving the communication from the Contractor, require the Contractor not to proceed with such sub-contract, and the Contractor shall comply therewith.

3.2.4 It is expressly agreed that the Contractor shall, at all times, be responsible and

^s May be deleted if the Contractor is not a Consortium.

liable for all its obligations under this Agreement notwithstanding anything contained in the agreements with its Sub-contractors or any other agreement that may be entered into by the Contractor, and no default under any such agreement shall excuse the Contractor from its obligations or liability hereunder.

3.3 Deleted

3.4 Contractor's personnel

3.4.1 The Contractor shall ensure that the personnel engaged by it or by its Sub-contractors in the performance of its obligations under this Agreement are at all times appropriately qualified, skilled and experienced in their respective functions in conformity with Good Industry Practice.

3.4.2 The Authority's Engineer may, for reasons to be specified in writing, direct the Contractor to remove any member of the Contractor's or Sub-contractor's personnel. Provided that any such direction issued by the Authority's Engineer shall specify the reasons for the removal of such person.

3.4.3 The Contractor shall on receiving such a direction from the Authority's Engineer order for the removal of such person or persons with immediate effect. It shall be the duty of the Contractor to ensure that such persons are evicted from the Site within 10 (ten) days of any such direction being issued in pursuance of Clause 3.4.2. The Contractor shall further ensure that such persons have no further connection with the Works or **Operation & Maintenance** under this Agreement. The Contractor shall then appoint (or cause to be appointed) a replacement.

3.5 Advertisement on Sewerage Project

The Sewerage Project or any part thereof shall not be used in any manner to advertise any commercial product or services.

3.6 Contractor's care of the Works

The Contractor shall bear full risk in and take full responsibility for the care of the Works, and of the Materials, goods and equipment for incorporation therein, from the Appointed Date until the date of Provisional Certificate (with respect to the Works completed prior to the issuance of the Provisional Certificate) and/or Completion Certificate (with respect to the Works referred to in the Punch List), save and except to the extent that any such loss or damage shall have arisen from any default or neglect of the Authority.

3.7 Electricity, water and other services

The Contractor shall be responsible for procuring of all power, water and other services that it may require.

3.8 Unforeseeable difficulties

Except as otherwise stated in the Agreement:

- (a) the Contractor accepts complete responsibility for having foreseen all difficulties and costs of successfully completing the Works;
- (b) the Contract Price shall not be adjusted to take account of any unforeseen difficulties or costs; and
- (c) the Scheduled Completion Date shall not be adjusted to take account of any unforeseen difficulties or costs.

ARTICLE 4

OBLIGATIONS OF THE AUTHORITY

4.1 Obligations of the Authority

- 4.1.1 The Authority shall, at its own cost and expense, undertake, comply with and perform all its obligations set out in this Agreement or arising hereunder.
- 4.1.2 The Authority shall be responsible for the correctness of the Scope of the Project, Project Facilities, Specifications and Standards and the criteria for testing of the completed Works.
- 4.1.3 The Authority shall provide to the Contractor:
- (a) upon receiving the Performance Security under Clause 7.1.1, the land/site in accordance with the provisions of Clauses 8.2 and 8.3, within a period of 30 (Thirty) days from the date of this Agreement, on not less than 90% (ninety per cent) of the total land/site requirement for the Sewerage Project;
 - (b) approval of the general arrangement drawings (the “GAD”) from appropriate authorities to enable the Contractor to lay the sewer lines across the railway line / roads on the Sewerage Project in accordance with the Specifications and Standards, and subject to the terms and conditions specified in such approval, within a period of 60 (sixty) days from the Appointed Date, and reimbursement of all the costs and expenses paid by the Contractor to the appropriate authorities for and in respect of the crossing of sewer lines;⁵⁶
 - (c) all environmental clearances as required under Clause 4.3.⁷
- 4.1.4 Delay in providing the land/site or approval of GAD by appropriate authorities, as the case may be, in accordance with the provisions of Clause 4.1.3 shall entitle the Contractor to Damages in a sum calculated in accordance with the provisions of Clause 8.3 of this Agreement and Time Extension in accordance with the provisions of Clause 10.5 of this Agreement. For the avoidance of doubt, the Parties agree that the Damages for delay in approval of GAD by the appropriate authorities for a particular road / railway crossing shall be deemed to be equal to the Damages payable under the provisions of Clause 8.3 for delay in providing Railway / Road crossing clearance for a length of 500 m for each such road / railway crossing.
- 4.1.5 Notwithstanding anything to the contrary contained in this Agreement, the Parties expressly agree that the aggregate Damages payable under Clauses 4.1.4, 8.3 and 9.2 shall not exceed 1% (one per cent) of the Contract Price. For the avoidance of doubt, the Damages payable by the Authority under the aforesaid Clauses shall not be additive if they arise concurrently from more than one cause but relate to the same part of the Sewerage Project.
- Both the parties agree that payment of these Damages shall be full and final settlement of all claims of the Contractor and such compensation shall be the sole remedy against delays of the Authority and both parties further agree this as final cure against delays of the Authority.
- 4.1.6 The Authority agrees to provide support to the Contractor and undertakes to observe, comply with and perform, subject to and in accordance with the provisions of this Agreement and the Applicable Laws, the following:

⁶ Clause (b) may be omitted if the Project does not include a major structure.

⁷ Clause 4.1.3(c) may be suitably modified in the event that all the environmental clearances for the Sewerage Project have been received or are not required. It should be clearly stated that all the environmental clearances for the Sewerage Project have been received; or such environmental clearances for the Sewerage Project are not required.

- (a) upon written request from the Contractor, and subject to the Contractor complying with Applicable Laws, provide reasonable support to the Contractor in procuring Applicable Permits required from any Government Instrumentality for implementation of the Project;
- (b) upon written request from the Contractor, provide reasonable assistance to the Contractor in obtaining access to all necessary infrastructure facilities and utilities, including water and electricity at rates and on terms no less favourable than those generally available to commercial customers receiving substantially equivalent services;
- (c) procure that no barriers that would have a material adverse effect on the works are erected or placed on or about the Sewerage Project by any Government Instrumentality or persons claiming through or under it, except for reasons of Emergency, national security, law and order or collection of inter-state taxes;
- (d) not do or omit to do any act, deed or thing which may in any manner be violative of any of the provisions of this Agreement;
- (e) support, cooperate with and facilitate the Contractor in the implementation of the Project in accordance with the provisions of this Agreement; and
- (f) Deleted.

4.2 Operation & Maintenance obligations prior to the Appointed Date - Deleted

4.3 Environmental Clearances

The Authority represents and warrants that the environmental clearances required **if any** for construction of the Project shall be procured by the Authority prior to the date of issue of LOA. For the avoidance of doubt, the present status of environmental clearances is specified in Schedule-A.⁶

⁶Clause 4.3 may be suitably modified in the event that all the environmental clearances for the Sewerage Project have been received or are not required. It should be clearly stated that all the environmental clearances for the Sewerage Project have been received; or such environmental clearances for the Sewerage Project are not required.

ARTICLE 5
REPRESENTATIONS AND WARRANTIES

5.1 Representations and warranties of the Contractor

The Contractor represents and warrants to the Authority that:

- (a) it is duly organised and validly existing under the laws of Odisha/India, and has full power and authority to execute and perform its obligations under this Agreement and to carry out the transactions contemplated hereby;
- (b) it has taken all necessary corporate and/or other actions under Applicable Laws to authorise the execution and delivery of this Agreement and to validly exercise its rights and perform its obligations under this Agreement;
- (c) this Agreement constitutes its legal, valid and binding obligation, enforceable against it in accordance with the terms hereof, and its obligations under this Agreement will be legally valid, binding and enforceable obligations against it in accordance with the terms hereof;
- (d) it is subject to the laws of Odisha/ India, and hereby expressly and irrevocably waives any immunity in any jurisdiction in respect of this Agreement or matters arising there under including any obligation, liability or responsibility hereunder;
- (e) the information furnished in the Bid and as updated on or before the date of this Agreement is true and accurate in all respects as on the date of this Agreement;
- (f) the execution, delivery and performance of this Agreement will not conflict with, result in the breach of, constitute a default under, or accelerate performance required by any of the terms of its memorandum and articles of association or any Applicable Laws or any covenant, contract, agreement, arrangement, understanding, decree or order to which it is a party or by which it or any of its properties or assets is bound or affected;
- (g) there are no actions, suits, proceedings, or investigations pending or, to its knowledge, threatened against it at law or in equity before any court or before any other judicial, quasi-judicial or other authority, the outcome of which may result in the breach of this Agreement or which individually or in the aggregate may result in any material impairment of its ability to perform any of its obligations under this Agreement;
- (h) it has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any court or any legally binding order of any Government Instrumentality which may result in any material adverse effect on its ability to perform its obligations under this Agreement and no fact or circumstance exists which may give rise to such proceedings that would adversely affect the performance of its obligations under this Agreement;
- (i) it has complied with Applicable Laws in all material respects and has not been subject to any fines, penalties, injunctive relief or any other civil or criminal liabilities which in the aggregate have or may have a material adverse effect on its ability to perform its obligations under this Agreement;
- (j) no representation or warranty by it contained herein or in any other document furnished by it to the Authority or to any Government Instrumentality in relation to Applicable Permits contains or will contain any untrue or misleading statement of material fact or omits or will omit to state a material fact necessary to make such representation or warranty not misleading;

- (k) no sums, in cash or kind, have been paid or will be paid, by it or on its behalf, to any person by way of fees, commission or otherwise for securing the contract or entering into this Agreement or for influencing or attempting to influence any officer or employee of the Authority in connection therewith;
- (l) all information provided by the {selected bidder/ members of the Consortium} in response to the Request for Proposal is to the best of its knowledge and belief, true and accurate in all material respects; and
- (m) nothing contained in this Agreement shall create any contractual relationship or obligation between the Authority and any Sub- contractors, designers, consultants or agents of the Contractor.

5.2 Representations and warranties of the Authority

The Authority represents and warrants to the Contractor that:

- (a) it has full power and authority to execute, deliver and perform its obligations under this Agreement and to carry out the transactions contemplated herein and that it has taken all actions necessary to execute this Agreement, exercise its rights and perform its obligations, under this Agreement;
- (b) It has taken all necessary actions under the Applicable Laws to authorise the execution, delivery and performance of this Agreement;
- (c) It has the financial standing and capacity to perform its obligations under this Agreement;
- (d) This Agreement constitutes a legal, valid and binding obligation enforceable against it in accordance with the terms hereof;
- (e) it has no knowledge of any violation or default with respect to any order, writ, injunction or any decree of any court or any legally binding order of any Government Instrumentality which may result in any material adverse effect on the Authority's ability to perform its obligations under this Agreement;
- (f) It has complied with Applicable Laws in all material respects;
- (g) It has good and valid right to the Site and has the power and authority to grant the clearance in respect thereof to the Contractor; and
- (h) It has procured land / road and environment clearances such that the Contractor can commence construction forthwith on 90% (ninety per cent) of the total land/site requirement for the Sewerage Project.

5.3 Disclosure

In the event that any occurrence or circumstance comes to the attention of either Party that renders any of its aforesaid representations or warranties untrue or incorrect, such Party shall immediately notify the other Party of the same. Such notification shall not have the effect of remedying any breach of the representation or warranty that has been found to be untrue or incorrect nor shall it adversely affect or waive any obligation of either Party under this Agreement.

ARTICLE 6
DISCLAIMER

6.1 Disclaimer

- 6.1.1 The Contractor acknowledges that prior to the execution of this Agreement, the Contractor has, after a complete and careful examination, made an independent evaluation of the Request for Proposal, Scope of the Project, Specifications and Standards of design, construction and Operation & Maintenance, Site, local conditions, physical qualities of ground, subsoil and geology, suitability and availability of access routes to the Site and all information provided by the Authority or obtained, procured or gathered otherwise, and has determined to its satisfaction the accuracy or otherwise thereof and the nature and extent of difficulties, risks and hazards as are likely to arise or may be faced by it in the course of performance of its obligations hereunder. Save as provided in Clause 4.1.2 and Clause 5.2, the Authority makes no representation whatsoever, express, implicit or otherwise, regarding the accuracy, adequacy, correctness, reliability and/or completeness of any assessment, assumptions, statement or information provided by it and the Contractor confirms that it shall have no claim whatsoever against the Authority in this regard.
- 6.1.2 The Contractor acknowledges and hereby accepts to have satisfied itself as to the correctness and sufficiency of the Contract Price.
- 6.1.3 The Contractor acknowledges and hereby accepts the risk of inadequacy, mistake or error in or relating to any of the matters set forth in Clause 6.1.1 above and hereby acknowledges and agrees that the Authority shall not be liable for the same in any manner whatsoever to the Contractor, or any person claiming through or under any of them, and shall not lead to any adjustment of Contract Price or Scheduled Completion Date.
- 6.1.4 The Parties agree that any mistake or error in or relating to any of the matters set forth in Clause 6.1.1 above shall not vitiate this Agreement, or render it voidable.
- 6.1.5 In the event that either Party becomes aware of any mistake or error relating to any of the matters set forth in Clause 6.1.1 above, that Party shall immediately notify the other Party, specifying the mistake or error.
- 6.1.6 Except as otherwise provided in this Agreement, all risks relating to the Project shall be borne by the Contractor; and the Authority shall not be liable in any manner for such risks or the consequences thereof.

Part III
Construction and Operation & maintenance

ARTICLE 7

PERFORMANCE SECURITY

7.1 Performance Security

(i) (A) Within 15 (fifteen) days of receipt of Letter of Acceptance, the selected Bidder shall furnish to the Authority an irrevocable and unconditional guarantee from a Bank in the form set forth in Annex-I of Schedule-G (the “**Performance Security**”) for an amount equal to **5% (five percent)** of its Bid Price (for Construction Cost). In case of bids mentioned below, the Selected Bidder, along with the Performance Security, shall also furnish to the Authority an irrevocable and unconditional guarantee from a Bank in the same form given at Annex-I of Schedule-G towards an Additional Performance Security (the “**Additional Performance Security**”) for an amount calculated as under:

(a) If the Bid Price offered by the Selected Bidder (for Construction Cost) is lower than 10% but up to 20% of the estimated Project Cost, then the Additional Performance Security shall be calculated @20% of the difference in the (i) Estimated Project Cost (as mentioned in RFP)-10% of the Estimated Project Cost and (ii) the Bid Price offered by the selected Bidder.

(b) If the Bid Price offered by the Selected Bidder (for Construction Cost) is lower than 20% of the Estimated Project Cost, then the Additional Performance Security shall be calculated @ 30% of the difference in the (i) Estimated Project Cost (as mentioned in RFP)-10% of the Estimated Project Cost and (ii) the Bid Price offered by the Selected Bidder.

(c) This Additional Performance Security shall be treated as part of the Performance Security.

(B) The Performance Security shall be valid until 60 (sixty) days after the Defects Liability Period. The Additional Performance Security shall be valid until 28 (twenty-eight) days after Project Completion Date.

(ii) The Selected Bidder has the option to provide 50% of the Performance Security and 50% of the Additional Performance Security, if any, within 15 (fifteen) days of receipt of Letter of Acceptance, in any case before signing of the Contract Agreement and the remaining Performance Security and Additional Performance Security, if any, shall be submitted within 30 days of signing of this agreement.

(iii) In the event the Selected Bidder fails to provide the remaining Performance Security and Additional Performance Security, if any, as prescribed herein, it may seek extension of time for a further period up to 60 days by paying the Damages upfront along with the request letter seeking the extension. The Damages shall be the sum calculated at the rate of 0.01% (zero point zero one per cent) of the Bid Price offered by the Selected Bidder for each day until the Performance Security and Additional Performance Security, if any, is provided in full as prescribed herein. The damages at full rate as given above shall be applicable even if a part of the Performance Security and the Additional Performance Security is provided.

(iv) For avoidance of any doubt, in case of failure of submission of Performance Security and Additional Performance Security, if any, within the additional 60 days’ time period, the award shall be deemed to be cancelled/ withdrawn and the Bid Security shall be encashed

and the proceeds there of appropriated by the Authority. Thereupon all rights, privileges, claims and entitlements of the Contractor under or arising out of the Award shall be deemed to have been waived by, and to have ceased with the concurrence of the Contractor, and the Award shall be deemed to have been withdrawn by the Authority

7.1 Extension of Performance Security and Additional Performance Security

The Contractor may initially provide the Performance Security for a period of 2 (two) years; provided that it shall procure the extension of the validity of the Performance Security, as necessary, at least 2 (two) months prior to the date of expiry thereof. Upon the Contractor providing an extended Performance Security, the previous Performance Security shall be deemed to be released and the Authority shall return the same to the Contractor within a period of 7 (seven) business days from the date of submission of the extended Performance Security.

7.2 Appropriation of Performance Security

- (i) Upon occurrence of a Contractor's Default, the Authority shall, without prejudice to its other rights and remedies hereunder or in law, be entitled to encash and appropriate the relevant amounts from the Performance Security as Damages for such Contractor's Default.
- (ii) Upon such encashment and appropriation from the Performance Security, the Contractor shall, within 30 (thirty) days thereof, replenish, in case of partial appropriation, to its original level the Performance Security, and in case of appropriation of the entire Performance Security provide a fresh Performance Security, as the case may be, and the Contractor shall, within the time so granted, replenish or furnish fresh Performance Security as aforesaid failing which the Authority shall be entitled to terminate the Agreement in accordance with Article 23. Upon replenishment or furnishing of a fresh Performance Security, as the case maybe, as aforesaid, the Contractor shall be entitled to an additional Cure Period of 30 (thirty) days for remedying the Contractor's Default, and in the event of the Contractor not curing its default within such Cure Period, the Authority shall be entitled to encash and appropriate such Performance Security as Damages, and to terminate this Agreement in accordance with Article 23.

7.3 Release of Performance Security

- (i) The Authority shall return the Performance Security to the Contractor within 60 (sixty) days of the expiry of the Maintenance Period or the Defects Liability Period, whichever is later, under this Agreement. Notwithstanding the aforesaid, the Parties agree that the Authority shall not be obliged to release the Performance Security until all Defects identified during the Defects Liability Period have been rectified.
- (ii) The Authority shall return the Additional Performance Security to the Contractor within 28 (twenty-eight) days from the date of issue of Completion Certificate under Article 12 of this Agreement.
- (iii) The Authority shall be liable to pay interest @ 9% (nine per cent) per annum for any delay in the return of Performance Security and Additional Performance Security, if any, beyond the period prescribed above for the period of delay.

- 7.3.1 The selected Bidder shall furnish to the Authority an irrevocable and unconditional guarantee from a Bank in the form set forth in Annex-I of Schedule-G (the "**Performance Security**") for an amount equal to **5% (five percent)** of its Bid Price (for O & M Cost) Prior to

commencement of the **O&M period**. The Contractor shall for the performance of its obligations hereunder during the operation & maintenance period, provide to the Authority, on commencement of the **O&M period**, an irrevocable and unconditional guarantee from a Nationalized Bank, counter guaranteed by its branch at Bhubaneswar in the form set forth in Schedule-G (the “**Performance Security for O&M**”) for an amount equal to 10% (ten percent) of the contract price for O&M cost (excluding energy cost). The performance security shall be valid until 60 days after the O&M period of 5 (five) years. The Authority shall return the performance security for O&M within 60 (sixty) days of the expiry of the operation & maintenance period of 5 years. **In case the bid amount for O&M cost is less than the estimated cost by more than 10%**, the successful bidder will deposit additional performance security to the extent of the differential cost of bid amount and 90% of the estimated cost relating to O&M cost in shape of Bank Guarantee in Schedule-G within 10 working days of signing of agreement and the same shall remain valid until 60 days after the O&M period.

7.4 Retention Money¹⁰

- (i) From every payment for Works due to the Contractor in accordance with the provisions of Clause 19.5, the Authority shall deduct 6% (six per cent) thereof as guarantee money for performance of the obligations of the Contractor during the Construction Period (the “**Retention Money**”) subject to the condition that the maximum amount of Retention Money shall not exceed 5% (five per cent) of the Contract Price.
- (ii) Upon occurrence of a Contractor’s Default, the Authority shall, without prejudice to its other right sand remedies here under or in law, been titled to appropriate the relevant amounts from the Retention Money as Damages for such Contractor’s Default.
- (iii) Within 15 (fifteen) days of the date of issue of the Completion Certificate, the Authority shall refund the balance of Retention Money remaining with the Authority after adjusting the amounts appropriated under the provisions of Clause 7.5 (ii).
- (iv) The Parties agree that in the event of Termination of this Agreement, the Retention Money specified in this Clause 7.5 shall be treated as if they are Performance Security and shall be reckoned as such for the purposes of Termination Payment under Clause 23.6.

⁷The Authority may, in its discretion, omit Clause 7.5 and in lieu thereof increase the Performance Security under Clause 7.1 from 7.5% (seven point five per cent) to 10% (ten percent).

ARTICLE 8

SITES FOR THE PROJECT

8.1 The Site

The site of the Sewerage Project (the “Site”) shall comprise the site described in Schedule-A in respect of which the land shall be provided by the Authority to the Contractor. The Authority shall be responsible for:

- (a) acquiring and providing the site in accordance with the alignment finalised by the Authority, free from all encroachments and encumbrances, and free access thereto for the execution of this Agreement; and
- (b) obtaining licenses and permits for environment clearance for the Sewerage Projects if required.

8.2 Procurement of the Site for construction of structures:

8.2.1 The Authority’s Representative and the Contractor shall, within 10 (ten) days of issue of LOA inspect the Site and prepare a memorandum containing an inventory of the Site including the vacant and unencumbered land, buildings, structures, road works, trees and any other immovable property on or attached to the Site. Subject to the provisions of Clause 8.2.3, such memorandum shall have appended thereto an appendix (the “Appendix”) specifying in reasonable detail those parts of the Site to which vacant access and land has not been given to the Contractor. Signing of the memorandum, in two counterparts (each of which shall constitute an original), by the authorised representatives of the Parties shall be deemed to constitute valid evidence of giving the land to the Contractor for discharging its obligations under and in accordance with the provisions of this Agreement and for no other purpose whatsoever.

Whenever the Authority is ready to hand over any part or parts of the Site included in the Appendix, it shall inform the Contractor, by notice, the proposed date and time of such handing over. The Authority Representative and the Contractor shall, on the date so notified, inspect the specified parts of the Site, and prepare a memorandum containing an inventory of the vacant and unencumbered land, buildings, structures, road works, trees and any other immovable property on or attached to the Site so handed over. Signing of the memorandum, in two counterparts (each of which shall constitute an original), by the authorised representatives of the Parties shall be deemed to constitute valid evidence of giving the relevant land to the Contractor.

8.2.2 The Authority shall provide **all land to the Contractor** included in the Appendix by the date specified in **Schedule-A** for those parts of the Site referred to therein, or no later than 90 (ninety) days of the Appointed Date for those parts of the Site which have not been specified in Schedule-A, and in the event of delay for any reason other than Force Majeure or breach of this Agreement by the Contractor, it shall pay to the Contractor, Damages in a sum calculated in accordance with Clause 8.3.

8.2.3 Notwithstanding anything to the contrary contained in this Clause 8.2, the Authority shall specify the parts of the Site, if any, for which land shall be provided to the Contractor on the dates specified in Schedule-A. Such parts shall also be included in the Appendix prepared in pursuance of Clause 8.2.1. For avoidance of doubt, the Parties expressly agree that the Appendix shall in no event contain areas required for the Sewerage Project cumulative area of which exceeds 10% (ten per cent) of the total area of the Sewerage Project.

8.3 Damages for delay in handing over the Site for construction of structures / crossing of sewer line.

8.3.1 In the event any part of the construction Site is not provided by the Authority on or before the date(s) specified in Clause 8.2 for any reason other than Force Majeure or breach of this Agreement by the Contractor, the Authority shall pay Damages to

the Contractor in a sum calculated in accordance with the following formula for and in respect of those parts of the Site which has not been provided:

Amount of Damages shall be paid in a sum calculated at the rate of Rs.5.00 (Rupees Five) per day for every 1000 (One thousand) square meters or part thereof, commencing from the 91st (Ninety first) day of the appointed date and until such site is procured.

In the event that any Damages are due and payable to the Contractor under the provisions of this Clause 8.3.1 for delay in providing the land, the Contractor shall, subject to the provisions of Clause 10.5, be entitled to Time Extension equal to the period for which the Damages have become due and payable under this Clause 8.3.1, save and except that:

- (a) if any delays involve time overlaps, the overlaps shall not be additive; and
- (b) such Time Extension shall be restricted only to the Works which are affected by the delay in providing the land.

For the avoidance of doubt, the Parties expressly agree that the Damages specified hereunder and the Time Extension specified in Clause 10.5 shall be restricted only to failure of the Authority to provide the land for and in respect of the construction of major structures.

8.3.2 Notwithstanding anything to the contrary contained in this Agreement, the Contractor expressly agrees that Works on all parts of the Site for which land is granted within 90 (ninety) days of the Appointed Date, or with respect to the parts of the Site provided in Schedule-A, no later than the date(s) specified therein, as the case may be, shall be completed before the Scheduled Completion Date and shall not qualify for any Time Extension under the provisions of Clause 8.3.1.

8.3.3 **Notwithstanding anything to the contrary contained in this Agreement, the Authority** may at any time withdraw any Works forming part of this Agreement, subject to such Works not exceeding an aggregate value, such value to be determined in accordance with Schedule-H, equal to 10(ten) percent of the Contract Price. Provided that if any Works cannot be undertaken within the municipal limits of a town or within any area falling in a reserved forest or wildlife sanctuary, as the case may be, because the requisite clearances or approvals for commencing construction of Works therein have not been given within 240 (two hundred and forty) days of the Appointed date, the affected Works shall be deemed to be withdrawn under the provisions of this Clause 8.3.3 unless the Parties agree to the contrary, and such Works shall not be computed for the purposes of the aforesaid ceiling of 10% (ten per cent) hereunder.

8.3.4 **In the event of withdrawal of Works under Clause 8.3.3**, the Contract Price shall be reduced by an amount equal to 90 (ninety) per cent of the value of the Works withdrawn and the Contractor shall not be entitled to any other compensation or Damages for the withdrawal of Works.

Provided that if any Works are withdrawn after commencement of the Construction of such works, the Authority shall pay to the Contractor 110% (one hundred and ten per cent) of the fair value of the work done, as assessed by the Authority's Engineer:

8.4 Site to be free from Encumbrances

Subject to the provisions of Clause 8.2, the Site shall be made available by the Authority to the Contractor pursuant hereto free from all Encumbrances and occupations and without the Contractor being required to make any payment to the Authority on account of any costs, compensation, expenses and charges for the acquisition and use of such Site for the duration of the Project Completion Schedule. For the avoidance of doubt, it is agreed that the existing rights of way, easements, privileges, liberties and appurtenances to the Site shall not be deemed to be Encumbrances. It is further agreed that, unless otherwise specified in this Agreement, the Contractor accepts and undertakes to bear any and all risks arising out of the inadequacy or physical condition of the Site.

8.5 Protection of Site from encroachments

On and after signing the memorandum and/or subsequent memorandum referred to in Clause 8.2.1, and until the issue of the Completion Certificate, the Contractor shall maintain a round-the-clock vigil over the Site and shall ensure and procure that no encroachment thereon takes place. During the Construction Period, the Contractor shall protect the Site from any and all occupations, encroachments or Encumbrances, and shall not place or create nor permit any Sub-contractor or other person claiming through or under the Agreement to place or create any Encumbrance or security threat over all or any part of the Site or the Project Assets, or on any rights of the Contractor therein or under this Agreement, save and except as otherwise expressly set forth in this Agreement. In the event of any encroachment or occupation on any part of the Site, the Contractor shall report such encroachment or occupation forthwith to the Authority and undertake its removal at its own cost and expenses.

8.6 Special/temporary land

The Contractor shall bear all costs and charges for any special or temporary land required by it in connection with access to the Site. The Contractor shall obtain at its cost such facilities on or outside the Site as may be required by it for the purposes of the Sewerage Project and the performance of its obligations under this Agreement.

8.7 Access to the Authority and the Authority's Engineer

8.7.1 The land given to the Contractor hereunder shall always be subject to the right of access of the Authority and the Authority's Engineer and their employees and agents for inspection, viewing and exercise of their rights and performance of their obligations under this Agreement.

8.7.2 The Contractor shall ensure, subject to all relevant safety procedures, that the Authority has un-restricted access to the Site during any emergency situation, as decided by the Authority's Engineer.

8.8 Geological and archaeological finds

It is expressly agreed that mining, geological or archaeological rights do not form part of this Agreement with the Contractor for the Works, and the Contractor hereby acknowledges that it shall not have any mining rights or interest in the underlying minerals, fossils, antiquities, structures or other remnants or things either of particular geological or archaeological interest and that such rights, interest and property on or under the Site shall vest in and belong to the Authority or the concerned Government Instrumentality. The Contractor shall take all reasonable precautions to prevent its workmen or any other person from removing or damaging such interest or property and shall inform the Authority forthwith of the discovery thereof and comply with such instructions as the concerned Government Instrumentality may reasonably give for the removal of such property. For the avoidance of doubt, it is agreed that any reasonable expenses incurred by the Contractor hereunder shall be reimbursed by the Authority. It is also agreed that the Authority shall procure that the instructions hereunder are issued by the concerned Government Instrumentality within a reasonable period.

ARTICLE 9

UTILITIES AND TREES

9.1 Existing utilities and roads

Notwithstanding anything to the contrary contained herein, the Contractor shall ensure that the respective entities owning the existing roads, land, level crossings, structures, or utilities on, under or above the Site are enabled by it to keep them in continuous satisfactory use, if necessary, by providing suitable temporary diversions with the authority of the controlling body of that road, land or utility.

9.2 Shifting of obstructing utilities

The Contractor shall, in accordance with Applicable Laws and with assistance of the Authority, cause shifting of any utility (including electric lines, water pipes and telephone cables) to an appropriate location or alignment, if such utility or obstruction adversely affects the execution of the Works or Operation & Maintenance of the Box Drainage Project in accordance with this Agreement. The actual cost of such shifting, as approved and communicated by the entity owning the utility, shall be paid by the Contractor and reimbursed by the Authority to the Contractor on certification by the entity owning such utility that the work has been satisfactorily executed by the Contractor. In the event of any delay in such shifting by the entity owning the utility beyond a period of 180 (one hundred and eighty) days from the date of notice by the Contractor to the entity owning the utility and to the Authority, the Contractor shall be entitled to Damages in a sum calculated in accordance with the formula specified in Clause 8.3.1 for the period of delay, and to Time Extension in accordance with Clause 10.5 for and in respect of the part(s) of the Works affected by such delay; provided that if the delays involve any time overlaps, the overlaps shall not be additive.

9.3 New utilities

9.3.1 The contractor Should give the GPS Location with photograph of before Dismantling and after reinstatement of Municipality Drains of each location where it will be executed.

9.3.2 The contractor Should give the GPS Location with photograph of before Dismantling and after reinstatement of Water pipe line of each location where it will be executed. No patch work will be allowed only complete work should be done.

9.3.3 Deleted.

9.3.4 Deleted.

9.4 Felling of trees

The Authority shall assist the Contractor in obtaining the Applicable Permits for felling of trees to be identified by the Authority for this purpose if and only if such trees cause a Material Adverse Effect on the construction or operation & maintenance of the Sewerage Project. The cost of such felling shall be borne by the Authority and in the event of any delay in felling thereof for reasons beyond the control of the Contractor; it shall be excused for failure to perform any of its obligations hereunder if such failure is a direct consequence of delay in the felling of trees. The Parties hereto agree that the felled trees shall be deemed to be owned by the Authority and shall be disposed in such manner and subject to such conditions as the Authority may in its sole discretion deem appropriate. For the avoidance of doubt, the Parties agree that if any felling of trees hereunder is in a forest area, the Applicable Permit thereof shall be procured by the Authority within the time specified in the Agreement.

ARTICLE 10

DESIGN AND CONSTRUCTION OF THE BOX DRAIN PROJECT

10.1 Obligations prior to commencement of Works

- 10.1.1 Within 20 (twenty) days of the Appointed Date, the Contractor shall:
- (a) appoint its representative, duly authorised to deal with the Authority in respect of all matters under or arising out of or relating to this Agreement;
 - (b) appoint a design director (the “**Design Director**”) who will head the Contractor’s design unit and shall be responsible for surveys, investigations, collection of data, and preparation of preliminary and detailed designs;
 - (c) undertake and perform all such acts, deeds and things as may be necessary or required before commencement of Works under and in accordance with this Agreement, the Applicable Laws and Applicable Permits; and
 - (d) make its own arrangements for quarrying of materials needed for the Sewerage Project under and in accordance with the Applicable Laws and Applicable Permits.
- 10.1.2 The Authority shall, within 15 (fifteen) days of the date of this Agreement, appoint an engineer (the “**Authority’s Engineer**”) to discharge the functions and duties specified in this Agreement, and shall notify to the Contractor the name, address and the date of appointment of the Authority’s Engineer forthwith.
- 10.1.3 Within 30 (thirty) days of the Appointed Date, the Contractor shall submit to the Authority and the Authority’s Engineer a programme (the “**Programme**”) for the Works, developed using networking techniques giving the following details:
- Part I Contractor’s organisation for the Project, the general methods and arrangements for design and construction, environmental management plan, Quality Assurance Plan including design quality plan and safety plan covering safety of users and workers during construction, Contractor’s key personnel and equipment.
- Part II Programme for completion of all stages of construction given in Schedule-H and Project Milestones of the Works as specified in Project Completion Schedule set forth in Schedule-J. The Programme shall include:
- (a) the order in which the Contractor intends to carry out the Works, including the anticipated timing of design and stages of Works;
 - (b) the periods for reviews under Clause 10.2;
 - (c) the sequence and timing of inspections and tests specified in this Agreement. The Contractor shall submit a revised programme whenever the previous programme is inconsistent with the actual progress or with the Contractor’s obligations.
- 10.1.4 The Contractor shall compute, on the basis of the Drawings prepared in accordance with Clause 10.2.4, and provide to the Authority’s Engineer, the length, area and numbers, as the case may be, in respect of the various items of work specified in Schedule-H and comprising the Scope of the Project. The Parties expressly agree that these details shall form the basis for estimating the interim payments for the Works in accordance with the provisions of Clause 19.3. For the avoidance of doubt, the sum of payments to be computed in respect of all the items of work shall not exceed the Contract Price, as may be adjusted in accordance with the provisions of this Agreement.
- 10.1.5 The Contractor shall appoint a safety consultant (the “**Safety Consultant**”) to carry out safety audit at the design / construction stage of the Sewerage Project in accordance with the Applicable Laws and Good Industry Practice.

10.1.6 The safety audit pursuant to Clause 10.1.5 shall be carried out by the Safety Consultant in respect of all such design details that have a bearing on safety of Users involved in or associated with accidents. The recommendations of the Safety Consultant shall be incorporated in the design of the Sewerage Project and the Contractor shall forward to the Authority's Engineer a certificate to this effect together with the recommendations of the Safety Consultant. In the event that any works required by the Safety Consultant shall fall beyond the scope of Schedule-B, Schedule-C or Schedule-D, the Contractor shall make a report thereon and seek the instructions of the Authority for Change in Scope. For the avoidance of doubt, the Safety Consultant to be engaged by the Contractor shall be independent of the design and implementation team of the Contractor.

10.2 Design and Drawings

10.2.1 Design and Drawings shall be developed in conformity with the Specifications and Standards set forth in Schedule-D. In the event, the Contractor requires any relaxation in design standards due to restricted area in any section, the alternative design criteria for such section shall be provided for review of the Authority's Engineer.

10.2.2 The Contractor shall appoint a proof check consultant (the "**Proof Consultant**") after proposing to the Authority a panel of three names of qualified and experienced firms from whom the Authority may choose one to be the Proof Consultant.

10.2.3 The Proof Consultant shall:

- (a) evolve a systems approach with the Design Director so as to minimise the time required for final designs and construction drawings; and
- (b) proof check the detailed calculations, drawings and designs, which have been approved by the Design Director.

10.2.4 In respect of the Contractor's obligations with respect to the design and Drawings of the Sewerage Project as set forth in Schedule-I, the following shall apply:

- (a) The Contractor shall prepare and submit, with reasonable promptness and in such sequence as is consistent with the Project Completion Schedule, three copies each of the design and Drawings, duly certified by the Proof Consultant, to the Authority's Engineer for review. Provided, however, that in respect of Major Structures, the Authority's Engineer may require additional drawings for its review in accordance with Good Industry Practice.
- (b) by submitting the Drawings for review to the Authority's Engineer, the Contractor shall be deemed to have represented that it has determined and verified that the design and engineering, including field construction criteria related thereto, are in conformity with the Scope of the Project, the Specifications and Standards and the Applicable Laws;
- (c) within 15 (fifteen) days of the receipt of the Drawings, the Authority's Engineer shall review the same and convey its observations to the Contractor with particular reference to their conformity or otherwise with the Scope of the Project and the Specifications and Standards. The Contractor shall not be obliged to await the observations of the Authority's Engineer on the Drawings submitted pursuant hereto beyond the said period of 15 (fifteen) days and may begin or continue Works at its own discretion and risk; Provided, however that in case of a Major Structure, the aforesaid period of 15 (fifteen) days may be extended up to 30 (thirty) days;
- (d) if the aforesaid observations of the Authority's Engineer indicate that the Drawings are not in conformity with the Scope of the Project or the Specifications and Standards, such Drawings shall be revised by the

Contractor in conformity with the provisions of this Agreement and resubmitted to the Authority's Engineer for review. The Authority's Engineer shall give its observations, if any, within 10 (ten) days of receipt of the revised Drawings. In the event the Contractor fails to revise and resubmit such Drawings to the Authority's Engineer for review as aforesaid, the Authority's Engineer may withhold the payment for the affected works in accordance with the provisions of Clause 19.5.4. If the Contractor disputes any decision, direction or determination of the Authority's Engineer hereunder, the Dispute shall be resolved in accordance with the Dispute Resolution Procedure;

- (e) no review and/or observation of the Authority's Engineer and/or its failure to review and/or convey its observations on any Drawings shall relieve the Contractor of its obligations and liabilities under this Agreement in any manner nor shall the Authority's Engineer or the Authority be liable for the same in any manner; and if errors, omissions, ambiguities, inconsistencies, inadequacies or other Defects are found in the Drawings, they and the construction works shall be corrected at the Contractor's cost, notwithstanding any review under this Article 10;
- (f) the Contractor shall be responsible for delays in submitting the Drawing as set forth in Schedule-I caused by reason of delays in surveys and field investigations, and shall not be entitled to seek any relief in that regard from the Authority; and
- (g) the Contractor warrants that its designers, including any third parties engaged by it, shall have the required experience and capability in accordance with Good Industry Practice and it shall indemnify the Authority against any damage, expense, liability, loss or claim, which the Authority might incur, sustain or be subject to arising from any breach of the Contractor's design responsibility and/or warranty set out in this Clause.

10.2.5 Any cost or delay in construction arising from review by the Authority's Engineer shall be borne by the Contractor.

10.2.6 Works shall be executed in accordance with the Drawings provided by the Contractor in accordance with the provisions of this Clause 10.2 and the observations of the Authority's Engineer thereon as communicated pursuant to the provisions of Clause 10.2.4 (d). Such Drawings shall not be amended or altered without prior written notice to the Authority's Engineer. If a Party becomes aware of an error or defect of a technical nature in the design or Drawings, that Party shall promptly give notice to the other Party of such error or defect.

10.2.7 Within 90 (ninety) days of the Project Completion Date, the Contractor shall furnish to the Authority and the Authority's Engineer a complete set of as-built Drawings, in 2 (two) hard copies and in micro film form or in such other mediums as may be acceptable to the Authority, reflecting the Sewerage Project as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Sewerage Project and setback lines, if any, of the buildings and structures forming part of Project Facilities.

10.3 Construction of the Box Drain Project

10.3.1 The Contractor shall construct the Sewerage Project as specified in Schedule-B and Schedule-C, and in conformity with the Specifications and Standards set forth in Schedule-D. The Contractor shall be responsible for the correct positioning of all parts of the Works, and shall rectify any error in the positions, levels, dimensions or alignment of the Works. The [as per the stipulated period of completion) *day from the Appointed Date shall be the scheduled completion date (the "**Scheduled**

Completion Date”) and the Contractor agrees and undertakes that the construction shall be completed on or before the Scheduled Completion Date, including any extension thereof.

* Period of completion.

10.3.2 The Contractor shall construct the Sewerage Project in accordance with the Project Completion Schedule set forth in Schedule-J. In the event that the Contractor fails to achieve any Project Milestone or the Scheduled Completion Date within a period of 30 (thirty) days from the date set forth in Schedule-J, unless such failure has occurred due to Force Majeure or for reasons solely attributable to the Authority, it shall pay Damages to the Authority of a sum calculated at the rate of **0.05% (zero point zero five percent)** of the Contract Price for delay of each day reckoned from the date specified in Schedule –J and until such Project Milestone is achieved or the Works are completed; provided that if the period for any or all Project Milestones or the Scheduled Completion Date is extended in accordance with the provisions of this Agreement, the dates set forth in Schedule-J shall be deemed to be modified accordingly and the provisions of this Agreement shall apply as if Schedule-J has been amended as above; provided further that in the event the Works are completed within or before the Scheduled Completion Date including any Time Extension, applicable for that work or section, the Damages paid under this Clause 10.3.2 shall be refunded by the Authority to the Contractor, but without any interest thereon. For the avoidance of doubt, it is agreed that recovery of Damages under this Clause 10.3.2 shall be without prejudice to the rights of the Authority under this Agreement including the right of Termination thereof. The Parties further agree that Time Extension hereunder shall only be reckoned for and in respect of the affected works as specified in Clause 10.5.2.

10.3.3 The Authority shall notify the Contractor of its decision to impose Damages in pursuance with the provisions of this Clause 10.3. provided that no deduction on account of Damages shall be effected by the Authority without notifying the Contractor of its decision to impose the Damages, and taking into consideration the representation, if any, made by the Contractor within 20 (twenty) days of such notice. The Parties expressly agree that the total amount of Damages under Clause 10.3.2 **shall not exceed 10% (ten percent) of the Contract Price.**

10.4 Deleted.

10.5 Extension of time for completion

10.5.1 Without prejudice to any other provision of this Agreement for and in respect of extension of time, the Contractor shall be entitled to extension of time in the Project Completion Schedule (the “**Time Extension**”) to the extent that completion of any Project Milestone is or will be delayed by any of the following, namely:

- (a) delay in providing the land and clearances or approval of appropriate authorities, specified in Clause 4.1.4;
- (b) Change of Scope (unless an adjustment to the Scheduled Completion Date has been agreed under Article 13);
- (c) occurrence of a Force Majeure Event;
- (d) any delay, impediment or prevention caused by or attributable to the Authority, the Authority's personnel or the Authority's other contractors on the Site; and
- (e) any other cause or delay which entitles the Contractor to Time Extension in accordance with the provisions of this Agreement.

10.5.2 The Contractor shall, no later than 15 (fifteen) business days from the occurrence of an event or circumstance specified in Clause 10.5.1, inform the Authority’s Engineer by notice in writing (in the prescribed format of Government of Odisha), with a copy to the Authority, stating in reasonable detail with supporting particulars, the event or

circumstances giving rise to the claim for Time Extension in accordance with the provisions of this Agreement. Provided that the period of 15 (fifteen) business days shall be calculated from the date on which the Contractor became aware, or should have become aware, of the occurrence of such an event or circumstance.

Provided further that notwithstanding anything to the contrary contained in this Agreement, Time Extension shall be due and applicable only for the Works which are affected by the aforesaid events or circumstances and shall not in any manner affect the Project Completion Schedule for and in respect of the Works which are not affected hereunder.

10.5.3 In the event of the failure of the Contractor to issue to the Authority's Engineer a notice in accordance with the provisions of Clause 10.5.2 within the time specified therein, the Contractor shall not be entitled to any Time Extension and shall forfeit its right for any such claims in future. For the avoidance of doubt, in the event of failure of the Contractor to issue notice as specified in this clause 10.5.3, the Authority shall be discharged from all liability in connection with the claim.

10.5.4 The Authority's Engineer shall, on receipt of the claim in accordance with the provisions of Clause 10.5.2, examine the claim expeditiously within the time frame specified herein. In the event the Authority's Engineer requires any clarifications to examine the claim, the Authority's Engineer shall seek the same within 15 (fifteen) days from the date of receiving the claim. The Contractor shall, on receipt of the communication of the Authority's Engineer requesting for clarification, furnish the same to the Authority's Engineer within 10 (ten) days thereof. The Authority's Engineer shall, within a period of 60 (sixty) days from the date of receipt of such clarifications, forward in writing to the Contractor its determination of Time Extension.

Provided that when determining each extension of time under this Clause 10.5, the Authority's Engineer shall review previous determinations and may increase, but shall not decrease, the total Time Extension.

10.5.5 If the event or circumstance giving rise to the notice has a continuing effect:

- (a) a fully detailed claim shall be considered as interim;
- (b) the Contractor shall, no later than 10 (ten) days after the close of each month, send further interim claims specifying the accumulated delay, the extension of time claimed, and such further particulars as the Authority's Engineer may reasonably require; and
- (c) the Contractor shall send a final claim within 30 (thirty) days after the effect of the event or the circumstance ceases.

Upon receipt of the claim hereunder, the Authority's Engineer shall examine the same in accordance with the provisions of Clause 10.5.4 within a period of 60 (sixty) days of the receipt thereof.

10.6 Incomplete Works

In the event the Contractor fails to complete the Works in accordance with the Project Completion Schedule, including any Time Extension granted under this Agreement, the Contractor shall endeavour to complete the balance work expeditiously and shall pay Damages to the Authority in accordance with the provisions of Clause 10.3.2 for delay of each day until the Works are completed in accordance with the provisions of this Agreement. Recovery of Damages under this Clause shall be without prejudice to the rights of the Authority under this Agreement including the right to termination under Clause 23.1.

10.7 Operation & Maintenance Manual

No later than 60 (sixty) days prior to the Project Completion Date, the Contractor shall, in consultation with the Authority's Engineer, evolve a operation & maintenance manual (the "**Operation & Maintenance Manual**") for the regular and preventive operation & maintenance of the Sewerage Project in conformity with the Specifications and Standards, safety requirements and Good Industry Practice, and shall provide 5 (five) copies thereof to the Authority's Engineer. The Authority's Engineer shall review the Operation & Maintenance Manual within 15 (fifteen) days of its receipt and communicate its comments to the Contractor for necessary modifications, if any.

ARTICLE 11

QUALITY ASSURANCE, MONITORING AND SUPERVISION

11.1 Quality of Materials and workmanship

The Contractor shall ensure that the Construction, Materials and workmanship are in accordance with the requirements specified in this Agreement, Specifications and Standards and Good Industry Practice.

11.2 Quality control system

11.2.1 The Contractor shall establish a quality control mechanism to ensure compliance with the provisions of this Agreement (the “Quality Assurance Plan” or “QAP”).

11.2.2 The Contractor shall, within 30 (thirty) days of the Appointed Date, submit to the Authority’s Engineer its Quality Assurance Plan which shall include the following:

(a) organisation, duties and responsibilities, procedures, inspections and documentation;

(b) quality control mechanism including sampling and testing of Materials, test frequencies, standards, acceptance criteria, testing facilities, reporting, recording and interpretation of test results, approvals, check list for site activities, and proforma for testing and calibration in accordance with the Specifications for Sewerage and Sewage Treatment Works issued by CPHEEO & relevant IS specifications and Good Industry Practice; and internal quality audit system.

c). The Authority’s Engineer shall convey its comments to the Contractor within a period of 21 (twenty-one) days of receipt of the QAP stating the modifications, if any, required, and the Contractor shall incorporate those in the QAP to the extent required for conforming with the provisions of this Clause 11.2.

11.2.3 The Contractor shall procure all documents, apparatus and instruments, fuel, consumables, water, electricity, labour, Materials, samples, and qualified personnel as are necessary for examining and testing the Project Assets and workmanship in accordance with the Quality Assurance Plan.

11.2.4 The cost of testing of Construction, Materials and workmanship under this Article 11 shall be borne by the Contractor.

11.3. Methodology

The Contractor shall, at least 15 (fifteen) days prior to the commencement of the construction, submit to the Authority’s Engineer for review the methodology proposed to be adopted for executing the Works, giving details of equipment to be deployed, traffic management and measures for ensuring safety. The Authority’s Engineer shall complete the review and convey its comments to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor.

11.4. Inspection and technical audit by the Authority

The Authority or any representative authorised by the Authority in this behalf may inspect and review the progress and quality of the construction of Sewerage Project and issue appropriate directions to the Authority’s Engineer and the Contractor for taking remedial action in the event the Works are not in accordance with the provisions of this Agreement.

11.5 External technical audit

At any time during construction, the Authority may appoint an external technical auditor to conduct an audit of the quality of the Works. The findings of the audit, to the extent accepted by the Authority, shall be notified to the Contractor and the Authority’s Engineer for taking remedial action in accordance with this Agreement. The Contractor shall provide all assistance as may be required by the auditor in the conduct of its audit hereunder. Notwithstanding anything contained in this Clause 11.5, the external technical audit shall not affect any obligations of

the Contractor or the Authority's Engineer under this Agreement.

11.6 Inspection of construction records

The Authority shall have the right to inspect the records of the Contractor relating to the Works.

11.7 Monthly progress reports

During the Construction Period, the Contractor shall, no later than 10 (ten) days after the close of each month, furnish to the Authority and the Authority's Engineer a monthly report on progress of the Works and shall promptly give such other relevant information as may be required by the Authority's Engineer.

11.8 Inspection

11.8.1 The Authority's Engineer and its authorized representative shall at all reasonable times:

- (a) have full access to all parts of the Site and to all places from which natural Materials are being obtained for use in the Works; and
- (b) during production, manufacture and construction at the Site and at the place of production, be entitled to examine, inspect, measure and test the Materials and workmanship, and to check the progress of manufacture of Materials.

11.8.2 The Contractor shall give the Authority's Engineer and its authorized agents access, facilities and safety equipment for carrying out their obligations under this Agreement.

11.8.3 The Authority's Engineer shall submit a monthly inspection report (the "**Inspection Report**") to the Authority and the Contractor bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. For the avoidance of doubt, such inspection or submission of Inspection Report by the Authority's Engineer shall not relieve or absolve the Contractor of its obligations and liabilities under this Agreement in any manner whatsoever.

11.9 Samples

The Contractor shall submit the following samples of Materials and relevant information to the Authority's Engineer for pre-construction review:

- (a) manufacturer's test reports and standard samples of manufactured Materials; and
- (b) samples of such other Materials as the Authority's Engineer may require.

11.10 Tests

11.10.1 For determining that the Works conform to the Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out or cause to be carried out tests, at such time and frequency and in such manner as specified in this Agreement, and in accordance with Good Industry Practice for quality assurance. The test checks by the Authority's Engineer shall comprise at least 20 (twenty) percent of the quantity or number of tests prescribed for each category or type of test for quality control by the Contractor.

11.10.2 In the event that results of any tests conducted under this Clause 11.10 establish any Defects or deficiencies in the Works, the Contractor shall carry out remedial measures and furnish a report to the Authority's Engineer in this behalf. The Authority's Engineer shall require the Contractor to carry out or cause to be carried out tests to determine that such remedial measures have brought the Works into compliance with the Specifications and Standards, and the procedure shall be repeated until such Works conform to the Specifications and Standards. For the avoidance of doubt, the cost of such tests and remedial measures in pursuance thereof shall be solely borne by the Contractor.

11.11 Examination of work before covering up

In respect of the work which the Authority's Engineer is entitled to examine, inspect, measure and/or test before it is covered up or put out of view or any part of the work is placed thereon, the Contractor shall give notice to the Authority's Engineer whenever any such work is ready and before it is covered up. The Authority's Engineer shall then either carry out the examination, inspection or testing without unreasonable delay, or promptly give notice to the Contractor that the Authority's Engineer does not require to do so. Provided, however, that if any work is of a continuous nature where it is not possible or prudent to keep it uncovered or incomplete, the Contractor shall notify the schedule of carrying out such work to give sufficient opportunity, not being less than 3 (three) business days' notice, to the Authority's Engineer to conduct its inspection, measurement or test while the work is continuing. Provided further that in the event the Contractor receives no response from the Authority's Engineer within a period of 3 (three) business days from the date on which the Contractor's notice hereunder is delivered to the Authority's Engineer, the Contractor shall be entitled to assume that the Authority's Engineer would not undertake the said inspection.

11.12 Rejection

If, as a result of an examination, inspection, measurement or testing, any Plant, Materials, design or workmanship is found to be defective or otherwise not in accordance with the provisions of this Agreement, the Authority's Engineer shall reject the Plant, Materials, design or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the Defect and ensure that the rejected item complies with the requirements of this Agreement.

If the Authority's Engineer requires the Plant, Materials, design or workmanship to be retested, the tests shall be repeated under the same terms and conditions, as applicable in each case. If the rejection and retesting cause the Authority to incur any additional costs, such cost shall be recoverable by the Authority from the Contractor; and may be deducted by the Authority from any monies due to be paid to the Contractor.

11.13 Remedial work

11.13.1 Notwithstanding any previous test or certification, the Authority's Engineer may instruct the Contractor to:

- (a) remove from the Site and replace any Plant or Materials which are not in accordance with the provisions of this Agreement;
- (b) remove and re-execute any work which is not in accordance with the provisions of this Agreement and the Specification and Standards; &
- (c) execute any work which is urgently required for the safety of the Sewerage Project, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work required on account of a Force Majeure Event, the provisions of Clause 21.6 shall apply.

11.13.2 If the Contractor fails to comply with the instructions issued by the Authority's Engineer under Clause 11.13.1, within the time specified in the Authority's Engineer's notice or as mutually agreed, the Authority's Engineer may advise the Authority to have the work executed by another agency. The cost so incurred by the Authority for undertaking such work shall, without prejudice to the rights of the Authority to recover damages in accordance with the provisions of this Agreement, be recoverable from the Contractor and may be deducted by the Authority from any monies due to be paid to the Contractor.

11.14 Delays during construction

Without prejudice to the provisions of Clause 10.3.2, in the event the Contractor does not achieve any of the Project Milestones or the Authority's Engineer shall have reasonably determined that the rate of progress of Works is such that Completion of the Sewerage Project is not likely to be achieved by the end of the Scheduled Completion Date, it shall notify the same to the Contractor, and the Contractor shall, within 15 (fifteen) days of such notice, by a communication inform the Authority's Engineer in reasonable detail about the steps it proposes to take to expedite progress and the period within which it shall achieve the Project Completion Date.

11.15 Quality control records and Documents

The Contractor shall hand over to the Authority's Engineer a copy of all its quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.2.

11.16 Video recording

During the Construction Period, the Contractor shall provide to the Authority for every calendar quarter, a video recording, which will be compiled into a 3 (three)- hour compact disc or digital video disc, as the case may be, covering the status and progress of Works in that quarter. The video recording shall be provided to the Authority no later than 15 (fifteen) days after the close of each quarter after the Appointed Date.

11.17 Suspension of unsafe Construction Works

- 11.17.1 Upon recommendation of the Authority's Engineer to this effect, the Authority may by notice require the Contractor to suspend forthwith the whole or any part of the Works if, in the reasonable opinion of the Authority's Engineer, such work threatens the safety of the Users.
- 11.17.2 The Contractor shall, pursuant to the notice under Clause 11.17.1, suspend the Works or any part thereof for such time and in such manner as may be specified by the Authority and thereupon carry out remedial measures to secure the safety of suspended works & the Users. The Contractor may by notice require the Authority's Engineer to inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the suspension hereunder may be revoked. Upon receiving the recommendations of the Authority's Engineer, the Authority shall either revoke such suspension or instruct the Contractor to carry out such other and further remedial measures as may be necessary in the reasonable opinion of the Authority, and the procedure set forth in this Clause 11.17 shall be repeated until the suspension hereunder is revoked.
- 11.17.3 Subject to the provisions of Clause 21.6, all reasonable costs incurred for maintaining and protecting the Works or part thereof during the period of suspension (the "**Preservation Costs**"), shall be borne by the Contractor; provided that if the suspension has occurred as a result of any breach of this Agreement by the Authority, the Preservation Costs shall be borne by the Authority.
- 11.17.4 If suspension of Works is for reasons not attributable to the Contractor, the Authority's Engineer shall determine any Time Extension to which the Contractor is reasonably entitled.

ARTICLE 12

COMPLETION CERTIFICATE

12.1 Tests on completion

- 12.1.1 At least 30 (thirty) days prior to the likely completion of the Sewerage Project, or a Section thereof, the Contractor shall notify the Authority's Engineer of its intent to subject the Sewerage Project or a Section thereof, to Tests. The date and time of each of the Tests shall be determined by the Authority's Engineer in consultation with the Contractor, and notified to the Authority who may designate its representative to witness the Tests. The Contractor shall either conduct the Tests as directed by the Authority's Engineer or provide such assistance as the Authority's Engineer may reasonably require for conducting the Tests. In the event of the Contractor and the Authority's Engineer failing to mutually agree on the dates for conducting the Tests, the Contractor shall fix the dates by giving not less than 10 (ten) days' notice to the Authority's Engineer.
- 12.1.2 All Tests shall be conducted in accordance with Schedule-K. The Authority's Engineer shall either conduct or observe, monitor and review the Tests conducted by the Contractor, as the case may be, and review the results of the Tests to determine compliance of the Sewerage Project or a Section thereof, with Specifications and Standards and if it is reasonably anticipated or determined by the Authority's Engineer during the course of any Test that the performance of the Sewerage Project or any part thereof, does not meet the Specifications and Standards, it shall have the right to suspend or delay such Test and require the Contractor to remedy and rectify the Defect or deficiencies. Upon completion of each Test, the Authority's Engineer shall provide to the Contractor and the Authority copies of all Test data including detailed Test results. For the avoidance of doubt, it is expressly agreed that the Authority's Engineer may require the Contractor to carry out or cause to be carried out additional Tests, in accordance with Good Industry Practice, for determining the compliance of the Sewerage Project or Section thereof with the Specifications and Standards.

12.2 Provisional Certificate

- 12.2.1 Subject to the provisions of Clause 12.2.5, upon completion of all Works forming part of the Sewerage Project, save and except the Works for which Time Extension has been granted under Clause 10.5, the Authority's Engineer shall, at the request of the Contractor, issue a provisional certificate of completion substantially in the form set forth in Schedule-L (the "**Provisional Certificate**") if the Tests for and in respect of the completed Works are successful. The Provisional Certificate shall have appended thereto a list of outstanding items of work (the "**Punch List**") that need to be completed in accordance with the provisions of this Agreement. The Contractor undertakes to complete the minor outstanding items of works in respect of those Sections of the Sewerage Project for which the Provisional Certificate has been issued, within a period of 30 (thirty) days of the date of Provisional Certificate, and those parts of the Works in respect of which Time Extension has been granted, within the extended period thereof. For the avoidance of doubt, the Parties agree that the Punch List shall include all Works for which Time Extension has been granted and shall also include any minor outstanding items of work forming part of the completed Sections if such works do not materially affect the use of the completed Sections for their intended purpose. The Parties further agree that Provisional Certificate shall not be issued if the completed Works cannot be safely and reliably placed in service of the Users thereof.

- 12.2.2 Upon issue of Provisional Certificate, the provisions of Articles 14 and 17 shall apply to the completed parts of the Sewerage Project and the property and ownership of all such completed Works shall vest in the Authority.
- 12.2.3 If the Authority's Engineer determines that the Sewerage Projector any completed part thereof does not conform to the provisions of this Agreement and cannot be safely and reliably placed in operation, it shall forthwith make a report in this behalf and send copies thereof to the Authority and the Contractor and withhold issuance of the Provisional Certificate until the Defects or deficiencies are rectified by the Contractor and Tests are successful in accordance with this Article 12.
- 12.2.4 Notwithstanding anything to the contrary contained in Clause 12.2.3, the Authority may, at any time after receiving a report from the Authority's Engineer under that Clause, direct the Authority's Engineer to issue a Provisional Certificate under Clause 12.2.1 and such direction shall be complied forthwith.
- 12.2.5 No Provisional Certificate shall be issued under the provisions of this Clause 12.2 until the Contractor has submitted valid claims for payment of at least 80% (eighty per cent) of the amount arrived at after reducing the lump sum price specified in Clause 19.1.1 by the amount attributable to works which have been withdrawn under the provisions of Clause 8.3.3. For the avoidance of doubt and by way of illustration, the Parties agree that if the Contract Price specified in Clause 19.1.1 is **Rs.105 cr. (Rs. one hundred and five crore)** and the works withdrawn under Clause 8.3.3 have a value of **Rs.5 cr. (Rs. five crore)**, a Provisional Certificate shall not be issued until valid claims for payment of an amount of **Rs.80 cr. (Rs. eighty crore)** have been submitted by the Contractor in accordance with the provisions of this Agreement. It is further agreed that all price adjustments made in pursuance of Clause 19.10 shall not be reckoned for computation of the claims for payments referred to in this Clause 12.2.5.

12.3 Completion of remaining Works

All items in the Punch List shall be completed by the Contractor in accordance with the provisions of this Agreement. For any delay in their completion other than for the reasons solely attributable to the Authority or due to Force Majeure, the Authority shall be entitled to recover Damages from the Contractor in accordance with the provisions of Clause 10.3.2 of this Agreement.

12.4 Completion Certificate

- 12.4.1 Upon completion of all Works, including the items specified in the Punch List, and the Authority's Engineer determining the Tests to be successful, it shall forthwith issue to the Contractor and the Authority a certificate substantially in the form set forth in Schedule-L (the "**Completion Certificate**").
- 12.4.2 Upon receiving the Completion Certificate, the Contractor shall remove its equipment, materials, debris and temporary works from the Site within a period of 30 (thirty) days thereof, failing which the Authority may remove or cause to be removed, such equipment, materials, debris and temporary works and recover from the Contractor an amount equal to 120% (one hundred and twenty per cent) of the actual cost of removal incurred by the Authority.
- 12.4.3 Without prejudice to the obligations of the Contractor specified in Articles 14 and 17, the property and ownership of all the completed Works forming part of the Sewerage Project shall vest in the Authority.

12.5 Rescheduling of Tests

If the Authority's Engineer certifies to the Authority and the Contractor that it is unable to issue the Completion Certificate or Provisional Certificate, as the case may be, because of events or circumstances on account of which the Tests could not be held or had to be suspended, the Contractor shall be entitled to re-schedule the Tests and hold the same as soon as reasonably practicable.

ARTICLE 13

CHANGE OF SCOPE

13.1 Change of Scope

13.1.1 The Authority may, notwithstanding anything to the contrary contained in this Agreement, require the Contractor to make modifications/alterations to the Works (“**Change of Scope**”) before the issue of the Completion Certificate either by giving an instruction or by requesting the Contractor to submit a proposal for Change of Scope involving additional cost or reduction in cost. Any such Change of Scope shall be made and valued in accordance with the provisions of this Article 13.

13.1.2 Change of Scope shall mean:

- (a) change in specifications of any item of Works;
- (b) omission of any work from the Scope of the Project except under Clause 8.3.3; provided that, subject to Clause 13.5, the Authority shall not omit any work under this Clause in order to get it executed by any other authority; and / or
- (c) any additional work, Plant, Materials or services which are not included in the Scope of the Project, including any associated Tests on completion of construction.

13.1.3 If the Contractor determines at any time that a Change of Scope will, if adopted, (i) accelerate completion, (ii) reduce the cost to the Authority of executing, the Sewerage Project, (iii) improve the efficiency or value to the Authority of the completed Sewerage Project, or (iv) otherwise be of benefit to the Authority, it shall prepare a proposal with relevant details at its own cost. The Contractor shall submit such proposal, supported with the relevant details and the amount of reduction in the Contract Price to the Authority to consider such Change of Scope. The Authority shall, within 15 (fifteen) days of receipt of such proposal, either accept such Change of Scope with modifications, if any, and initiate proceedings thereof in accordance with this Article 13 or reject the proposal and inform the Contractor of its decision. For the avoidance of doubt, the Parties agree that the Contractor shall not undertake any Change of Scope without the express consent of the Authority, save and except any Works necessary for meeting any Emergency.

13.2 Procedure for Change of Scope

13.2.1 In the event of the Authority determining that a Change of Scope is necessary, it may direct the Authority’s Engineer to issue to the Contractor a notice specifying in reasonable detail the works and services contemplated there under (the “**Change of Scope Notice**”).

13.2.2 Upon receipt of a Change of Scope Notice, the Contractor shall, with due diligence, provide to the Authority and the Authority’s Engineer such information as is necessary, together with preliminary documentation in support of:

- (a) the impact, if any, which the Change of Scope is likely to have on the Project Completion Schedule if the works or services are required to be carried out during the Construction Period; and
- (b) the options for implementing the proposed Change of Scope and the effect, if any, each such option would have on the costs and time thereof, including the following details:
 - (i) breakdown of the quantities, unit rates and cost for different items of work;
 - (ii) proposed design for the Change of Scope; and
 - (iii) proposed modifications, if any, to the Project Completion Schedule of the Sewerage Project.

For the avoidance of doubt, the Parties expressly agree that, subject to the provisions of Clause 13.4.2, the Contract Price shall be increased or decreased, as the case may be, on account of Change of Scope.

- 13.2.3 The Contractor's quotation of costs for the Change of Scope shall be determined on the following principles:
- (a) For works where Schedule of Rates (SOR) for concerned area of State's Public Works / P.H. Department are available shall be applicable for determination of costs. In case of non-availability of current SOR, the available Schedule of Rates shall be applied by updating the same based on WPI.
 - (b) For works not similar in nature to the Works being executed, the cost of work shall be derived on the basis of CPWD analysis of rates Standard Data Book and the applicable schedule of rates for the relevant circle, as published by the State Government, and such rates shall be indexed with reference to the WPI once every year, with the base being the month and year of the publication of the said schedule of rates; provided, however, that for any item not included in the schedule of rates, the prevailing market rates as determined by the Authority's Engineer shall apply, and for any item in respect of which CPWD analysis of rate does not provide the requisite details, the Authority's Engineer shall determine the rate in accordance with Good Industry Practice.
- 13.2.4 Upon reaching an agreement, the Authority shall issue an order (the "**Change of Scope Order**") requiring the Contractor to proceed with the performance thereof. In the event that the Parties are unable to agree, the Authority may:
- (a) issue a Change of Scope Order requiring the Contractor to proceed with the performance thereof at the rates and conditions approved by the Authority till the matter is resolved in accordance with Article 26; or
 - (b) proceed in accordance with Clause 13.5.
- 13.2.5 The provisions of this Agreement, insofar as they relate to Works and Tests, shall apply *mutatis mutandis* to the works undertaken by the Contractor under this Article 13.

13.3 Payment for Change of Scope

Payment for Change of Scope shall be made in accordance with the payment schedule specified in the Change of Scope Order.

13.4 Restrictions on Change of Scope

- 13.4.1 No Change of Scope shall be executed unless the Authority has issued the Change of Scope Order save and except any Works necessary for meeting any Emergency.
- 13.4.2 Unless the Parties mutually agree to the contrary, the total value of all Change of Scope Orders **shall not exceed 10 (ten) per cent** of the Contract Price.
- 13.4.3 Notwithstanding anything to the contrary in this Article 13, no change made necessary because of any default of the Contractor in the performance of its obligations under this Agreement shall be deemed to be Change of Scope, and shall not result in any adjustment of the Contract Price or the Project Completion Schedule.

13.5 Power of the Authority to undertake works

- 13.5.1 In the event the Parties are unable to agree to the proposed Change of Scope Orders in accordance with Clause 13.2, the Authority may, after giving notice to the Contractor and considering its reply thereto, award such works or services to any person on the basis of open competitive bidding from amongst bidders who are pre-qualified for undertaking the additional work; provided that the Contractor shall have the option of matching the first ranked bid in terms of the selection criteria, subject to payment of 2% (two per cent) of the bid amount to the Authority[§], and thereupon securing the award of such works or services. For the avoidance of doubt, it is agreed that the Contractor shall be entitled to exercise such option only if it has participated in the bidding process and its bid does not exceed the first ranked bid

[§] The Authority shall transfer 75% (seventy five percent) of the amount so received to the first ranked bidder whose bid shall have been matched by the Contractor.

by more than 10% (ten percent) thereof. It is also agreed that the Contractor shall provide assistance and cooperation to the person who undertakes the works or services hereunder, but shall not be responsible for rectification of any Defects and/ or operation & maintenance of works carried out by other agencies.

- 13.5.2 The works undertaken in accordance with this Clause 13.5 shall conform to the Specifications and Standards and shall be carried out in a manner that minimises the disruption in operation of the Sewerage Project. The provisions of this Agreement, insofar as they relate to Works and Tests, shall apply *mutatis mutandis* to the works carried out under this Clause 13.5.

ARTICLE 14
OPERATION & MAINTENANCE
(Not in the Scope of this Contract)

14.1 Operation & Maintenance obligations of the Contractor

14.1.1 The Contractor shall operate & maintain the infrastructure developed by him under the Sewerage Project for a period of 5 (five) years] commencing from the date of issue of the Provisional Certificate (the “**Operation & Maintenance Period**”). The Energy charges shall be paid by the department directly to the concerned Electrical Authority. The energy consumption shall be assessed by the bidder basing on **energy efficient design** of the electro-mechanical equipment (those are covered under the scope of work) at **Waste Water treatment plant (WWTP), etc.** The bidder shall **offer towards** yearly energy consumption considering the rated capacity of electromechanical equipment **@ Rs.7.00/KWH in the online BoQ. From the offered price WATCO shall derive the assured energy consumption in the KWH unit during financial bid evaluation.** The energy consumption charges for each month will be directly paid by the department up to the consumption units as assessed by the contractor, beyond which the cost of energy consumption shall be borne by the contractor and the excess amount will be deducted from the bill of the contractor for payment to the Electrical Authority. The price for manpower & materials for the respective years of the O&M period quoted by the bidder shall correspond to the Present Value (PV) which shall be adjusted as per the price adjustment clause mentioned in the contract document (Clause No. 19.12)

For the avoidance of doubt, it is agreed that in the event no Provisional Certificate is issued, the Operation & Maintenance Period shall commence from the date of the Completion Certificate.

Note-1: The detailed calculation towards Operation & Maintenance cost of the project to be executed by the Agency is provided at Annex-III of Schedule-E for reference and guidance only.

14.1.2 During the Operation & Maintenance Period, the Authority shall provide to the Contractor access to the Site for Operation & Maintenance in accordance with this Agreement. The obligations of the Contractor hereunder shall include but not limited to the following: -

- (a) permitting safe & smooth functioning of Sewerage Project;
- (b) undertaking routine maintenance including prompt repairs of Civil, Electrical & Mechanical installations including pipe lines;
- (c) undertaking repairs to structures;
- (d) informing the Authority of any un authorized use of the Sewerage Project;
- (e) informing the Authority of any encroachments on the Sewerage Project; and
- (f) operation and maintenance of all collection and conveyance systems necessary for the efficient operation & maintenance of the Sewerage Project in accordance with the provisions of this Agreement.

14.1.3 In respect of any Defect or deficiency not specified in Schedule-E, the Contractor shall, at its own cost, undertake repair or rectification in accordance with Good Industry Practice, save and except to the extent that such Defect or deficiency shall have arisen on account of any default or neglect of the Authority or a Force Majeure Event.

14.1.4 The Contractor shall remove promptly from the Sewerage Project any waste materials (including hazardous materials and waste water), rubbish and other debris (including without limitation, accident debris) and keep the Sewerage Project in a clean, tidy and orderly condition, and in conformity with the Applicable Laws, Applicable Permits and Good Industry Practice.

14.2 Operation & Maintenance Requirements

The Contractor shall ensure and procure that at all times during the Operation & Maintenance Period, the Sewerage Project conforms to the operation & maintenance requirements set forth in Schedule-E (the “**Operation & Maintenance Requirements**”).

14.3 Operation & Maintenance Programme

14.3.1 The Contractor shall prepare a monthly operation & maintenance programme (the “**Operation & Maintenance Programme**”) in consultation with the Authority and submit the same to the Authority not later than 10 (ten) days prior to the commencement of the month in which the Operation & Maintenance is to be carried out. For this purpose, a joint monthly inspection by the Contractor and the Authority shall be undertaken. The Operation & Maintenance Programme shall contain the following:

- (a) The condition of the Civil, Electrical & Mechanical installations including pipeline in the format prescribed by the Authority,
- (b) the proposed operation & maintenance works; and
- (c) deployment of resources for operation & maintenance works.

14.4 Safety, vehicle breakdowns and accidents

14.4.1 Deleted

14.4.2 Deleted

14.5 Zone closure

14.5.1 The Contractor shall not close any Zone of the Sewerage Project for undertaking operation & maintenance works except with the prior written approval of the Authority. Such approval shall be sought by the Contractor through a written request to be made at least 10 (ten) days before the proposed closure of Zone and shall be accompanied by particulars thereof. Within 5 (five) business days of receiving such request, the Authority shall grant permission with such modifications as it may deem necessary.

14.5.2 Upon receiving the permission pursuant to Clause 14.5.1, the Contractor shall be entitled to close the designated Zone for the period specified therein, and in the event of any delay in re-opening such Zone, the Contractor shall, for every stretch of 250 (two hundred and fifty) metres, or part thereof, pay Damages to the Authority calculated at the rate of 0.1% (zero point one per cent) of the monthly operation & maintenance payment for each day of delay until the Zone has been re-opened for Water Supply.

14.6 Reduction of payment for non-performance of Operation & Maintenance obligations

14.6.1 In the event that the Contractor fails to repair or rectify any Defect or deficiency set forth in Schedule-E within the period specified therein, it shall be deemed as failure of performance of Operation & Maintenance obligations by the Contractor and the Authority shall be entitled to effect reduction in monthly lump sum payment for operation & maintenance in accordance with Clause 19.7 and Schedule-M, without

prejudice to the rights of the Authority under this Agreement, including Termination thereof.

14.6.2 If the nature and extent of any Defect justifies more time for its repair or rectification than the time specified in Schedule-E, the Contractor shall be entitled to additional time in conformity with Good Industry Practice. Such additional time shall be determined by the Authority and conveyed to the Contractor.

14.7 Authority's right to take remedial measures

In the event the Contractor does not maintain and/or repair the Sewerage Projector any part thereof in conformity with the Operation & Maintenance Requirements, the Operation & Maintenance Manual or the Operation & Maintenance Programme, as the case may be, and fails to commence remedial works within 15 (fifteen) days of receipt of the Operation & Maintenance Inspection Report under Clause 15.2 or a notice in this behalf from the Authority, the Authority shall, without prejudice to its rights under this Agreement including Termination thereof, be entitled to undertake such remedial measures at the cost of the Contractor, and to recover its cost from the Contractor. In addition to recovery of the aforesaid cost, a sum equal to 20% (twenty per cent) of such cost shall be paid by the Contractor to the Authority as Damages.

14.8 Restoration of loss or damage to Sewerage Project

Save and except as otherwise expressly provided in this Agreement, in the event that the Sewerage Project or any part thereof suffers any loss or damage during the Operation & Maintenance from any cause attributable to the Contractor, the Contractor shall, at its cost and expense, rectify and remedy such loss or damage forthwith so that the Sewerage Project conforms to the provisions of this Agreement.

14.9 Overriding powers of the Authority

14.9.1 If in the reasonable opinion of the Authority, the Contractor is in material breach of its obligations under this Agreement and, in particular, the Operation & Maintenance Requirements, and such breach is causing or likely to cause material hardship or danger to the Users and pedestrians, the Authority may, without prejudice to any of its rights under this Agreement including Termination thereof, by notice require the Contractor to take reasonable measures immediately for rectifying or removing such hardship or danger, as the case may be.

14.9.2 In the event that the Contractor, upon notice under Clause 14.9.1, fails to rectify or remove any hardship or danger within a reasonable period, the Authority may exercise overriding powers under this Clause 14.9.2 and take over the performance of any or all the obligations of the Contractor to the extent deemed necessary by it for rectifying or removing such hardship or danger; provided that the exercise of such overriding powers by the Authority shall be of no greater scope and of no longer duration than is reasonably required hereunder; provided further that any costs and expenses incurred by the Authority in discharge of its obligations hereunder shall be recovered by the Authority from the Contractor, and the Authority shall be entitled to deduct any such costs and expenses incurred from the payments due to the Contractor under Clause 19.7 for the performance of its Operation & Maintenance obligations.

14.9.3 In the event of a national emergency, civil commotion or any other circumstances specified in Clause 21.3, the Authority may take over the performance of any or all the obligations of the Contractor to the extent deemed necessary by it, and exercise

such control over the Sewerage Project or give such directions to the Contractor as may be deemed necessary; provided that the exercise of such overriding powers by the Authority shall be of no greater scope and of no longer duration than is reasonably required in the circumstances which caused the exercise of such overriding power by the Authority. For the avoidance of doubt, it is agreed that the consequences of such action shall be dealt in accordance with the provisions of Article 21. It is also agreed that the Contractor shall comply with such instructions as the Authority may issue in pursuance of the provisions of this Clause 14.9.3, and shall provide assistance and cooperation to the Authority, on a best effort basis, for performance of its obligations hereunder.

ARTICLE 15

**SUPERVISION AND MONITORING DURING
OPERATION & MAINTENANCE**

(Not in the Scope of this Contract)

15.1 Inspection by the Contractor

- 15.1.1 The Authority shall undertake regular inspections to evaluate continuously the compliance with the Operation & Maintenance Requirements.
- 15.1.2 The Contractor shall carry out a detailed inspection of all structures & Sewerage System in accordance with the guidelines contained in Manual on O&M of Sewerage Systems published by CPHEEO. Report of this inspection together with details of proposed operation & maintenance works as required shall be conveyed to the Authority forthwith. The Contractor shall complete the proposed operation & maintenance works and send a compliance report to the Authority.

15.2 Inspection and payments

- 15.2.1 The Authority may inspect the Sewerage Project at any time, but at least once in every month, to ensure compliance with the Operation & Maintenance Requirements. It shall make a report of such inspection (“**Operation & Maintenance Inspection Report**”) stating in reasonable detail the Defects or deficiencies, if any, with particular reference to the Operation & Maintenance Requirements, the Operation & Maintenance Manual, and the Operation & Maintenance Programme and send a copy thereof to the Contractor within 10 (ten) days of such inspection.
- 15.2.2 After the Contractor submits to the Authority the Monthly Operation & Maintenance Statement for the Sewerage Project pursuant to Clause 19.6, the Authority shall carry out an inspection within 10 (ten) days to certify the amount payable to the Contractor. The Authority shall inform the Contractor of its intention to carry out the inspection at least 3 (three) business days in advance of such inspection. The Contractor shall assist the Authority in verifying compliance with the Operation & Maintenance Requirements.
- 15.2.3 For each case of non-compliance of Operation & Maintenance Requirements as specified in the inspection report of the Authority, the Authority shall calculate the amount of reduction in payment in accordance with the formula specified in Schedule-M.
- 15.2.4 Any deduction made on account of non-compliance will not be paid subsequently even after establishing the compliance thereof. Such deduction will continue to be made every month until the compliance is procured.

15.3 Tests

For determining that the Sewerage Project conforms to the Operation & Maintenance Requirements, the Authority shall require the Contractor to carry out, or cause to be carried out, tests specified by it in accordance with CPHEEO Manual/ Good Industry Practice and Pollution Control Board norms . The Contractor shall, with due diligence, carry out or cause to be carried out all such tests in accordance with the instructions of the Authority and furnish the results of such tests forthwith to the Authority.

15.4 Reports of unusual occurrence

The Contractor shall, during the Operation & Maintenance Period, prior to the close of each day, send to the Authority by facsimile or e-mail, a report stating unusual occurrences on the Sewerage Project relating to the safety and security of the Users. A monthly summary of such reports shall also be sent within 3 (three) business days of the closing of month.

ARTICLE 16
TRAFFIC REGULATION

16.1 Traffic regulation by the Contractor

- 16.1.1 The Contractor shall take all the required measures and make arrangements for the safety of Users during the construction of the Sewerage Project or a Section thereof in accordance with the relevant provisions. It shall provide, erect and maintain all such barricades, signs, markings, flags, and lights as may be required by Good Industry Practice for the safety of the traffic passing through the Section under construction.
- 16.1.2 All works shall be carried out in a manner creating least interference to traffic passing through the Sewerage Project or a Section thereof. In stretches where construction works are taken up, the Contractor shall ensure that proper passage is provided for the traffic. Where it is not possible or safe to allow traffic on part width of the carriageway, a temporary diversion of proper specifications shall be constructed by the Contractor at its own cost. The Contractor shall take prior approval of the Authority's Engineer for any proposed arrangement for traffic regulation during Construction and Operation & Maintenance, which approval shall not be unreasonably withheld.

ARTICLE 17

DEFECTS LIABILITY

17.1 Defects Liability Period

17.1.1 The Contractor shall be responsible for all the Defects and deficiencies, except usual wear and tear in the Sewerage Projector any Section thereof, till the expiry of a period of **2 (Two)** years commencing from the date of Provisional Certificate (the “**Defects Liability Period**”). Provided that the Defects Liability Period shall in no case be less than **24 (Twenty-four) months** from the date of Completion Certificate for and in respect of works for which Time Extension was granted. Provided further that in the event no Provisional Certificate is issued, the Defects Liability Period shall commence from the date of the Completion Certificate. For the avoidance of doubt, any repairs or restoration on account of usual wear or tear in **the Box Drain Project** or any Section thereof shall form a part of the **Operation & Maintenance** obligations of the Contractor as specified in Article 14.

17.1.2 Deleted.

17.2 Remedying Defects

The Contractor shall repair or rectify all Defects and deficiencies observed by the Authority’s Engineer during the Defects Liability Period within a period of 15 (fifteen) days from the date of notice issued by the Authority’s Engineer in this behalf, or within such reasonable period as may be determined by the Authority’s Engineer at the request of the Contractor, in accordance with Good Industry Practice.

17.3 Cost of remedying Defects

For the avoidance of doubt, any repair or rectification undertaken in accordance with the provisions of Clause 17.2, including any additional testing, shall be carried out by the Contractor at its own risk and cost, to the extent that such rectification or repair is attributable to:

- (a) the design of the Project;
- (b) Plant, Materials or workmanship not being in accordance with this Agreement and the Specifications and Standards;
- (c) improper operation & maintenance during construction of the Sewerage Project by the Contractor; and/ or
- (d) failure by the Contractor to comply with any other obligation under this Agreement.

17.4 Contractor’s failure to rectify Defects

In the event that the Contractor fails to repair or rectify such Defect or deficiency within the period specified in Clause 17.2, the Authority shall be entitled to get the same repaired, rectified or remedied at the Contractor’s cost so as to make the **Box Drain Project** conform to the Specifications and Standards and the provisions of this Agreement. All costs consequent thereon shall, after due consultation with the Authority and the Contractor, be determined by the Authority’s Engineer. The costs so determined and an amount equal to twenty percent of the cost as Damages shall be recoverable by the Authority from the Contractor and may be deducted by the Authority from any monies due to the Contractor.

17.5 Contractor to search cause

17.5.1 The Authority’s Engineer may instruct the Contractor to examine the cause of any Defect in the Works or part thereof before the expiry of the Defects Liability Period.

17.5.2 In the event any Defect identified under Clause 17.5.1 is attributable to the Contractor, the Contractor shall rectify such Defect within the period specified by the Authority’s Engineer, and shall bear the cost of the examination and rectification of such Defect.

17.5.3 In the event such Defect is not attributable to the Contractor, the Authority's Engineer shall, after due consultation with the Authority and the Contractor, determine the costs incurred by the Contractor on such examination and notify the same to the Contractor, with a copy to the Authority, and the Contractor shall be entitled to payment of such costs by the Authority.

17.6. Extension of Defects Liability Period

The Defects Liability Period shall be deemed to be extended till the identified Defects under Clause 17.2 have been remedied.

ARTICLE 18

AUTHORITY'S ENGINEER

18.1 Appointment of the Authority's Engineer

- 18.1.1 The Authority shall appoint a consulting engineering firm substantially in accordance with the selection criteria set forth in Schedule-N, to be the engineer under this Agreement (the “**Authority's Engineer**”).
- 18.1.2 The appointment of the Authority's Engineer shall be made no later than 15 (fifteen) days from the date of this Agreement. The Authority shall notify the appointment or replacement of the Authority's Engineer to the Contractor.
- 18.1.3 The staff of the Authority's Engineer shall include suitably qualified engineers and other professionals who are competent to assist the Authority's Engineer to carry out its duties.

18.2 Duties and authority of the Authority's Engineer

- 18.2.1 The Authority's Engineer shall perform the duties and exercise the authority in accordance with the provisions of this Agreement, and substantially in accordance with the terms of reference (“**Terms of Reference**” or “**TOR**”) set forth in Annex 1 of Schedule N, but subject to obtaining prior written approval of the Authority before determining:
- (a) any Time Extension;
 - (b) any additional cost to be paid by the Authority to the Contractor;
 - (c) the Termination Payment; or
 - (d) any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or liability on either Party for a sum exceeding Rs.50,00,000 (Rupees fifty lakh).
- 18.2.2 No decision or communication of the Authority's Engineer shall be effective or valid unless it is accompanied by an attested true copy of the approval of the Authority for and in respect of any matter specified in Clause 18.2.1.
- 18.2.3 The Authority's Engineer shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions under this Agreement. Such reports shall be submitted by the Authority's Engineer within 10 (ten) days of the beginning of every month. For the avoidance of doubt, the Authority's Engineer shall include in its report, compliance of the recommendations of the Safety Consultant.

18.3 Delegation by the Authority's Engineer

- 18.3.1 The Authority's Engineer may, by order in writing, delegate any of his duties and responsibilities to suitably qualified and experienced personnel who are accountable to Authority's Engineer, or may revoke any such delegation, under intimation to the Authority and the Contractor. Provided, however, that the Authority's Engineer shall be responsible and liable for all actions and omissions of such personnel.
- 18.3.2 Any failure of the Authority's Engineer to disapprove any work, Plant or Materials shall not constitute approval, and shall therefore not prejudice the right of the Authority to reject the work, Plant or Materials, which is not in accordance with the provisions of this Agreement and the Specifications and Standards.
- 18.3.3 Notwithstanding anything stated in Clause 18.3.1 above, the Authority's Engineer shall not delegate the authority to refer any matter for the Authority's prior approval wherever required in accordance with the provisions of Clause 18.2.

18.4 Instructions of the Authority's Engineer

- 18.4.1 The Authority's Engineer may issue to the Contractor instructions for remedying any Defect. The Contractor shall take such instructions from the Authority's Engineer, or from an assistant to whom appropriate authority has been delegated under Clause 18.3.

- 18.4.2 The instructions issued by the Authority's Engineer shall be in writing. However, if the Authority's Engineer issues any oral instructions to the Contractor, it shall confirm in writing the oral instructions within 2 (two) working days of issuing them.
- 18.4.3 In case the Contractor does not receive the confirmation of the oral instruction within the time specified in Clause 18.4.2, the Contractor shall seek the written confirmation of the oral instructions from the Authority's Engineer. The Contractor shall obtain acknowledgement from the Authority's Engineer of the communication seeking written confirmation. In case of failure of the Authority's Engineer or its delegated assistant to reply to the Contractor within 2 (two) days of the receipt of the communication from the Contractor, the Contractor may not carry out the instruction.
- 18.4.4 In case of any dispute on any of the instructions issued by the delegated assistant, the Contractor may refer the dispute to the Authority's Engineer, who shall then confirm, reverse or vary the instructions within [3 (three)] business days of the dispute being referred.

18.5 Determination by the Authority's Engineer

- 18.5.1 The Authority's Engineer shall consult with each Party in an endeavour to reach agreement wherever this Agreement provides for the determination of any matter by the Authority's Engineer. If such agreement is not achieved, the Authority's Engineer shall make a fair determination in accordance with this Agreement having due regard to all relevant circumstances. The Authority's Engineer shall give notice to both the Parties of each agreement or determination, with supporting particulars.
- 18.5.2 Each Party shall give effect to each agreement or determination made by the Authority's Engineer in accordance with the provisions of this Agreement. Provided, however, that if any Party disputes any instruction, decision, direction or determination of the Authority's Engineer, the Dispute shall be resolved in accordance with the Dispute Resolution Procedure.

18.6 Remuneration of the Authority's Engineer

The remuneration, cost and expenses of the Authority's Engineer shall be paid by the Authority.

18.7 Termination of the Authority's Engineer

- 18.7.1 The Authority may, in its discretion, replace the Authority's Engineer at any time, but only after appointment of another Authority's Engineer in accordance with Clause 18.1.
- 18.7.2 If the Contractor has reasons to believe that the Authority's Engineer is not discharging its duties and functions in accordance with the provisions of this Agreement, it may make a written representation to the Authority and seek termination of the appointment of the Authority's Engineer. Upon receipt of such representation, the Authority shall hold a tripartite meeting with the Contractor and Authority's Engineer and make best efforts for an amicable resolution of the representation. In the event that the appointment of the Authority's Engineer is terminated hereunder, the Authority shall appoint forthwith another Authority's Engineer in accordance with Clause 18.1.

Part IV
Financial Covenants

ARTICLE 19

PAYMENTS

19.1 Contract Price

- 19.1.1 The Authority shall make payments to the Contractor for the Works on the basis of the lump sum price accepted by the Authority in consideration of the obligations specified in this Agreement for an amount of Rs. (Rs.) (the “**Contract Price**”), which shall be subject to adjustments in accordance with the provisions of this Agreement. For the avoidance of doubt, the Parties expressly agree that the Contract Price shall not include the cost of Operation & Maintenance which shall be paid separately in accordance with the provisions of Clause 19.7. The Parties further agree that save and except as provided in this Agreement, the Contract Price shall be valid and effective until issue of Completion Certificate.
- 19.1.2 (a) **The Contract Price shall be excluding of GST which will be paid as applicable**
- (b) The Contract Price includes all duties, taxes, royalty, and fees that may be levied in accordance with the laws and regulations in force as on the Base Date on the Contractor's equipment, Plant, Materials and supplies acquired for the purpose of this Agreement and on the services performed under this Agreement. Nothing in this Agreement shall relieve the Contractor from its responsibility to pay any tax including any tax that may be levied in India on profits made by it in respect of this Agreement. Statutory deduction of taxes as applicable & royalty shall be made from each bill at the time of payment.
- (c) The Building & Other Construction Workers Welfare Cess Act 1996: In accordance with the provisions under the said Act 1% (One percent) of the approved agreement value will be deducted from the R/A Bill at the time of making payment to the contractor and such amount shall be remitted in favour of **The Odisha Building & Other Construction Workers Welfare Board.**
- 19.1.3 The Contract Price shall not be adjusted for any change in costs stated in Clause 19.1.2 above, except as stated in Clauses 19.10 and 19.17.
- 19.1.4 The Contract Price shall not be adjusted to take account of any unforeseen difficulties or costs, unless otherwise provided for in this Agreement.
- 19.1.5 Unless otherwise stated in this Agreement, the Contract Price covers all the Contractor's obligations for the Works under this Agreement and all things necessary for the Construction and the remedying of any Defects in the Sewerage Project.
- 19.1.6 All payments under this Agreement shall be made in Indian Rupees.

19.2 Advance Payment

- 19.2.1 The Authority shall make an interest-bearing advance payment **@10% per Annum** (the “**Advance Payment**”), equal in amount to 10 (ten) percent of the Contract Price, **for construction work** for mobilization expenses and for acquisition of equipment. The Advance Payment shall be made in four installments. The first installment shall be an amount equal to **2%** (two percent) of the Contract Price **for construction work**, the second installment shall be equal to **3%** (three percent) of the Contract Price **for construction work**, the third installment shall be equal to **3%** (three percent) of the Contract Price and the fourth installment shall be equal to **2%** (two percent) of the Contract Price **for construction work**.
- 19.2.2 The Contractor may apply to the Authority for the first installment of Advance Payment at any time after the Appointed Date, along with an irrevocable and unconditional guarantee from a Nationalised Bank, counter guaranteed by its branch at Bhubaneswar for an amount equivalent to 110% (one hundred and ten per cent) of such installment, substantially in the form provided at **Annex-III of Schedule-G**, to remain effective till the complete and full repayment thereof. At any time after 30 (thirty) days from the Appointed Date, the Contractor may apply for the second

instalment of the Advance Payment along with an irrevocable and unconditional guarantee from a Nationalized Bank, counter guaranteed by its branch at Bhubaneswar for an amount equivalent to 110% (one hundred and ten per cent) of such instalment, substantially in the form provided at Annex-III of Schedule-G, to remain effective till the complete and full repayment thereof.

- 19.2.3 At any time, after 60 (sixty) days from the Appointed Date, the Contractor may apply to the Authority for the third instalment of the Advance Payment along with an irrevocable and unconditional guarantee from a Nationalized Bank, counter guaranteed by its branch at Bhubaneswar Bank for an amount equivalent to 110% (one hundred and ten per cent) of such instalment, substantially in the form provided at Annex-III of Schedule-G, to remain effective till the complete and full repayment thereof.
- 19.2.3.1 At any time, after 90 (Ninety) days from the Appointed Date on verification of acquisition of required materials and equipment by Project Director of concerned Project Management Circle, the Contractor may apply to the Authority for the fourth installment of the Advance Payment along with an irrevocable and unconditional guarantee from a Nationalized Bank, counter guaranteed by its branch at Bhubaneswar for an amount equivalent to 110% (one hundred and ten per cent) of such installment, substantially in the form provided at Annex-III of Schedule-G, to remain effective till the complete and full repayment thereof
- 19.2.4 The first, second, third and the fourth instalments shall be paid by the Authority to the Contractor within 15 (fifteen) days of the receipt of its respective requests in accordance with the provisions of this Clause 19.2.
- 19.2.5 Each instalment of Advance Payment shall be repaid by the Contractor to the **Authority no later than 365 (three hundred and sixty-five) days** from the respective date of Advance Payment.
- 19.2.6** The Contractor shall repay each instalment of the Advance Payment on or before the due date of repayment. In the event of the Contractor's failure to make the repayment on time, the Authority shall be entitled to encash the Bank guarantee for Advance Payment. The Parties expressly agree that for any delay in repayment of the Advance Payment, the Contractor shall pay interest to the Authority for each day of delay, such interest to be calculated at the rate of **18% (eighteen per cent) per annum.**
- 19.2.7 If the Advance Payment has not been fully repaid prior to Termination under Clause 21.7 or Article 23, as the case may be, the whole of the balance then outstanding shall immediately become due and payable by the Contractor to the Authority. Without prejudice to the provisions of Clause 19.2.7, in the event of Termination for Contractor Default, the Advance Payment shall be deemed to carry interest at the rate of 10% (ten per cent) per annum from the date of Advance Payment to the date of recovery by encashment of the Bank Guarantee for the Advance Payment. For the avoidance of doubt, the aforesaid interest shall be payable on each instalment of the Advance Payment, regardless of whether the instalment or any part thereof has been repaid to the Authority prior to Termination.

19.3 Procedure for estimating the payment for the Works

- 19.3.1 The Authority shall make interim payments to the Contractor as certified by the Authority's Engineer on completion of a stage, in a length, number or areas specified and valued in accordance with the proportion of the Contract Price assigned to each item and its stage in Schedule-H.
- 19.3.2 The Contractor shall base its claim for interim payment for the stages completed till the end of the month for which the payment is claimed, valued in accordance with Clause 19.3.1, supported with necessary particulars and documents in accordance with this Agreement. Any reduction in the Contract Price arising out of Change of Scope or the works withdrawn under Clause 8.3 shall not affect the amounts payable for the items or stage payments thereof which are not affected by such Change of Scope or withdrawal. For avoidance

of doubt and by way of illustration, the Parties agree that if the amount assigned to Major structures is reduced owing to Change of Scope or withdrawal of work, the reduction in payment shall be restricted to relevant payments for Major structures only and the payment due in respect of all other stage payments shall not be affected in any manner. The Parties further agree that the adjustments arising out of the aforesaid modifications shall be carried out in a manner that the impact of such modifications is restricted to the said Change of Scope or withdrawal, as the case may be, and does not alter the payments due for and in respect of items or stage payments which do not form part of such Change of Scope or withdrawal.

19.4 Stage Payment Statement for Works

The Contractor shall submit a statement (the “**Stage Payment Statement**”), in 3 copies, by the 7th(seventh) day of the month to the Authority’s Engineer in the form set forth in Schedule-O, showing the amount calculated in accordance with Clause 14019.3 to which the Contractor considers himself entitled for completed stage(s) of the Works. The Stage Payment Statement shall be accompanied with the progress reports and any other supporting documents. The Contractor shall not submit any claim for payment of incomplete stages of work.

19.5 Stage Payment for Works

- 19.5.1 Within 10 (ten) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 19.4, the Authority’s Engineer shall broadly determine the amount due to the Contractor and recommend the release of 90 (ninety) percent of the amount so determined as part payment against the Stage Payment Statement, pending issue of the Interim Payment Certificate by the Authority’s Engineer. Within 10 (ten) days of the receipt of recommendation of the Authority’s Engineer, the Authority shall make electronic payment directly to the Contractor’s bank account.
- 19.5.2 Within 15 (fifteen) days of the receipt of the Stage Payment Statement referred to in Clause 19.4, the Authority’s Engineer shall determine and shall deliver to the Authority and the Contractor an IPC certifying the amount due and payable to the Contractor, after adjusting the payments already released to the Contractor against the said statement. For the avoidance of doubt, the Parties agree that the IPC shall specify all the amounts that have been deducted from the Stage Payment Statement and the reasons there for.
- 19.5.3 In cases where there is a difference of opinion as to the value of any stage, the Authority’s Engineer’s view shall prevail and interim payments shall be made to the Contractor on this basis; provided that the foregoing shall be without prejudice to the Contractor’s right to raise a Dispute.
- 19.5.4 The Authority’s Engineer may, for reasons to be recorded, withhold from payment:
 - (a) the estimated value of work or obligation that the Contractor has failed to perform in accordance with this Agreement and the Authority’s Engineer had notified the Contractor; and
 - (b) the estimated cost of rectification of work done being not in accordance with this Agreement.
- 19.5.5 Payment by the Authority shall not be deemed to indicate the Authority's acceptance, approval, consent or satisfaction with the work done.

19.6 Monthly Operation & Maintenance Statement of the Sewerage Project

19.6.1 The Contractor shall submit to the Authority a monthly operation & maintenance statement (“**Monthly Operation & Maintenance Statement**”)/claim in 3 (three) copies by the 7th (seventh) day of each month in the format set forth in Schedule-O for the Operation & Maintenance of the Sewerage Project during the previous month.

19.6.2 The monthly lump sum amount payable for Operation & Maintenance shall be 1/12th (one-twelfth) of the annual cost of Operation & Maintenance as specified in Clause 14.1.1.

19.7 Payment for Operation & Maintenance of the Sewerage Project

19.7.1 Within 15 (fifteen) days of receipt of the Monthly Operation & Maintenance Statement/claim from the Contractor pursuant to Clause 19.6, the Authority shall verify the Contractor’s monthly operation & maintenance statement and certify the amount to be paid to the Contractor taking into account:

- (a) Compliance with the Operation & Maintenance Requirements; and
- (b) reduction for non-compliance with the Operation & Maintenance Requirement in accordance with Clause 19.7.2.

The Authority shall approve or amend the monthly operation & maintenance statement/claim to reflect the amount due to the Contractor in accordance with this Agreement.

19.7.2 Payment for Operation & Maintenance shall be made in fixed monthly amounts in accordance with this Agreement. If the Operation & Maintenance Requirements set forth in Schedule-E are not met, reduction in payments shall be made in accordance with the provisions of Schedule-M. The reductions for non-compliance with the Operation & Maintenance Requirements shall be applied on the basis of monthly inspections by the Authority.

19.7.3 The deduction made on account of non-compliance with the Operation & Maintenance Requirements shall not be subsequently considered for payment after the compliance is achieved by repair or rectification.

19.7.4 The Authority shall pay to the Contractor every month any amount due under this Clause

19.7. The payment shall be made no later than 30 (thirty) days from the date of submission of the last claim for the relevant month.

19.8 Payment of Damages

19.8.1 The Contractor may claim Damages due and payable to it in accordance with the provisions of this Agreement.

19.8.2 The Authority, within 15 (fifteen) days of the receipt of the claim under Clause 19.8.1, after making adjustments in accordance with the provisions of this Agreement shall pay to the Contractor the amount due within a period of 30 (thirty) days from the date of the submission of the claim under this Clause 19.8. In the event of the failure of the Authority to make payment to the Contractor within the specified time, the Authority shall be liable to pay to the Contractor interest thereon and the provisions of Clause 19.9 shall apply *mutatis mutandis* thereto.

19.9 Time of payment and interest

19.9.1 The Authority shall pay to the Contractor any amount due under any payment certificate issued by the Authority’s Engineer in accordance with the provisions of this Article 19, or in accordance with any other clause of this Agreement as follows:

- (a) payment shall be made no later than 30 (thirty) days from the date of submission of the Stage Payment Statement by the Contractor to the Authority’s Engineer for certification in accordance with the provisions of Clause 19.4 for an IPC; provided that, in the event the IPC is not issued by the Authority’s Engineer within the aforesaid period of 30 (thirty) days, the Authority shall pay the

amount shown in the Contractor's Stage Payment Statement and any discrepancy therein shall be added to, or deducted from, the next payment certificate issued to the Contractor; and

- (b) payment shall be made no later than 30 (thirty) days from the date of submission of the Final Payment Certificate for Works along with the discharge submitted to the Authority's Engineer in accordance with the provisions of Clause 19.15 for certification.

19.9.2 In the event of the failure of the Authority to make payment to the Contractor within the time period stated in this Clause 19.9, the Authority shall be liable to pay to the Contractor interest at the Base Rate plus 2% (two percent), calculated at quarterly rests, on all sums remaining unpaid from the date on which the same should have been paid, calculated in accordance with the provisions of Clause 19.9.1(a) and (b) and till the date of actual payment.

19.10. Price adjustment for the Works

19.10.1 The amounts payable to the Contractor for Works shall be adjusted in accordance with the provisions of this Clause 19.10.

19.10.2 Subject to the provisions of Clause 19.10.3, the amounts payable to the Contractor for Works, shall be adjusted in the IPC issued by the Authority's Engineer for the increase or decrease in the index cost of inputs for the Works, by the addition or subtraction of the amounts determined by the formulae prescribed in Clause 19.10.4.

19.10.3 To the extent that full compensation for any increase or decrease in costs to the Contractor is not covered by the provisions of this or other Clauses in this Agreement, the costs and prices payable under this Agreement shall be deemed to include the amounts required to cover the contingency of such other increase or decrease of costs and prices.

19.10.4 The Contract Price shall be adjusted for increase or decrease in rates and price of labour, cement, steel, Plant, machinery and spares, bitumen, pipes, fuel and lubricants, and other material inputs in accordance with the principles, procedures and formulae specified below: **(as per OM No.15847/W Dt.19.11.2019 of Works Department, Govt. of Odisha):**

- (a) Price adjustment shall be applied on completion of the specified stage of the respective item of work in accordance with Schedule-H;
- (b) Adjustment for each item of work/stage shall be made separately.
- (c) Deleted
- (d) Deleted
- (e) Deleted
- (f) In case an IPC relates to a month which is within 3 (three) months from the Base Date, no price adjustment shall be applicable.

19.10.5 Contract price shall be adjusted for increase or decrease in rates and price of labour, materials, fuels and lubricants in accordance with the following principles and procedures and as per formula given in following Paras.

- (a) The price adjustment shall apply for the work done from the start date given in the contract data up to end of the initial intended completion date or extensions granted by the Engineer and shall not apply to the work carried out beyond the stipulated time for reasons attributable to the contractor.
- (b) The price adjustment shall be determined during each month from the formula given in following Paras.
- (c) Following expressions and meanings are assigned to the work done during each month:

R= Total value of work done during the month. It would include the amount of secured advance granted, if any, during the month, less the

amount of secured advance recovered, if any during the month. It will exclude value for works executed for extra items under variations.

19.10.6 To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clauses in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs

The formula (e) for adjustment of prices are:

19.10.6 (a)(i): **Adjustment of Other Materials Component**

Price adjustment for increase or decrease in cost of local materials other than cement, steel, bitumen, pipe and POL procured by the contractor shall be paid in accordance with the following formula:

$$V_M = 0.85 \times P_m/100 \times R \times (M_1 - M_0)/M_0$$

V_M = Increase or decrease in the cost of work during the month under consideration due to changes in rates for local materials other than cement, steel, bitumen and POL.

M_0 = The all India wholesale price index (all commodities) on 28 days preceding the date of opening of Bids, as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

M_1 = The all India wholesale price index (all commodities) for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_m = Percentage of local material component (other than cement, steel, bitumen and POL) of the work.

19.10.6 (a)(ii): **Adjustment for Cement Component**

Price adjustment for increase or decrease in the cost of cement procured by the contractor shall be paid in accordance with the following formula:

$$V_c = 0.85 \times P_c/100 \times R \times (C_1 - C_0)/C_0$$

V_c = Increase or decrease in the cost of work during the month under consideration due to changes in the rates for cement

C_0 = The all India wholesale price index for Ordinary Portland Cement (OPC) on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

C_1 = The all India wholesale price index for Ordinary Portland Cement (OPC) for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_c = Percentage of Cement Component of the Work.

19.10.6 (a)(iii): **Adjustment for Steel Component**

Price adjustment for increase or decrease in the cost of steel procured by the contractor shall be paid in accordance with the following formula:

$$V_s = 0.85 \times P_s/100 \times R \times (S_1 - S_0)/S_0$$

V_s = Increase or decrease in the cost of work during the month under consideration due to changes in the rates for steel.

S_0 = The all India wholesale price index for steel (Mild Steel long products) on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi

S_1 = The all India wholesale price index for steel (Mild Steel long products) for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_s = Percentage of steel component of the work

Note: For the application of this clause, index of (Mild Steel long products) has been chosen to represent steel group.

19.10.6 (a)(iv): **Adjustment of Bitumen Component**

Price adjustment for increase or decrease in the cost of bitumen shall be paid in accordance with the following formula:

$$V_b = 0.85 \times P_b/100 \times R \times (B_1 - B_0)/B_0$$

V_b = Increase or decrease in the cost of work during the month under consideration due to changes in the rate for bitumen.

B_0 = The official retail price of bulk bitumen at the IOCL/BPCL depot at nearest center on the day 28 days prior to date of opening of Bids.

B_1 = The official retail price of bulk bitumen at IOCL/BPCL depot at nearest center for the 15th day of the month under consideration.

P_b = Percentage of bitumen component of the work

19.10.6 (a)(v): **Adjustment towards differential cost of Pipes.**

Price adjustment for increase or decrease in the cost of pipe shall be paid in accordance with the following formula:

$$V_{pi} = 0.85 \times P_{pi}/100 \times R \times (P_{i1} - P_{i0})/P_{i0}$$

V_{pi} = Differential cost of pipe i.e. amount of increase or decrease in rupees to be paid or recovered during the month under consideration.

P_{pi} = Percentage of pipe component of the work

P_{i1} = **All India Whole sale price index of pipe** for the period under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_{i0} = All India Whole sale price index of pipe on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

19.10.6 (b): **Adjustment of Labour Component**

Price adjustment for increase or decrease in the cost due to labour shall be paid in accordance with the following formula:

$$V_L = 0.85 \times P_l/100 \times R \times (L_1 - L_0)/L_0$$

V_L = Increase or decrease in the cost of work during the month under consideration due to changes in rates for local labour.

L_0 = The minimum wages for unskilled labour as Notified by Government of Odisha as prevailed on the last stipulated date of receipt of tender including extension, if any.

L_1 = The minimum wages for unskilled labour as Notified by Government of Odisha as prevailed on the last date of the Month previous to the one under consideration.

P_l = Percentage of labour component of the work.

19.10.6 (c): **Adjustment of POL (fuel and lubricant) Component**

Price adjustment for increase or decrease in cost POL (fuel and lubricant) shall be paid in accordance with the following formula:

$$V_f = 0.85 \times P_f/100 \times R \times (F_1 - F_0)/F_0$$

V_f = Increase or decrease in the cost of work during the month under consideration due to changes in the rates for fuel and lubricants.

F_0 = The official retail price of High-Speed Diesel (HSD) at the existing consumer pumps of IOCL/ BPCL/ HPCL at nearest center on the day 28 days prior to the date of opening of Bids.

F_1 = The official retail price of HSD at the existing consumer pumps of IOCL/BPCL/ HPCL at nearest center for the 15th day of the month under

consideration .

$P_f =$ Percentage of fuel and lubricants component of the work

Note: For the application of this clause, the price of High-Speed Diesel oil has been chosen to represent fuel and lubricants group.

19.10.6 (d): **Adjustment for Plant and Machinery Spares Component**

(vi) Price adjustment for increase or decrease in the cost of plant and machinery spares procured by the Contractor shall be paid in accordance with the following formula:

$$V_p - 0.85 \times P_p / 100 \times R \times (P_1 - P_0) / P_0$$

V_p - Increase or decrease in the cost of work during the month under consideration due to changes in the rates for plant and machinery spares.

P_0 - The all India wholesale price index for manufacture of machinery for mining, quarrying and construction on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_1 - The all India wholesale price index for manufacture of machinery for mining, quarrying and construction for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_p - Percentage of plant and machinery spares component of the work.

Note: For the application of this clause, index of manufacturing of machinery for mining, quarrying and construction has been chosen to represent the Plant and machinery Spares group.

Regarding wholesale price Index (WPI) for appropriate commodity for payment of price adjustment, due to change of base year of WPI from 1993- 94 to 2004-05 & 2011-12, it is observed that, the commodity 'Bars and Rod', 'Cement', 'Heavy machinery and parts' included in the list of WPI 1993-94 series are not mentioned as such in the WPI 2004-05 & 2011-12 series. Therefore, the following items in the WPI 2004-05 & 2011-12 series shall be considered corresponding to items in WPI 1993-94 series:

| Sl. No. | Item in WPI 1993-94 series | Item in WPI 2004-05 series | Item in WPI 2011-12 series |
|---------|----------------------------|----------------------------|--|
| 1. | Cement | Grey Cement | Ordinary Port land cement |
| 2. | Bars & rods | Rebars | Mild steel long products |
| 3. | Heavy Machinery & parts | Construction Machinery | Manufacture of machinery for mining, quarrying & construction. |

19.10.6 (e): **APPLICATION OF ESCALATION CLAUSE:**

The contractor shall for the purpose of **availing reimbursement/refund of differential cost of steel, bitumen, cement, pipe, POL and wages, keep such books of account and other documents as are necessary to show that the amount of increase claimed or reduction available and shall allow inspection of the same by a duly authorized representative of Government and further, shall at the request of the Engineer-in-Charge**, furnish documents to be verified in such a manner as the Engineer-in-Charge may require any document and information kept. The contractor shall within a reasonable time of 15 days of his becoming aware of any alteration in the price of such material, wages of Labour and/or price of POL give notice

thereof to the Engineer-in-Charge stating that the same is given pursuant to this condition along with information relating to there to which he may be in a position to supply.

Percentage Table

| Sl. No. | Category of works | | % Component (cost wise) | | |
|---------|-----------------------------------|--------------------------------|--------------------------|-------------------------|--|
| | | | Labour (P _l) | P.O.L (P _f) | Steel (P _s)+ Cement(P _c)+ Bitumen (P _b)+ Pipes (P _{pi}) + Plant &Machinery Spare& Component (P _p) + Other Materials* |
| 1. | R&B works (% of component) | Road works | 5 | 5 | 90 |
| | | Bridge works | 5 | 5 | 90 |
| | | Building works | 5 | 5 | 90 |
| 2. | Irrigation works (% of component) | Structural work | 5 | 5 | 90 |
| | | Earth, Canal & Embankment work | 5 | 5 | 90 |
| 3. | P.H. Work | Structural work | 5 | 5 | 90 |
| | | Pipeline work | 5 | 5 | Pipe – 70% * Machinery + Other material -20% |
| | | Sewer line | 5 | 5 | Pipe – 70% * Machinery + Other material -20% |

**Note: Further break up may be worked out considering the consumption of Cement, Steel, Bitumen, pipe and Plant & Machinery Spare Component in the concerned works and shall be provided in the bid document in shape of "Schedule of Adjustment Data" as an "Appendix to Bid". (Enclosed herewith).*

Appendix to Bid

Schedule of Adjustment Data

[For all works, adjustment factor for Labour and POL shall be considered @ 5% each. Steel, Cement, Pipes, other Materials and Machinery shall contribute to 90% of Price Adjustment and shall be calculated for each work separately during preparation of estimate, shall be approved by the authority during technical sanction as a "Schedule of Adjustment Data" and shall form part of the Bid Document]

| Cl. No.6.19 offF2/P1 Contracts Sl. No. | Index description | Source of index | Base value* | Base Date* | Weightage of Item** |
|---|------------------------|---|----------------|---------------|------------------------|
| 19.10.6 (a)(i) | Other Materials | All India Whole sale price index (all commodities) as published by the Office of the Economic Advisor to the Govt. of India, Ministry of Commerce and industry. | | | |
| 19.10.6 (a)(ii) | Cement | All India Whole sale price index for Cement (Ordinary Portland Cement) as published by the Office of the Economic Advisor to the Govt. of India, Ministry of Commerce and industry. | | | |
| 19.10.6 (a)(iii) | Steel | All India Whole sale price index for Steel (Mild Steel-Long Products) as published by the Office of the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry | | | |
| 19.10.6 (a)(iv) | Bitumen (VG-30) | Official retail price of bulk bitumen at the nearest IOC/HPCL Depot. | | | |
| 19.10.6 (a)(v) | Pipes | All India Whole sale price index for the type of pipe under consideration , as published by the Office of the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry | | | |
| 19.10.6 (b) | Labour | Minimum Wage notified by the Labour and Employee's State Insurance Department of Government of Odisha, India. | | | 5% |
| 19.10.6 (c) | POL | Official retail price of HSD at nearest IOCL/ HPCL/ BPCL Consumer Pump Depot. | | | 5% |
| 19.10.6 (d) | Plant and Machinery | All India Whole sale price index for Manufacture of Machinery for Mining, Quarrying and Construction as published by the Office of the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry. | | | |
| Total : | | | | | 100% |

* Values to be filled up at the time of drawl of contract.

** Values to be filled up in the bid document.

19.11 Restrictions on price adjustment

Price adjustment shall be due and payable only in respect of the stages of Works for which the Stage Payment Statement has been submitted by the Contractor no later than 30 (thirty) days from the date of the applicable Project Milestone or the Scheduled Completion Date, as the case may be, including any Time Extension granted there for in accordance with the provisions of this Agreement. For the avoidance of doubt, in the event of submission of any Stage Payment Statement after the period specified herein, price adjustment shall be applicable until the date of the respective Project Milestone or the Scheduled Completion Date, as the case may be.

19.12. Price adjustment on labour for Operation & Maintenance of water supply Project.

The contract price for operation & maintenance shall be adjusted **quarterly** for increase or decrease in rates and prices of labour, materials & spare parts, fuel & lubricants & chemical etc. in accordance with the principles, procedures & formula specified below.

19.12.1: Price Adjustment on labour component

Differential cost of labour due to enhancement of minimum wages by the State Government will be adjusted in accordance with the following formula.

$$VOL = 0.85 \times PL \times R(L1 - Lo)/Lo$$

Where,

VOL = Increase in the payment on labour

PL = % of Labour component of the O&M contract price.

Lo = Minimum wages prevailing on the bid due date

L1 = The minimum wages for the first day of relevant quarter under consideration for determining price adjustment.

R = Value of O&M work done.

19.12.2: Price adjustment on O&M materials & Spare parts

Price adjustment for O&M materials & Spare parts component of the contract price for O&M shall be made in accordance with Wholesale Price Index (WPI) as per following formula.

$$VOM = 0.85 \times PM \times R(M1 - M0)/M0$$

Where,

VOM = Increase or decrease in the cost of O&M materials & Spare parts component during the period under consideration due to changes in the rates for relevant components as stated in 19.12.5.

PM = Materials & spare parts component of the O&M contract price.

M1 = The WPI for materials & Spare parts on the first day of month three months prior to the month to which the IPC relates.

M0 = The wholesale price index as published by the Ministry of Commerce & Industry, Government of India (Hereinafter called as "WPI") for materials & Spare parts for the month of base date.

R = Value of O&M work done.

19.12.3: Price adjustment on Fuel & Lubricants

$$VOF = 0.85 \times PF \times R(F1 - F0)/F0$$

VOF = Increase or decrease in the cost of Fuel & Lubricants component during the period under consideration due to changes in the rates for relevant components as stated in 19.12.5

PF is the percentage of fuel & lubricant component for the relevant item as stated in sub-paragraph 19.12.5

FI = The official retail price of HSD at the existing consumer pumps of IOC in the State of [Odisha] on the first day of the month three months prior to the month to which the IPC relates.

FO = The official retail price of highspeed diesel (HSD) oil at the existing consumer pumps of Indian Oil Corporation (“IOC”) in the State of [Odisha] on the Base Date.

R = Value of O&M work done.

19.12.4: Price adjustment on Chemicals & chemicals products

$$VOC = 0.85 PC \times R(C1 - C0)/C0$$

VOC = Increase or decrease in the cost of Chemicals & chemicals products component during the period under consideration due to changes in the rates for relevant components as stated in 19.12.5

PC is the percentage of chemicals, chemical product for the relevant item as stated in sub-paragraph 19.12.5.

C1 = The WPI for chemical & chemical products on the 1st day of month three months prior to the month to which the IPC relates.

CO = The WPI for chemical & chemical products for the month of base date
R = Value of O&M work done.

19.12.5 The following percentages shall govern the price adjustment of the contract price for O&M excluding the cost of energy.

| Sl.No | Components | Percentage |
|-------|------------------------------------|-------------|
| 01 | Labour component (PL) | 60 % |
| 02 | O&M materials & Spare parts (PM) | 29 % |
| 03 | Fuel & Lubricants (PF) | 3 % |
| 04 | Chemicals, chemicals products (PC) | 8 % |
| | Total | 100% |

19.13 Final Payment Statement

19.13.1 Within 60 (sixty) days after receiving the Completion Certificate under Clause 12.4, the Contractor shall submit to the Authority’s Engineer for consideration six copies of a Final Payment Statement (the “**Final Payment Statement**”) for Works, with supporting documents showing in detail, in the form prescribed by the Authority’s Engineer:

- (a) the summary of Contractor’s Stage Payment claims for Works as submitted in accordance with Clause 19.4;
- (b) the amounts received from the Authority against each claim; and
- (c) any further sums which the Contractor considers due to it from the Authority.

If the Authority’s Engineer disagrees with or cannot verify any part of the Final Payment Statement, the Contractor shall submit such further information as the Authority’s Engineer may reasonably require. The Authority’s Engineer shall deliver to the Authority:

- (i) an IPC for those parts of the Final Payment Statement which are not in dispute, along with a list of disputed items which shall then be settled in accordance with the provisions of Article 26; or
- (ii) a Final Payment Certificate in accordance with Clause 19.15 if there are no disputed items.

19.13.2 If the Authority’s Engineer does not prescribe the form referred to in Clause 19.13.1 within 15 (fifteen) days of the date of issue of the Completion Certificate, the Contractor shall submit the statement in such form as it deems fit.

19.14 Discharge

Upon submission of the Final Payment Statement for Works under Clause 19.13, the Contractor

shall give to the Authority, with a copy to the Authority's Engineer, a written discharge confirming that the total of the Final Payment Statement represents full and final settlement of all monies due to the Contractor in respect of this Agreement for all the Works arising out of this Agreement, except for any monies due to either Party on account of any Defect. Provided that such discharge shall become effective only after the payment due has been made in accordance with the Final Payment Certificate issued pursuant to Clause 19.15.

19.15 Final Payment Certificate

- 19.15.1 Within 30 (thirty) days after receipt of the Final Payment Statement for Works under Clause 19.13, and the written discharge under Clause 19.14, and there being no disputed items of claim, the Authority's Engineer shall deliver to the Authority, with a copy to the Contractor, a final payment certificate (the "**Final Payment Certificate**") stating the amount which, in the opinion of the Authority's Engineer, is finally due under this Agreement or otherwise. For the avoidance of doubt, before issuing the Final Payment Certificate, the Authority's Engineer shall ascertain from the Authority all amounts previously paid by the Authority and for all sums to which the Authority is entitled, the balance, if any, due from the Authority to the Contractor or from the Contractor to the Authority, as the case may be.
- 19.15.2 The Authority shall, in accordance with the provisions of Clause 19.9, pay to the Contractor the amount which is stated as being finally due in the **Final Payment Certificate**.

19.16 Final payment statement for Operation & Maintenance of Sewerage Project.

- 19.16.1 Within 30 (thirty) days after completion of the Operation & Maintenance Period, the Contractor shall submit to the Authority six copies of the final payment statement for Operation & Maintenance of the Sewerage Project, with supporting documents showing the details set forth below in the form prescribed by the Authority:
- (a) the total amount claimed in accordance with the monthly statement for Operation & Maintenance of Sewerage Project;
 - (b) the amount paid in accordance with the **Interim Payment Certificates**/claims; and
 - (c) any sums which the Contractor considers to be due to it, with supporting documents.
- 19.16.2 The Authority shall check and approve the final payment within 30 (thirty) days of the receipt of the final payment statement of Operation & Maintenance under Clause 19.16.1, segregating the items of amount payable from the items of amount disallowed. The Authority shall make payment on the basis of the final payment statement within a period of 30 (thirty) days thereafter.
- 19.16.3 If the Authority does not prescribe the form within 15 (fifteen) days of the date of issue of the Completion Certificate, the Contractor shall submit the statement in such form as it deems fit.

19.17 Change in law

- 19.17.1 If as a result of Change in Law, the Contractor suffers any additional costs in the execution of the Works or in relation to the performance of its other obligations under this Agreement, the Contractor shall, within 15 (fifteen) days from the date it becomes reasonably aware of such addition in cost, notify the Authority with a copy to the Authority's Engineer of such additional cost due to Change in Law.
- 19.17.2 If as a result of Change in Law, the Contractor benefits from any reduction in costs for the execution of this Agreement or in accordance with the provisions

of this Agreement, either Party shall, within 15 (fifteen) days from the date it becomes reasonably aware of such reduction in cost, notify the other Party with a copy to the Authority's Engineer of such reduction in cost due to Change in Law.

- 19.17.3 The Authority's Engineer shall, within 15 (fifteen) days from the date of receipt of the notice from the Contractor or the Authority, determine any addition or reduction to the Contract Price, as the case may be, due to the Change in Law.

19.18 Correction of Interim Payment Certificates

The Authority's Engineer may by an Interim Payment Certificate make any correction or modification in any previous Interim Payment Certificate issued by the Authority's Engineer.

19.19 Authority's claims

If the Authority considers itself to be entitled to any payment from the Contractor under any Clause of this Agreement, it shall give notice and particulars to the Contractor 20 (twenty) days before making the recovery from any amount due to the Contractor, and shall take into consideration the representation, if any, made by the Contractor in this behalf, before making such recovery.

19.20 Bonus for early completion

In the event that the Project Completion Date occurs prior to the Scheduled Completion Date, the Contractor shall be entitled to receive a payment of bonus equivalent to **0.03%** (zero point zero three percent) of the Contract Price **for each day** by which the Project Completion Date precedes the Scheduled Completion Date, but subject to a **maximum of 3% (three percent)** of the Contract Price. Provided, however, that the payment of bonus, if any, shall be made only after the issue of the Completion Certificate. For the avoidance of the doubt, the Parties agree that for the purpose of determining the bonus payable hereunder, the Contract Price shall always be deemed to be the amount specified in Clause 19.1.1, and shall exclude any revision thereof for any reason. The Parties also agree that bonus shall be payable only if each work for which Extension of Time has been granted is completed within respective Extended Time.

ARTICLE 20

INSURANCE

The Contractor shall effect and maintain at its own cost the insurances specified in Schedule-P and as per the requirements under the Applicable Laws.

20.1 Insurance for Work

20.1.1 Subject to the provisions of Clause 21.6, the Authority and the Contractor shall, in accordance with its obligations as provided for in this Agreement, be liable to bear the cost of any loss or damage that does not fall within the scope of this Article 20 or cannot be recovered from the insurers.

20.1.2 Subject to the exceptions specified in Clause 20.1.4 below, the Contractor shall, save and except as provided for in this Agreement, fully indemnify, hold harmless and defend the Authority from and against any and all losses, damages, costs, charges and/or claims with respect to:

(a) **the death of or injury to any person; or**

(b) **the loss of or damage to any property (other than the Works);**

that may arise out of or in consequence of any breach by the Contractor of this Agreement during the execution of the Works or the remedying of any Defects therein.

20.1.3 Notwithstanding anything stated above in Clause 20.1.3, the Authority shall fully indemnify the Contractor from and against any and all losses, damages, costs, charges, proceedings and/or claims arising out of or with respect to

(a) the use or occupation of land or any part thereof by the Authority;

(b) the right of the Authority to execute the Works, or any part thereof, on, over, under, in or through any land;

(c) the damage to property which is the unavoidable result of the execution and completion of the Works, or the remedying of any Defects therein, in accordance with this Agreement; and

(d) the death of or injury to persons or loss of or damage to property resulting from any act or neglect of the Authority, its agents, servants or other contractors, not being employed by the Contractor.

Provided that, in the event of any injury or damage as a result of the contributory negligence of the Contractor, the Authority shall be liable to indemnify the Contractor from and against any and all losses, damages, costs, charges, proceedings and/or claims to the extent as may be proportionately determined to be the liability of the Authority, its servants or agents or other contractors not associated with the Contractor in such injury or damage.

20.1.4 Without prejudice to the obligations of the Parties as specified under Clauses 20.1.3 and 20.1.4, the Contractor shall maintain or effect such third-party insurances as may be required under the Applicable Laws.

20.1.5 The Contractor shall provide to the Authority, within 30 days of the Appointed Date, evidence of professional liability insurance maintained by its Design Director and/or consultants to cover the risk of professional negligence in the design of Works. The professional liability coverage shall be for a sum of not less than [3% (three per cent)] of the Contract Price and shall be maintained until the end of the Defects Liability Period.

20.1.6 Insurance for Construction period shall be in the scope of bidder

20.2 Notice to the Authority

No later than 15 (fifteen) days after the date of this Agreement, the Contractor shall by notice furnish to the Authority, in reasonable detail, information in respect of the

insurances that it proposes to effect and maintain in accordance with this Article 20. Within 15 (fifteen) days of receipt of such notice, the Authority may require the Contractor to effect and maintain such other insurances as may be necessary pursuant hereto, and in the event of any difference or disagreement relating to any such insurance, the Dispute Resolution Procedure shall apply.

20.3 Evidence of Insurance Cover

20.3.1 All insurances obtained by the Contractor in accordance with this Article 20 shall be maintained with insurers on terms consistent with Good Industry Practice. Within 10 (ten) days from the Appointed Date, the Contractor shall furnish to the Authority notarised true copies of the certificate(s) of insurance, copies of insurance policies and premium payment receipts in respect of such insurance, and no such insurance shall be cancelled, modified, or allowed to expire or lapse until the expiration of at least 45 (forty-five) days after notice of such proposed cancellation, modification or non-renewal has been delivered by the Contractor to the Authority. The Contractor shall act in accordance with the directions of the Authority. Provided that the Contractor shall produce to the Authority the insurance policies in force and the receipts for payment of the current premium.

20.3.2 The Contractor shall ensure the adequacy of the insurances at all times in accordance with the provisions of this Agreement.

20.4 Remedy for failure to insure

If the Contractor shall fail to effect and keep in force all insurances for which it is responsible pursuant hereto, the Authority shall have the option to either keep in force any such insurances, and pay such premium and recover the costs thereof from the Contractor, or in the event of computation of a Termination Payment, treat an amount equal to the Insurance Cover as deemed to have been received by the Contractor.

20.5 Waiver of subrogation

All insurance policies in respect of the insurance obtained by the Contractor pursuant to this Article 20 shall include a waiver of any and all rights of subrogation or recovery of the insurers there under against, inter alia, the Authority, and its assigns, successors, undertakings and their subsidiaries, Affiliates, employees, insurers and underwriters, and of any right of the insurers to any set-off or counterclaim or any other deduction, whether by attachment or otherwise, in respect of any liability of any such person insured under any such policy or in any way connected with any loss, liability or obligation covered by such policies of insurance.

20.6 Contractor's waiver

The Contractor hereby further releases, assigns and waives any and all rights of subrogation or recovery against, inter alia, the Authority and its assigns, undertakings and their subsidiaries, Affiliates, employees, successors, insurers and underwriters, which the Contractor may otherwise have or acquire in or from or in any way connected with any loss, liability or obligation covered by policies of insurance maintained or required to be maintained by the Contractor pursuant to this Agreement (other than third party liability insurance policies) or because of deductible clauses in or inadequacy of limits of any such policies of insurance.

20.7 Cross liabilities

Any such insurance maintained or effected in pursuance of **this Article 20** shall include a cross liability clause such that the insurance shall apply to the Contractor and to the Authority as separately insured.

20.8 Accident or injury to workmen

Notwithstanding anything stated in this Agreement, it is hereby expressly agreed between the Parties that the Authority shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or Sub-contractor, save and except as for death or injury resulting from

any act, omission or default of the Authority, its agents or servants. The Contractor shall indemnify and keep indemnified the Authority from and against all such claims, proceedings, damages, costs, charges, and expenses whatsoever in respect of the above save and except for those acts, omissions or defaults for which the Authority shall be liable.

20.9 Insurance against accident to workmen

The Contractor shall effect and maintain during the Agreement such insurances as may be required to insure the Contractor's personnel and any other persons employed by it on the Sewerage Project from and against any liability incurred in pursuance of this Article 20. Provided that for the purposes of this Clause 20.9, the Contractor's personnel/any person employed by the Contractor shall include the Sub-contractor and its personnel. It is further provided that, in respect of any persons employed by any Sub-contractor, the Contractor's obligations to insure as aforesaid under this Clause 20.9 shall be discharged if the Sub-contractor shall have insured against any liability in respect of such persons in such manner that the Authority is indemnified under the policy. The Contractor shall require such Sub-contractor to produce before the Authority, when required, such policy of insurance and the receipt for payment of the current premium within 10 (ten) days of such demand being made by the Authority.

20.10 Application of insurance proceeds

The proceeds from all insurance claims, except for life and injury, shall be applied for any necessary repair, reconstruction, reinstatement, replacement, improvement, delivery or installation of the Sewerage Project and the provisions of this Agreement in respect of construction of works shall apply *mutatis mutandis* to the works undertaken out of the proceeds of insurance.

20.11 Compliance with policy conditions

Each Party hereby expressly agrees to fully indemnify the other Party from and against all losses and claims arising from its failure to comply with conditions imposed by the insurance policies effected in accordance with this Agreement.

Part V
Force Majeure and Termination

ARTICLE 21

FORCE MAJEURE

21.1 Force Majeure

As used in this Agreement, the expression “Force Majeure” or “Force Majeure Event” shall mean occurrence in India of any or all of Non-Political Event, Indirect Political Event and Political Event, as defined in Clauses 21.2, 21.3 and 21.4 respectively, if it affects the performance by the Party claiming the benefit of Force Majeure (the “**Affected Party**”) of its obligations under this Agreement and which act or event (i) is beyond the reasonable control of the Affected Party, and (ii) the Affected Party could not have prevented or overcome by exercise of due diligence and following Good Industry Practice, and (iii) has Material Adverse Effect on the Affected Party.

21.2 Non-Political Event

A Non-Political Event shall mean one or more of the following acts or events:

- (a) act of God, epidemic, extremely adverse weather conditions, lightning, earthquake, landslide, cyclone, flood, volcanic eruption, chemical or radioactive contamination or ionising radiation, fire or explosion (to the extent of contamination or radiation or fire or explosion originating from a source external to the Site);
- (b) strikes or boycotts (other than those involving the Contractor, Sub-contractors or their respective employees/representatives, or attributable to any act or omission of any of them) interrupting supplies and services to the Sewerage Project for a continuous period of 24 (twenty-four) hours and an aggregate period exceeding 30 (thirty) days in an Accounting Year, and not being an Indirect Political Event set forth in Clause 21.3;
- (c) any failure or delay of a Sub-contractor but only to the extent caused by another Non-Political Event;
- (d) any judgement or order of any court of competent jurisdiction or statutory authority made against the Contractor in any proceedings for reasons other than (i) failure of the Contractor to comply with any Applicable Law or Applicable Permit, or (ii) on account of breach of any Applicable Law or Applicable Permit or of any contract, or (iii) enforcement of this Agreement, or (iv) exercise of any of its rights under this Agreement by the Authority;
- (e) the discovery of geological conditions, toxic contamination or archaeological remains on the Site that could not reasonably have been expected to be discovered through a site inspection; or
- (f) any event or circumstances of a nature analogous to any of the foregoing.

21.3 Indirect Political Event

An Indirect Political Event shall mean one or more of the following acts or events:

- (a) an act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, blockade, embargo, riot, insurrection, terrorist or military action, civil commotion or politically motivated sabotage;
- (b) industry-wide or State-wide strikes or industrial action for a continuous period of 24 (twenty-four) hours and exceeding an aggregate period of 30 (thirty) days in an Accounting Year;
- (c) any civil commotion, boycott or political agitation which prevents construction of the Sewerage Project by the Contractor for an aggregate period exceeding 30 (thirty) days in an Accounting Year;
- (d) any failure or delay of a Sub-contractor to the extent caused by any Indirect Political Event;

- (e) any Indirect Political Event that causes a Non-Political Event; or
- (f) any event or circumstances of a nature analogous to any of the foregoing.

21.4 Political Event

A Political Event shall mean one or more of the following acts or events by or on account of any Government Instrumentality:

- (a) Change in Law, only if consequences thereof cannot be dealt with under and in accordance with the provisions of Clause 19.17;
- (b) compulsory acquisition in national interest or expropriation of any Project Assets or rights of the Contractor or of the Sub-Contractors;
- (c) unlawful or unauthorised or without jurisdiction revocation of, or refusal to renew or grant without valid cause, any clearance, license, permit, authorisation, no objection certificate, consent, approval or exemption required by the Contractor or any of the Sub-contractors to perform their respective obligations under this Agreement; provided that such delay, modification, denial, refusal or revocation did not result from the Contractor's or any Sub-contractor's inability or failure to comply with any condition relating to grant, maintenance or renewal of such clearance, license, authorisation, no objection certificate, exemption, consent, approval or permit;
- (d) any failure or delay of a Sub-contractor but only to the extent caused by another Political Event; or
- (e) any event or circumstances of a nature analogous to any of the foregoing.

21.5 Duty to report Force Majeure Event

21.5.1 Upon occurrence of a Force Majeure Event, the Affected Party shall by notice report such occurrence to the other Party forthwith. Any notice pursuant hereto shall include full particulars of:

- (a) the nature and extent of each Force Majeure Event which is the subject of any claim for relief under this Article 21 with evidence in support thereof;
- (b) the estimated duration and the effect or probable effect which such Force Majeure Event is having or will have on the Affected Party's performance of its obligations under this Agreement;
- (c) the measures which the Affected Party is taking or proposes to take for alleviating the impact of such Force Majeure Event; and
- (d) any other information relevant to the Affected Party's claim.

21.5.2 The Affected Party shall not be entitled to any relief for or in respect of a Force Majeure Event unless it shall have notified the other Party of the occurrence of the Force Majeure Event as soon as reasonably practicable, and in any event no later than 10 (ten) days after the Affected Party knew, or ought reasonably to have known, of its occurrence, and shall have given particulars of the probable material effect that the Force Majeure Event is likely to have on the performance of its obligations under this Agreement.

21.5.3 For so long as the Affected Party continues to claim to be materially affected by such Force Majeure Event, it shall provide the other Party with regular (and not less than weekly) reports containing information as required by Clause 21.5.1, and such other information as the other Party may reasonably request the Affected Party to provide.

21.6 Effect of Force Majeure Event on the Agreement

21.6.1 Upon the occurrence of any Force Majeure after the Appointed Date, the costs incurred and attributable to such event and directly relating to this Agreement (the "**Force Majeure costs**") shall be allocated and paid as follows:

- (a) upon occurrence of a Non-Political Event, the Parties shall bear their respective Force Majeure costs and neither Party shall be required to pay to the other Party any costs thereof;

- (b) upon occurrence of an Indirect Political Event, all Force Majeure costs attributable to such Indirect Political Event, and not exceeding the Insurance Cover for such Indirect Political Event, shall be borne by the Contractor, and to the extent Force Majeure costs exceed such Insurance Cover, one half of such excess amount shall be reimbursed by the Authority to the Contractor for the Force Majeure events; and
- (c) upon occurrence of a Political Event, all Force Majeure costs attributable to such Political Event shall be reimbursed by the Authority to the Contractor.

For the avoidance of doubt, Force Majeure costs may include costs directly attributable to the Force Majeure Event, but shall not include debt repayment obligations, if any, of the Contractor.

21.6.2 Save and except as expressly provided in this Article 21, neither Party shall be liable in any manner whatsoever to the other Party in respect of any loss, damage, cost, expense, claims, demands and proceedings relating to or arising out of occurrence or existence of any Force Majeure Event or exercise of any right pursuant hereto.

21.6.3 Upon the occurrence of any Force Majeure Event during the Construction Period, the Project Completion Schedule for and in respect of the affected Works shall be extended on a day for day basis for such period as performance of the Contractor's obligations is affected on account of the Force Majeure Event or its subsisting effects.

21.7 Termination Notice for Force Majeure Event

21.7.1 If a Force Majeure Event subsists for a period of 60 (sixty) days or more within a continuous period of 120 (one hundred and twenty) days, either Party may in its discretion terminate this Agreement by issuing a Termination Notice to the other Party without being liable in any manner whatsoever, save as provided in this Article 21, and upon issue of such Termination Notice, this Agreement shall, notwithstanding anything to the contrary contained herein, stand terminated forthwith; provided that before issuing such Termination Notice, the Party intending to issue the Termination Notice shall inform the other Party of such intention and grant 15 (fifteen) days' time to make a representation, and may after the expiry of such 15 (fifteen) days period, whether or not it is in receipt of such representation, in its sole discretion issue the Termination Notice.

21.8 Termination Payment for Force Majeure Event

21.8.1 In the event of this Agreement being terminated on account of a Non-Political Event, the Termination Payment shall be an amount equal to the sum payable under Clause 23.5.

Provided that in the event Termination occurs during the Operation & Maintenance Period, the Authority's Engineer shall only determine the value of Works associated with **Operation & Maintenance**.

21.8.2 If Termination is on account of an Indirect Political Event, the Termination Payment shall include:

- (a) any sums due and payable under Clause 23.5; and
- (b) the reasonable cost, as determined by the Authority's Engineer, of the Plant and Materials procured by the Contractor and transferred to the Authority for use in Construction or Operation & Maintenance only if such Plant and Materials are in conformity with the Specifications and Standards;

Provided that in the event Termination occurs during the Operation & Maintenance Period, the Authority's Engineer shall only determine the value of Works associated with **Operation & Maintenance**.

21.8.3 If Termination is on account of a Political Event, the Authority shall make a Termination Payment to the Contractor in an amount that would be payable under Clause 23.6.2 as if it were an Authority Default.

21.9 Dispute resolution

In the event that the Parties are unable to agree in good faith about the occurrence or existence of a Force Majeure Event, such Dispute shall be finally settled in accordance with the Dispute Resolution Procedure; provided that the burden of proof as to the occurrence or existence of such Force Majeure Event shall be upon the Party claiming relief and/or excuse on account of such Force Majeure Event.

21.10 Excuse from performance of obligations

If the Affected Party is rendered wholly or partially unable to perform its obligations under this Agreement because of a Force Majeure Event, it shall be excused from performance of such of its obligations to the extent it is unable to perform on account of such Force Majeure Event; provided that:

- (a) the suspension of performance shall be of no greater scope and of no longer duration than is reasonably required by the Force Majeure Event;
- (b) the Affected Party shall make all reasonable efforts to mitigate or limit damage to the other Party arising out of or as a result of the existence or occurrence of such Force Majeure Event and to cure the same with due diligence; and
- (c) when the Affected Party is able to resume performance of its obligations under this Agreement, it shall give to the other Party notice to that effect and shall promptly resume performance of its obligations hereunder.

ARTICLE 22

SUSPENSION OF CONTRACTOR'S RIGHTS

22.1 Suspension upon Contractor Default

Upon occurrence of a Contractor Default, the Authority shall be entitled, without prejudice to its other rights and remedies under this Agreement including its right of Termination hereunder, to (i) suspend carrying out of the Works or **Operation & Maintenance** or any part thereof, and (ii) carry out such Works or **Operation & Maintenance** itself or authorise any other person to exercise or perform the same on its behalf during such suspension (the "**Suspension**"). Suspension hereunder shall be effective forthwith upon issue of notice by the Authority to the Contractor and may extend up to a period not exceeding 90 (ninety) days from the date of issue of such notice.

22.2 Authority to act on behalf of Contractor

During the period of Suspension hereunder, all rights and liabilities vested in the Contractor in accordance with the provisions of this Agreement shall continue to vest therein and all things done or actions taken, including expenditure incurred by the Authority for discharging the obligations of the Contractor under and in accordance with this Agreement shall be deemed to have been done or taken for and on behalf of the Contractor and the Contractor undertakes to indemnify the Authority for all costs incurred during such period. The Contractor hereby licenses and sub-licenses respectively, the Authority or any other person authorised by it under Clause 22.1 to use during Suspension, all Intellectual Property belonging to or licensed to the Contractor with respect to the Sewerage Project and its design, engineering, construction and **operation & maintenance**, and which is used or created by the Contractor in performing its obligations under the Agreement.

22.3 Revocation of Suspension

22.3.1 In the event that the Authority shall have rectified or removed the cause of Suspension within a period not exceeding 60 (sixty) days from the date of Suspension, it shall revoke the Suspension forthwith and restore all rights of the Contractor under this Agreement. For the avoidance of doubt, the Parties expressly agree that the Authority may, in its discretion, revoke the Suspension at any time, whether or not the cause of Suspension has been rectified or removed hereunder.

22.3.2 Upon the Contractor having cured the Contractor Default within a period not exceeding 60 (sixty) days from the date of Suspension, the Authority shall revoke the Suspension forthwith and restore all rights of the Contractor under this Agreement.

22.4 Termination

22.4.1 At any time during the period of Suspension under this Article 22, the Contractor may by notice require the Authority to revoke the Suspension and issue a Termination Notice. The Authority shall, within 15 (fifteen) days of receipt of such notice, terminate this Agreement under and in accordance with Article 23.

22.4.2 Notwithstanding anything to the contrary contained in this Agreement, in the event that Suspension is not revoked within 90 (ninety) days from the date of Suspension hereunder, the Agreement shall, upon expiry of the aforesaid period, be deemed to have been terminated by mutual agreement of the Parties and all the provisions of this Agreement shall apply, *mutatis mutandis*, to such Termination as if a Termination Notice had been issued by the Authority upon occurrence of a Contractor Default.

ARTICLE 23

TERMINATION

23.1 Termination for Contractor Default

23.1.1 Save as otherwise provided in this Agreement, in the event that any of the defaults specified below shall have occurred, and the Contractor fails to cure the default within the Cure Period set forth below, or where no Cure Period is specified, then within a Cure Period of 60 (sixty) days, the Contractor shall be deemed to be in default of this Agreement (the “**Contractor Default**”), unless the default has occurred solely as a result of any breach of this Agreement by the Authority or dueto Force Majeure. The defaults referred to herein shall include:

- (a) the Contractor fails to provide, extendor replenish, as the case may be, the Performance Security in accordance with this Agreement;
- (b) subsequent to the replenishment or furnishing of fresh Performance Securityin accordance with Clause 7.3, the Contractor fails to cure, within a Cure Period of 30 (thirty) days, the Contractor Default for which the whole or partof the Performance Security was appropriated;
- (c) the Contractor does not achieve the latest outstanding Project Milestone due in accordance with the provisions of Schedule-J, subject to any Time Extension, and continues to be in default for 45 (forty five) days;
- (d) the Contractor abandons or manifests intention to abandon the construction or **Operation & Maintenance** of the **Box Drain Project** without the prior written consent of the Authority;
- (e) the Contractor fails to proceed with the Works in accordance with the provisions of Clause 10.1 or stops Works **and/or the operation & maintenance** for 30 (thirty) days without reflecting the same in the current programme and such stoppage has not been authorized by the Authority’s Engineer;
- (f) the Project Completion Date does not occur within the period specified in Schedule-J for the Scheduled Completion Date, or any extension thereof;
- (g) failure to complete the Punch List items within the periods stipulated therefore in Clause 12.2.1;
- (h) the Contractor fails to rectify any Defect, the non-rectification of which shall have a Material Adverse Effect on the Project, within the time specified in this Agreement or as directed by the Authority’s Engineer;
- (i) the Contractor subcontracts the Works or any part thereof in violation of this Agreement or assigns any part of the Works without the prior approval of the Authority;
- (j) the Contractor creates any Encumbrance in breach of this Agreement;
- (k) an execution levied on any of the assets of the Contractor has caused a Material Adverse Effect;
- (l) the Contractor is adjudged bankrupt or insolvent, or if a trustee or receiver is appointed for the Contractor or for the whole or material part of its assets that has a material bearing on the Project;
- (m) the Contractor has been, or is in the process of being liquidated, dissolved, wound-up, amalgamated or reconstituted in a manner that would cause, in the reasonable opinion of the Authority, a Material Adverse Effect;
- (n) a resolution for winding up of the Contractor is passed, or any petition for winding up of the Contractor is admitted by a court of competent jurisdiction and a provisional liquidator or receiver is appointed and such order has not been set aside within 90 (ninety) days of the date thereof or the Contractor is ordered to be wound up by court except for the purpose of amalgamation or

reconstruction; provided that, as part of such amalgamation or reconstruction, the entire property, assets and undertaking of the Contractor are transferred to the amalgamated or reconstructed entity and that the amalgamated or reconstructed entity has unconditionally assumed the obligations of the Contractor under this Agreement; and provided that:

- (i) the amalgamated or reconstructed entity has the capability and experience necessary for the performance of its obligations under this Agreement; and
- (ii) the amalgamated or reconstructed entity has the financial standing to perform its obligations under this Agreement and has a credit worthiness at least as good as that of the Contractor as at the Appointed Date;
- (o) any representation or warranty of the Contractor herein contained which is, as of the date hereof, found to be materially false or the Contractor is at any time hereafter found to be in breach thereof;
- (p) the Contractor submits to the Authority any statement, notice or other document, in written or electronic form, which has a material effect on the Authority's rights, obligations or interests and which is false in material particulars;
- (q) the Contractor has failed to fulfil any obligation, for which failure Termination has been specified in this Agreement; or
- (r) the Contractor commits a default in complying with any other provision of this Agreement if such a default causes a Material Adverse Effect on the Project or on the Authority.

23.1.2 Without prejudice to any other rights or remedies which the Authority may have under this Agreement, upon occurrence of a Contractor Default, the Authority shall be entitled to terminate this Agreement by issuing a Termination Notice to the Contractor; provided that before issuing the Termination Notice, the Authority shall by a notice inform the Contractor of its intention to issue such Termination Notice and grant 15 (fifteen) days to the Contractor to make a representation, and may after the expiry of such 15 (fifteen) days, whether or not it is in receipt of such representation, issue the Termination Notice.

23.1.3 After termination of this Agreement for Contractor Default, the Authority may complete the Works and/or arrange for any other entities to do so. The Authority and these entities may then use any Materials, Plant and equipment, Contractor's documents and other design documents made by or on behalf of the Contractor.

23.2 Termination for Authority Default

23.2.1 In the event that any of the defaults specified below shall have occurred, and the Authority fails to cure such default within a Cure Period of 90 (ninety) days or such longer period as has been expressly provided in this Agreement, the Authority shall be deemed to be in default of this Agreement (the "**Authority Default**") unless the default has occurred as a result of any breach of this Agreement by the Contractor or due to Force Majeure. The defaults referred to herein shall include:

- (a) the Authority commits a material default in complying with any of the provisions of this Agreement and such default has a Material Adverse Effect on the Contractor;
- (b) the Authority has failed to make payment of any amount due and payable to the Contractor within the period specified in this Agreement;
- (c) the Authority has failed to provide, within a period of 180 (one hundred and eighty) days from the Appointed Date, the environmental clearances required for construction of the Sewerage Project;

- (d) the Authority repudiates this Agreement or otherwise takes any action that amounts to or manifests an irrevocable intention not to be bound by this Agreement; or
- (e) the Authority's Engineer fails to issue the relevant Interim Payment Certificate within 60 (sixty) days after receiving a statement and supporting documents.

23.2.2 Without prejudice to any other right or remedy which the Contractor may have under this Agreement, upon occurrence of an Authority Default, the Contractor shall be entitled to terminate this Agreement by issuing a Termination Notice to the Authority; provided that before issuing the Termination Notice, the Contractor shall by a notice inform the Authority of its intention to issue the Termination Notice and grant 15 (fifteen) days to the Authority to make a representation, and may after the expiry of such 15 (fifteen) days, whether or not it is in receipt of such representation, issue the Termination Notice.

If on the consideration of the Authority's representation or otherwise, the contractor does not issue the Termination Notice on such 15th day and prefers to continue with the project, it is deemed that the cause of action of the Termination Notice has been condoned by the Contractor. Hence, he forfeits his right to any other remedy on that count.

23.3 Termination for Authority's convenience

Notwithstanding anything stated hereinabove, the Authority may terminate this Agreement for convenience. The termination shall **take effect 30 (thirty) days** from the date of notice hereunder.

23.4 Requirements after Termination

Upon Termination of this Agreement in accordance with the terms of this Article 23, the Contractor shall comply with and conform to the following:

- (a) deliver to the Authority all Plant and Materials which shall have become the property of the Authority under this Article 23;
- (b) deliver all relevant records, reports, Intellectual Property and other licences pertaining to the Works, **Operation & Maintenance** other design documents and in case of Termination occurring after the Provisional Certificate has been issued, the "as built" Drawings for the Works;
- (c) transfer and/or deliver all Applicable Permits to the extent permissible under Applicable Laws; and
- (d) vacate the Site within 15 (fifteen) days.

23.5 Valuation of Unpaid Works

23.5.1 Within a period of 45 (forty-five) days after Termination under Clause 23.1, 23.2 or 23.3, as the case may be, has taken effect, the Authority's Engineer shall proceed in accordance with Clause 18.5 to determine as follows the valuation of unpaid Works (the "**Valuation of Unpaid Works**"):

- (a) value of the completed stage of the Works, less payments already made;
- (b) reasonable value of the partially completed stages of works as on the date of Termination, only if such works conform with the Specifications and Standards; and
- (c) Deleted

and shall adjust from the sum thereof (i) any other amounts payable or recoverable, as the case may be, in accordance with the provisions of this Agreement; and (ii) all taxes due to be deducted at source.

23.5.2 The Valuation of Unpaid Works shall be communicated to the Authority, with a copy to the Contractor, within a period of 30 (thirty) days from the date of Termination.

23.6 Termination Payment

23.6.1 Upon Termination on account of Contractor's Default under Clause 23.1, the Authority shall:

- (a) **encash** and appropriate the Performance Security and Retention Money, or in the event the Contractor has failed to replenish or extend the Performance Security, claim the amount stipulated in Clause 7.1.1, as agreed pre-determined compensation to the Authority for any losses, delays and cost of completing the Works and **Operation & Maintenance** if any;
- (b) **encash** and appropriate the bank guarantee, if any, for and in respect of the outstanding Advance Payment and interest thereon; and
- (c) pay to the Contractor, by way of Termination Payment, an amount equivalent to the Valuation of Unpaid Works after adjusting any other sums payable or recoverable, as the case may be, in accordance with the provisions of this Agreement.

23.6.2 Upon Termination on account of an Authority Default under Clause 23.2 or for Authority's convenience under Clause 23.3, the Authority shall:

- (a) return the Performance Security and Retention Money forthwith;
- (b) encash and appropriate the bank guarantee, if any, for and in respect of the outstanding Advance Payment; and
- (c) pay to the Contractor, by way of Termination Payment, an amount equal to:
 - (i) Valuation of Unpaid Works;
 - (ii) the reasonable cost, as determined by the Authority's Engineer, of the Plant and Materials procured by the Contractor and transferred to the Authority for its use, only if such Plant and Materials are in conformity with the Specifications and Standards;
 - (iii) the reasonable cost of temporary works, as determined by the Authority's Engineer; and
 - (iv) **10% (ten percent)** of the cost of the Works **Operation & Maintenance** that are not commenced or not completed,

and shall adjust from the sum thereof (i) any other amounts payable or recoverable, as the case may be, in accordance with the provisions of this Agreement, and (ii) all taxes due to be deducted at source.

23.6.3 Termination Payment shall become due and payable to the Contractor within 30 (thirty) days of a demand being made by the Contractor to the Authority with the necessary particulars, and in the event of any delay, the Authority shall pay interest at the Base Rate plus 2% (two percent), calculated at quarterly rests, on the amount of Termination Payment remaining unpaid; provided that such delay shall not exceed 90 (ninety) days. For the avoidance of doubt, it is expressly agreed that Termination Payment shall constitute full discharge by the Authority of its payment obligations in respect thereof hereunder.

23.6.4 The Contractor expressly agrees that Termination Payment under this Article 23 shall constitute a full and final settlement of all claims of the Contractor on account of Termination of this Agreement and that it shall not have any further right or claim under any law, treaty, convention, contract or otherwise.

23.7 Other rights and obligations of the Parties

Upon Termination for any reason whatsoever

- (a) property and ownership in all Materials, Plant and Works and the Sewerage Project shall, as between the Contractor and the Authority, vest in the Authority in whole; provided that the foregoing shall be without prejudice to Clause 23.6
- b) risk of loss or damage to any Materials, Plant or Works and the care and custody thereof shall pass from the Contractor to the Authority; and
- (c) the Authority shall be entitled to restrain the Contractor and any person

claiming through or under the Agreement from entering upon the Site or any part of the Project except for taking possession of materials, stores, implements, construction plants and equipment of the Contractor, which have not been vested in the Authority in accordance with the provisions of this Agreement.

23.8 Survival of rights

Notwithstanding anything to the contrary contained in this Agreement any Termination pursuant to the provisions of this Agreement shall be without prejudice to the accrued rights of either Party including its right to claim and recover money damages, insurance proceeds, security deposits, and other rights and remedies, which it may have in law or Agreement. All rights and obligations of either Party under this Agreement, including Termination Payments, shall survive the Termination up to a period of 3 (three) years for giving effect to such rights and obligations.

Part VI
Other Provisions

ARTICLE 24

ASSIGNMENT AND CHARGES

24.1 Restrictions on assignment and charges

This Agreement shall not be assigned by the Contractor to any person, save and except with the prior consent in writing of the Authority, which consent the Authority shall be entitled to decline without assigning any reason.

24.2 Hypothecation of Materials or Plant

Notwithstanding the provisions of Clause 24.1, the Contractor may pledge or hypothecate to its lenders, any Materials or Plant prior to their incorporation in the Works. Further, the Contractor may, by written notice to the Authority, assign its right to receive payments under this Agreement either absolutely or by way of charge, to any person providing financing to the Contractor in connection with the performance of the Contractor's obligations under this Agreement. The Contractor acknowledges that any such assignment by the Contractor shall not relieve the Contractor from any obligations, duty or responsibility under this Agreement.

ARTICLE 25

LIABILITY AND INDEMNITY

25.1 General indemnity

25.1.1 The Contractor will indemnify, defend, save and hold harmless the Authority and its officers, servants, agents, Government Instrumentalities and Government owned and/or controlled entities/enterprises, (the “**Authority Indemnified Persons**”) against any and all suits, proceedings, actions, demands and third party claims for any loss, damage, cost and expense of whatever kind and nature, whether arising out of any breach by the Contractor of any of its obligations under this Agreement or from any negligence under the Agreement, including any errors or deficiencies in the design documents, or tort or on any other ground whatsoever, except to the extent that any such suits, proceedings, actions, demands and claims have arisen due to any negligent act or omission, or breach or default of this Agreement on the part of the Authority Indemnified Persons.

25.2 Indemnity by the Contractor

25.2.1 Without limiting the generality of Clause 25.1, the Contractor shall fully indemnify, hold harmless and defend the Authority and the Authority Indemnified Persons from and against any and all loss and/or damages arising out of or with respect to:

- (a) failure of the Contractor to comply with Applicable Laws and Applicable Permits;
- (b) payment of taxes required to be made by the Contractor in respect of the income or other taxes of the Sub-contractors, suppliers and representatives; or
- (c) non-payment of amounts due as a result of Materials or services furnished to the Contractor or any of its Sub-contractors which are payable by the Contractor or any of its Sub-contractors.

25.2.2 Without limiting the generality of the provisions of this Article 25, the Contractor shall fully indemnify, hold harmless and defend the Authority Indemnified Persons from and against any and all suits, proceedings, actions, claims, demands, liabilities and damages which the Authority Indemnified Persons may hereafter suffer, or pay by reason of any demands, claims, suits or proceedings arising out of claims of infringement of any domestic or foreign patent rights, copyrights or other intellectual property, proprietary or confidentiality rights with respect to any materials, information, design or process used by the Contractor or by the Sub-contractors in performing the Contractor's obligations or in any way incorporated in or related to the Project. If in any such suit, action, claim or proceedings, a temporary restraint order or preliminary injunction is granted, the Contractor shall make every reasonable effort, by giving a satisfactory bond or otherwise, to secure the revocation or suspension of the injunction or restraint order. If, in any such suit, action, claim or proceedings, the Sewerage Project, or any part thereof or comprised therein, is held to constitute an infringement and its use is permanently enjoined, the Contractor shall promptly make every reasonable effort to secure for the Authority a licence, at no cost to the Authority, authorising continued use of the infringing work. If the Contractor is unable to secure such licence within a reasonable time, the Contractor shall, at its own expense, and without impairing the Specifications and Standards, either replace the affected work, or part, or process thereof with non-infringing work or part or process, or modify the same so that it becomes non-infringing.

25.3 Notice and contest of claims

In the event that either Party receives a claim or demand from a third party in respect of which it is entitled to the benefit of an indemnity under this Article 25 (the “**Indemnified Party**”) it shall notify the other Party (the “**Indemnifying Party**”) within 15 (fifteen) days of receipt of the claim or demand and shall not settle or pay the claim without the prior approval of the Indemnifying Party, which approval shall not be unreasonably withheld or delayed. In the event that the Indemnifying Party wishes to contest or dispute the claim or demand, it may conduct the proceedings in the name of the Indemnified Party, subject to the Indemnified Party being secured against any costs involved, to its reasonable satisfaction.

25.4 Defence of claims

25.4.1 The Indemnified Party shall have the right, but not the obligation, to contest, defend and litigate any claim, action, suit or proceeding by any third party alleged or asserted against such Party in respect of, resulting from, related to or arising out of any matter for which it is entitled to be indemnified hereunder, and reasonable costs and expenses thereof shall be indemnified by the Indemnifying Party. If the Indemnifying Party acknowledges in writing its obligation to indemnify the Indemnified Party in respect of loss to the full extent provided by this Article 25, the Indemnifying Party shall be entitled, at its option, to assume and control the defence of such claim, action, suit or proceeding, liabilities, payments and obligations at its expense and through the counsel of its choice; provided it gives prompt notice of its intention to do so to the Indemnified Party and reimburses the Indemnified Party for the reasonable cost and expenses incurred by the Indemnified Party prior to the assumption by the Indemnifying Party of such defence. The Indemnifying Party shall not be entitled to settle or compromise any claim, demand, action, suit or proceeding without the prior written consent of the Indemnified Party, unless the Indemnifying Party provides such security to the Indemnified Party as shall be reasonably required by the Indemnified Party to secure the loss to be indemnified hereunder to the extent so compromised or settled.

25.4.2 If the Indemnifying Party has exercised its rights under Clause 25.3, the Indemnified Party shall not be entitled to settle or compromise any claim, action, suit or proceeding without the prior written consent of the Indemnifying Party (which consent shall not be unreasonably withheld or delayed).

25.4.3 If the Indemnifying Party exercises its rights under Clause 25.3, the Indemnified Party shall nevertheless have the right to employ its own counsel, and such counsel may participate in such action, but the fees and expenses of such counsel shall be at the expense of the Indemnified Party, when and as incurred, unless:

- (a) the employment of counsel by such party has been authorised in writing by the Indemnifying Party; or
- (b) the Indemnified Party shall have reasonably concluded that there may be a conflict of interest between the Indemnifying Party and the Indemnified Party in the conduct of the defence of such action; or
- (c) the Indemnifying Party shall not, in fact, have employed independent counsel reasonably satisfactory to the Indemnified Party, to assume the defence of such action and shall have been so notified by the Indemnified Party; or
- (d) the Indemnified Party shall have reasonably concluded and specifically notified the Indemnifying Party either:
 - (i) that there may be specific defences available to it which are different from or additional to those available to the Indemnifying Party; or

(ii) that such claim, action, suit or proceeding involves or could have a material adverse effect upon it beyond the scope of this Agreement:
Provided that if Sub-clauses (b), (c) or (d) of this Clause 25.4.3 shall be applicable, the counsel for the Indemnified Party shall have the right to direct the defence of such claim, demand, action, suit or proceeding on behalf of the Indemnified Party, and the reasonable fees and disbursements of such counsel shall constitute legal or other expenses hereunder.

25.5 No consequential claims

Notwithstanding anything to the contrary contained in this Article 25, the indemnities herein provided shall not include any claim or recovery in respect of any cost, expense, loss or damage of an indirect, incidental or consequential nature, including loss of profit, except as expressly provided in this Agreement.

25.6 Survival on Termination

The provisions of this Article 25 shall survive Termination.

ARTICLE 26

DISPUTE RESOLUTION

26.1 Dispute Resolution

26.1.1 Any dispute, difference or controversy of whatever nature howsoever arising under or out of or in relation to this Agreement (including its interpretation) between the Parties, and so notified in writing by either Party to the other Party (the “**Dispute**”) shall, in the first instance, be attempted to be resolved amicably in accordance with the conciliation procedure set forth in Clause 26.2.

26.1.2 The Parties agree to use their best efforts for resolving all Disputes arising under or in respect of this Agreement promptly, equitably and in good faith, and further agree to provide each other with reasonable access during normal business hours to all non-privileged records, information and data pertaining to any Dispute.

26.2 Conciliation

In the event of any Dispute between the Parties, either Party may call upon the Authority’s Engineer, or such other person as the Parties may mutually agree upon (the “**Conciliator**”) to mediate and assist the Parties in arriving at an amicable settlement thereof. Failing mediation by the Conciliator or without the intervention of the Conciliator, either Party may require such Dispute to be referred to the Managing Director, WATCO and the Chairman of the Board of Directors of the Contractor for amicable settlement, and upon such reference, the said persons shall meet no later than 7 (seven) business days from the date of reference to discuss and attempt to amicably resolve the Dispute. If such meeting does not take place within the 7 (seven) business day period or the Dispute is not amicably settled within 15 (fifteen) days of the meeting or the Dispute is not resolved as evidenced by the signing of written terms of settlement within 30 (thirty) days of the notice in writing referred to in Clause 26.1.1 or such longer period as may be mutually agreed by the Parties, either Party may refer the Dispute to arbitration in accordance with the provisions of Clause 26.3.

26.3 Arbitration

26.3.1 Any Dispute which is not resolved amicably by conciliation, as provided in Clause 26.2, shall be finally decided by reference to arbitration by a Board of Arbitrators appointed in accordance with Clause 26.3.2. Such arbitration shall be held in accordance with the Arbitration and Conciliation Act, 1996 of India. **The venue of such arbitration shall be [Bhubaneswar]**, and the language of arbitration proceedings shall be English.

26.3.2 There shall be a Board of three arbitrators, of whom each Party shall select one, and the third arbitrator shall be appointed by the two arbitrators so selected and in the event of disagreement between the two arbitrators, the appointment shall be made in accordance with the Rules.

26.3.3 The arbitrators shall make a reasoned award (the “**Award**”). Any Award made in any arbitration held pursuant to this Article 26 shall be final and binding on the Parties as from the date it is made, and the Contractor and the Authority agree and undertake to carry out such Award without delay.

26.3.4 The Contractor and the Authority agree that an Award may be enforced against the Contractor and/or the Authority, as the case may be, and their respective assets wherever situated.

26.3.5 This Agreement and the rights and obligations of the Parties shall remain in full force and effect, pending the Award in any arbitration proceedings hereunder.

26.3.6 In the event the Party against whom the Award has been granted challenges the Award for any reason in a court of law, it shall make an interim payment to the

other Party for an amount equal to 75% (seventy-five per cent) of the Award, pending final settlement of the Dispute. The aforesaid amount shall be paid forthwith upon furnishing an irrevocable Bank Guarantee for a sum equal to 120 % (one hundred and twenty per cent) of the aforesaid amount. Upon final settlement of the Dispute, the aforesaid interim payment shall be adjusted and any balance amount due to be paid or returned, as the case may be, shall be paid or returned with interest calculated at the rate of 10% (ten per cent) per annum from the date of interim payment to the date of final settlement of such balance.

26.4 Adjudication by Regulatory Authority, Tribunal or Commission

In the event of constitution of a statutory regulatory authority, tribunal or commission, as the case may be, with powers to adjudicate upon disputes between the Contractor and the Authority, all Disputes arising after such constitution shall, instead of reference to arbitration under Clause 26.3, be adjudicated upon by such regulatory authority, tribunal or commission in accordance with the Applicable Law and all references to Dispute Resolution Procedure shall be construed accordingly. For the avoidance of doubt, the Parties hereto agree that the adjudication hereunder shall not be final and binding until an appeal against such adjudication has been decided by an appellate tribunal or court of competent jurisdiction, as the case maybe, or no such appeal has been preferred within the time specified in the Applicable Law.

ARTICLE 27

MISCELLANEOUS

27.1 Governing law and jurisdiction

This Agreement shall be construed and interpreted in accordance with and governed by the laws of Odisha/ India, and the courts at [Bhubaneswar] shall have exclusive jurisdiction over matters arising out of or relating to this Agreement.

27.2 Waiver of immunity

Each Party unconditionally and irrevocably:

- (a) agrees that the execution, delivery and performance by it of this Agreement constitute commercial acts done and performed for commercial purpose;
- (b) agrees that, should any proceedings be brought against it or its assets, property or revenues in any jurisdiction in relation to this Agreement or any transaction contemplated by this Agreement, no immunity (whether by reason of sovereignty or otherwise) from such proceedings shall be claimed by or on behalf of the Party with respect to its assets;
- (c) waives any right of immunity which it or its assets, property or revenues now has, may acquire in the future or which may be attributed to it in any jurisdiction; and
- (d) consents generally in respect of the enforcement of any judgement or award against it in any such proceedings to the giving of any relief or the issue of any process in any jurisdiction in connection with such proceedings (including the making, enforcement or execution against it or in respect of any assets, property or revenues whatsoever irrespective of their use or intended use of any order or judgement that may be made or given in connection therewith).

27.3 Delayed payments

The Parties hereto agree that payments due from one Party to the other Party under the provisions of this Agreement shall be made within the period set forth therein, and if no such period is specified, within 30 (thirty) days of receiving a demand along with the necessary particulars. In the event of delay beyond such period, the defaulting Party shall pay interest for the period of delay calculated at a rate equal to Base Rate plus 2 (two) percent, calculated at quarterly rests, and recovery thereof shall be without prejudice to the rights of the Parties under this Agreement including Termination thereof.

27.4 Waiver

27.4.1 Waiver, including partial or conditional waiver, by either Party of any default by the other Party in the observance and performance of any provision of or obligations under this Agreement:-

- (a) shall not operate or be construed as a waiver of any other or subsequent default hereof or of other provisions of or obligations under this Agreement;
- (b) shall not be effective unless it is in writing and executed by a duly authorised representative of the Party; and
- (c) shall not affect the validity or enforceability of this Agreement in any manner.

27.4.2 Neither the failure by either Party to insist on any occasion upon the performance of the terms, conditions and provisions of this Agreement or any obligation there under nor time or other indulgence granted by a Party to the other Party shall be treated or deemed as waiver of such breach or acceptance of any variation or the relinquishment of any such right hereunder.

27.5 Liability for review of Documents and Drawings

Except to the extent expressly provided in this Agreement:

- (a) no review, comment or approval by the Authority or the Authority's Engineer of any Document or Drawing submitted by the Contractor nor any observation

or inspection of the construction or **operation & maintenance** of the Sewerage Project nor the failure to review, approve, comment, observe or inspect hereunder shall relieve or absolve the Contractor from its obligations, duties and liabilities under this Agreement, the Applicable Laws and Applicable Permits; and

- (b) the Authority shall not be liable to the Contractor by reason of any review, comment, approval, observation or inspection referred to in Sub-clause (a) above.

27.6 Exclusion of implied warranties etc.

This Agreement expressly excludes any warranty, condition or other undertaking implied at law or by custom or otherwise arising out of any other agreement between the Parties or any representation by either Party not contained in a binding legal agreement executed by both Parties.

27.7 Survival

27.7.1 Termination shall:

- (a) not relieve the Contractor or the Authority, as the case may be, of any obligations hereunder which expressly or by implication survive Termination hereof; and
- (b) except as otherwise provided in any provision of this Agreement expressly limiting the liability of either Party, not relieve either Party of any obligations or liabilities for loss or damage to the other Party arising out of, or caused by, acts or omissions of such Party prior to the effectiveness of such Termination or arising out of such Termination.

27.7.2 All obligations surviving Termination/ final settlements shall only survive for a period of 3 (three) years following the date of such Termination/ final settlements.

27.8 Entire Agreement

This Agreement and the Schedules together constitute a complete and exclusive statement of the terms of the agreement between the Parties on the subject hereof, and no amendment or modification hereto shall be valid and effective unless such modification or amendment is agreed to in writing by the Parties and duly executed by persons especially empowered in this behalf by the respective Parties. All prior written or oral understandings, offers or other communications of every kind pertaining to this Agreement are abrogated and withdrawn. For the avoidance of doubt, the Parties hereto agree that any obligations of the Contractor arising from the Request for Proposal or Request for Proposals, as the case may be, shall be deemed to form part of this Agreement and treated as such.

27.9 Severability

If for any reason whatever, any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties will negotiate in good faith with a view to agreeing to one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable to such invalid, illegal or unenforceable provision. Failure to agree upon any such provisions shall not be subject to the Dispute Resolution Procedure set forth under this Agreement or otherwise.

27.10 No partnership

This Agreement shall not be interpreted or construed to create an association, joint venture or partnership between the Parties, or to impose any partnership obligation or liability upon either Party, and neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

27.11 Third parties

This Agreement is intended solely for the benefit of the Parties, and their respective successors and permitted assigns, and nothing in this Agreement shall be construed to create any duty to, standard of care with reference to, or any liability to, any person not a Party to this Agreement.

27.12 Successors and assigns

This Agreement shall be binding upon, and inure to the benefit of the Parties and their respective successors and permitted assigns.

27.13 Notices

Any notice or other communication to be given by any Party to the other Party under or in connection with the matters contemplated by this Agreement shall be in writing and shall:

- (a) in the case of the Contractor, be given by facsimile or e-mail and by letter delivered by hand to the address given and marked for attention of the person set out below or to such other person as the Contractor may from time to time designate by notice to the Authority; provided that notices or other communications to be given to an address within Odisha may, if they are subsequently confirmed by sending a copy thereof by registered acknowledgement due, air mail or by courier, be sent by facsimile or e-mail to the person as the Contractor may from time to time designate by notice to the Authority;
- (b) in the case of the Authority, be given by facsimile or e-mail and by letter delivered by hand and be addressed to the Authority with a copy delivered to the Authority Representative or such other person as the Authority may from time to time designate by notice to the Contractor; provided that if the Contractor does not have an office in [Bhubaneswar], it may send such notice by facsimile or e-mail and by registered acknowledgement due, air mail or by courier; and
- (c) any notice or communication by a Party to the other Party, given in accordance herewith, shall be deemed to have been delivered when in the normal course of post it ought to have been delivered and in all other cases, it shall be deemed to have been delivered on the actual date and time of delivery; provided that in the case of facsimile or e-mail, it shall be deemed to have been delivered on the working day following the date of its delivery.

27.14 Language

All notices required to be given by one Party to the other Party and all other communications, Documentation and proceedings which are in any way relevant to this Agreement shall be in writing and in English language.

27.15 Counterparts

This Agreement may be executed in two counterparts, each of which, when executed and delivered, shall constitute an original of this Agreement.

27.16 Confidentiality

The Parties shall treat the details of this Agreement as private and confidential, except to the extent necessary to carry out obligations under it or to comply with Applicable Laws. The Contractor shall not publish, permit to be published, or disclose any particulars of the Works in any trade or technical paper or elsewhere without the previous agreement of the Authority.

27.17 Copyright and Intellectual Property rights

27.17.1 As between the Parties, the Contractor shall retain the copyright and other intellectual property rights in the Contractor's Documents and other design documents made by (or on behalf of) the Contractor. The Contractor shall be deemed (by signing this Agreement) to give to the Authority a non-terminable transferable non-exclusive

royalty-free license to copy, use and communicate the Contractor's Documents, including making and using modifications of them. This license shall:

- (a) apply throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works,
- (b) entitle any person in proper possession of the relevant part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works, and
- (c) in the case of Contractor's Documents which are in the form of computer programs and other software, permit their use on any computer on the Site and other places as envisaged by this Agreement, including replacements of any computers supplied by the Contractor:

27.17.2 The Contractor's Documents and other design documents made by (or on behalf of) the Contractor shall not, without the Contractor's consent, be used, copied or communicated to a third party by (or on behalf of) the Authority for purposes other than those permitted under this Clause 27.17.

27.17.3 As between the Parties, the Authority shall retain the copyright and other intellectual property rights in this Agreement and other documents made by (or on behalf of) the Authority. The Contractor may, at its cost, copy, use, and obtain communication of these documents for the purposes of this Agreement. They shall not, without the Authority's consent, be copied, used or communicated to a third party by the Contractor, except as necessary for the purposes of the contract.

27.18 Limitation of Liability

27.18.1 Neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract or for any indirect or consequential loss or damage which may be suffered by the other Party in connection with this Agreement, save and except as provided under Articles 23 and 25.

27.18.2 The total liability of one Party to the other Party under and in accordance with the provisions of this Agreement, save and except as provided in Articles 23 and 25, shall not exceed the Contract Price. For the avoidance of doubt, this Clause shall not limit the liability in any case of fraud, deliberate default or reckless misconduct by the defaulting Party.

ARTICLE 28

DEFINITIONS

28.1 Definitions

In this Agreement, the following words and expressions shall, unless repugnant to the context or meaning thereof, have the meaning hereinafter respectively assigned to them:

“**Accounting Year**” means the financial year commencing from the first day of April of any calendar year and ending on the thirty-first day of March of the next calendar year;

“**Advance Payment**” shall have the meaning set forth in Clause 19.2;

“**Affected Party**” shall have the meaning set forth in Clause 21.1;

“**Affiliate**” means, in relation to either Party {and/or Members}, a person who controls, is controlled by, or is under the common control with such Party {or Member} (as used in this definition, the expression “control” means, with respect to a person which is a company or corporation, the ownership, directly or indirectly, of more than 50% (fifty per cent) of the voting shares of such person, and with respect to a person which is not a company or corporation, the power to direct the management and policies of such person, whether by operation of law or by contractor otherwise);

“**Agreement**” means this Agreement, its Recitals, the Schedules hereto and any amendments thereto made in accordance with the provisions contained in this Agreement;

“**Applicable Laws**” means all laws, brought into force and effect by GOI or the State Government including rules, regulations and notifications made there under, and judgements, decrees, injunctions, writs and orders of any court of record, applicable to this Agreement and the exercise, performance and discharge of the respective rights and obligations of the Parties hereunder, as may be in force and effect during the subsistence of this Agreement;

“**Applicable Permits**” means all clearances, licenses, permits, authorisations, no objection certificates, consents, approvals and exemptions required to be obtained or maintained under Applicable Laws in connection with the construction, operation and maintenance of the Sewerage Projects during the subsistence of this Agreement;

“**Appointed Date**” means that date which is later of the 15th day of the date of this Agreement, the date on which the Contractor has delivered the Performance Security in accordance with the provisions of Article 7 and the date on which the Authority has provided the land / site on no less than 90% (Ninety per cent) of the required **area of major structures** of *the Project*;

“**Arbitration Act**” means the Arbitration and Conciliation Act, 1996 and shall include modifications to or any re-enactment thereof, as in force from time to time;

“**Authority**” shall have the meaning attributed thereto in the array of Parties hereinabove as set forth in the Recitals;

“**Authority’s Default**” shall have the meaning set forth in Clause 23.2;

“**Authority’s Engineer**” shall have the meaning set forth in Clause 18.1;

“**Authority’s Representative**” means such person or persons as may be authorised in writing by the Authority to act on its behalf under this Agreement and shall include any person or persons having authority to exercise any rights or perform and fulfil any obligations of the Authority under this Agreement;

“**Bank**” means a Nationalised Bank in India;

“**Base Rate**” means the floor rate of interest announced by the State Bank of India for all its lending operations;

“Base Date” means the last date of that calendar month, which date precedes the Bid Due Date by at least 28 (twenty-eight) days;

“Bid” means the documents in their entirety comprised in the bid submitted by the [selected bidder/Consortium] in response to the Request for Proposals in accordance with the provisions thereof;

“Bid Security” means the bid security provided by the Contractor to the Authority in accordance with the Request for Proposal, and which is to remain in force until substituted by the Performance Security;

“Change in Law” means the occurrence of any of the following after the Base Date:

- (a) the enactment of any new Indian law;
- (b) the repeal, modification or re-enactment of any existing Indian law;
- (c) the commencement of any Indian law which has not entered into effect until the Base Date;
- (d) a change in the interpretation or application of any Indian law by a judgement of a court of record which has become final, conclusive and binding, as compared to such interpretation or application by a court of record prior to the Base Date; or
- (e) any change in the rates of any of the Taxes or royalties that have a direct effect on the Project;

“Change of Scope” shall have the meaning set forth in Article 13;

“Change of Scope Notice” shall have the meaning set forth in Clause 13.2.1;

“Change of Scope Order” shall have the meaning set forth in Clause 13.2.4;

“Completion Certificate” shall have the meaning set forth in Clause 12.4;

“Consortium” means the consortium of entities which have formed a joint venture for implementation of this Project;⁵

“Construction” shall have the meaning set forth in Clause 1.2.1 (f);

“Construction Period” means the period commencing from the Appointed Date and ending on the date of the Completion Certificate;

“Contract Price” means the amount specified in Clause 19.1.1;

“Contractor” shall have the meaning attributed thereto in the array of Parties hereinabove as set forth in the Recitals;

“Contractor Default” shall have the meaning set forth in Clause 23.1;

“Cure Period” means the period specified in this Agreement for curing any breach or default of any provision of this Agreement by the Party responsible for such breach or default and shall:

- (a) commence from the date on which a notice is delivered by one Party to the other Party asking the latter to cure the breach or default specified in such notice;
- (b) not relieve any Party from liability to pay Damages or compensation under the provisions of this Agreement; and
- (c) not in any way be extended by any period of Suspension under this Agreement; provided that if the cure of any breach by the Contractor requires any reasonable action by the Contractor that must be approved by the Authority or the Authority’s Engineer hereunder, the applicable Cure Period shall be extended by the period taken by the Authority or the Authority’s Engineer to accord their approval;

“CPHEEO” means Central Public Health & Environmental Engineering Organisation, MoUD, Govt. of India.

⁵This definition may be omitted if the Contractor is not a Consortium.

“Damages” shall have the meaning set forth in paragraph (w) of Clause 1.2.1;

“Defect” means any defect or deficiency in Construction of the Works or any part thereof, which does not conform with the Specifications and Standards, and in the case of **Operation & Maintenance**, means any defect or deficiency which is specified in Schedule-E;

“Defects Liability Period” shall have the meaning set forth in Clause 17.1;

“Dispute” shall have the meaning set forth in Clause 26.1.1;

“Dispute Resolution Procedure” means the procedure for resolution of Disputes set forth in Article 26;

“Drawings” means all of the drawings, calculations and documents pertaining to the Sewerage Project as set forth in Schedule-I, and shall include ‘as built’ drawings of the Sewerage Project;

“Document” or “Documentation” means documentation in printed or written form, or in tapes, discs, drawings, computer programmes, writings, reports, photographs, films, cassettes, or expressed in any other written, electronic, audio or visual form;

“Emergency” means a condition or situation that is likely to endanger the safety or security of the individuals on or about the Sewerage Project, including Users thereof, or which poses an immediate threat of material damage to any of the Project Assets;

“Encumbrances” means, in relation to the Sewerage Project, any encumbrances such as mortgage, charge, pledge, lien, hypothecation, security interest, assignment, privilege or priority of any kind having the effect of security or other such obligations, and shall include any designation of loss payees or beneficiaries or any similar arrangement under any insurance policy pertaining to the Sewerage Project, where applicable herein but excluding utilities referred to in Clause 9.1;

“EPC” means engineering, procurement and construction;

“Final Payment Certificate” shall have the meaning set forth in Clause 19.15.1;

“Final Payment Statement” shall have the meaning set forth in Clause 19.13.1;

“Force Majeure” or “Force Majeure Event” shall have the meaning ascribed to it in Clause 21.1;

“GAD” or “General Arrangement Drawings” shall have the meaning set forth in Clause 4.1.3 (b);

“GOI” or “Government” means the Government of India or the Government of Odisha, as the case may be;

“Good Industry Practice” means the practices, methods, techniques, designs, standards, skills, diligence, efficiency, reliability and prudence which are generally and reasonably expected from a reasonably skilled and experienced contractor engaged in the same type of undertaking as envisaged under this Agreement and which would be expected to result in the performance of its obligations by the Contractor in accordance with this Agreement, Applicable Laws and Applicable Permits in reliable, safe, economical and efficient manner;

“Government Instrumentality” means any department, division or sub-division of the Government or the State Government and includes any commission, board, authority, agency or municipal and other local authority or statutory body including panchayat under the control of the Government or the State Government, as the case may be, and having jurisdiction over all or any part of the Sewerage Projector the performance of all or any of the services or obligations of the Contractor under or pursuant to this Agreement;

“Indemnified Party” means the Party entitled to the benefit of an indemnity pursuant to Article 25;

“Indemnifying Party” means the Party obligated to indemnify the other Party pursuant to Article 25;

“Indirect Political Event” shall have the meaning set forth in Clause 21.3;

“Insurance Cover” means the aggregate of the maximum sums insured under the insurances taken out by the Contractor pursuant to Article 20, and includes all insurances required to be taken out by the Contractor under Clauses 20.1 and 20.9 but not actually taken, and when used in the context of any act or event, it shall mean the aggregate of the maximum sums insured and payable or deemed to be insured and payable in relation to such act or event;

“Intellectual Property” means all patents, trademarks, service marks, logos, get-up, trade names, internet domain names, rights in designs, blue prints, programmes and manuals, drawings, copyright (including rights in computer software), database rights, semi-conductor, topography rights, utility models, rights in know-how and other intellectual property rights, in each case whether registered or unregistered and including applications for registration, and all rights or forms of protection having equivalent or similar effect anywhere in the world;

“Interim Payment Certificate” or **“IPC”** the interim payment certificate issued by the Authority’s Engineer for payment to the Contractor in respect of Contractor’s claims for payment raised in accordance with the provisions of this Agreement;

{**“Lead Member”** shall, in the case of a consortium, mean the member of such consortium who shall have the authority to bind the contractor and each member of the Consortium; and shall be deemed to be the Contractor for the purposes of this Agreement;}⁵

“LOA” or **“Letter of Acceptance”** means the letter of acceptance referred to in Recital (E);

“Operation & Maintenance” means the **operation & maintenance** of the Sewerage Project as set forth in Article 14 for the period specified therein;

“Operation & Maintenance Inspection Report” shall have the meaning set forth in Clause 15.2.1;

“Operation & Maintenance Manual” shall have the meaning ascribed to it in Clause 10.7;

“Operation & Maintenance Programme” shall have the meaning set forth in Clause 14.3;

“Operation & Maintenance Period” shall have the meaning set forth in Clause 14.1.1;

“Operation & Maintenance Requirements” shall have the meaning set forth in Clause 14.2;

“Major structures” means different **units & components** of Sewage Treatment Plant and Sewage Pumping Stations.

“Manual” shall mean the Manual on sewerage and sewage treatment published by CPHEEO, MoUD, GoI;

“Material Adverse Effect” means a material adverse effect of any act or event on the ability of either Party to perform any of its obligations under and in accordance with the provisions of this Agreement and which act or event causes a material financial burden or loss to either Party;

“Materials” are all the supplies used by the Contractor for incorporation in the Works or for the **Operation & Maintenance** of the Sewerage Project;

“Monthly Operation & Maintenance Statement” shall have the meaning set forth in Clause 19.6.1;

“MoUD” means the Ministry of Urban Development, GoI;

⁵This definition may be omitted if the Contractor is not a Consortium.

“**Non-Political Event**” shall have the meaning set forth in Clause 21.2;

“**Parties**” means the parties to this Agreement collectively and “**Party**” shall mean any of the parties to this Agreement individually;

“**Performance Security**” shall have the meaning set forth in Clause 7.1;

“**Plant**” means the apparatus and machinery intended to form or forming part of the Works;

“**Political Event**” shall have the meaning set forth in Clause 21.4;

“**Programme**” shall have the meaning set forth in Clause 10.1.3;

“**Project**” means the construction and **operation & maintenance** of the **Box Drain Project** in accordance with the provisions of this Agreement, and includes all works, services and equipment relating to or in respect of the Scope of the Project; “**Project Assets**” means all physical and other assets relating to (a) tangible assets such as civil works, electrical works, mechanical works and equipments, electrical systems, communication systems, rest areas and administrative offices, laboratory facilities; and (b) Project Facilities situated on the Site; etc.

“**Project Completion Date**” means the date on which the Provisional Certificate is issued and, in the event, no Provisional Certificate is issued, the date on which the Completion Certificate is issued;

“**Project Completion Schedule**” means the progressive Project Milestones set forth in Schedule-J for completion of the Sewerage Project on or before the Scheduled Completion Date;

“**Project Facilities**” means all the amenities and facilities situated on the Site, as described in Schedule-C;

“**Sewerage Project**” means the proposed Sewerage Project to be executed as mentioned at Annex –I of schedule –A in accordance with this Agreement;

“**Project Milestone**” means the project milestone set forth in Schedule-J;

“**Proof Consultant**” shall have the meaning set forth in Clause 10.2.2;

“**Provisional Certificate**” shall have the meaning set forth in Clause 12.2;

“**Punch List**” shall have the meaning set forth in Clause 12.2.1;

“**Quality Assurance Plan**” or “**QAP**” shall have the meaning set forth in Clause 11.2;

“**Re.**”, “**Rs.**” or “**Rupees**” or “**Indian Rupees**” means the lawful currency of the Republic of India;

“**Request for Proposals**” or “**RFP**” shall have the meaning set forth in Recital ‘D’;

“**Retention Money**” shall have the meaning set forth in Clause 7.5.1;

“**Land / Site**” means the constructive possession of the Site free from encroachments and encumbrances, together with all way leaves, easements, unrestricted access and other rights of way, howsoever described, necessary for construction and **operation & maintenance** of the Sewerage Project in accordance with this Agreement;

“**Safety Consultant**” shall have the meaning set forth in Clause 10.1.5;

“**Scheduled Completion Date**” shall be the date set forth in Clause 10.3.1;

“**Scope of the Project**” shall have the meaning set forth in Clause 2.1;

“**Section**” means a part of the *Sewerage Project*;

“**Site**” shall have the meaning set forth in Clause 8.1;

“**Specifications and Standards**” means the specifications and standards relating to the quality, quantity, capacity and other requirements for the Sewerage Project, as set forth in Schedule-D, and any modifications thereof, or additions thereto, as included in the design and engineering for the Sewerage Project submitted by the Contractor to, and expressly approved by, the Authority;

“**Stage Payment Statement**” shall have the meaning set forth in Clause 19.4;

“**Structures**” means all civil, electrical and mechanical installations, as the case maybe;

“**Sub-contractor**” means any person or persons to whom a part of the Works or the

Operation & Maintenance has been subcontracted by the Contractor and the permitted legal successors in title to such person, but not an assignee to such person;

“**Suspension**” shall have the meaning set forth in Article 22;

“**Taxes**” means any Indian taxes including **GST**, customs duties, value added tax, sales tax, local taxes, cess and any impost or surcharge of like nature (whether Central, State or local) on the goods, Materials, equipment and services incorporated in and forming part of the **Box Drain Project** charged, levied or imposed by any Government Instrumentality, but excluding any interest, penalties and other sums in relation thereto imposed on any account whatsoever. For the avoidance of doubt, Taxes shall not include taxes on corporate income;

“**Termination**” means the expiry or termination of this Agreement;

“**Termination Notice**” means the communication issued in accordance with this Agreement by one Party to the other Party terminating this Agreement;

“**Termination Payment**” means the amount payable by either Party to the other upon Termination in accordance with Article 23;

“**Terms of Reference**” or “**TOR**” shall have the meaning set forth in Clause 18.2.1;

“**Tests**” means the tests set forth in Schedule-K to determine the completion of Works in accordance with the provisions of this Agreement;

“**Time Extension**” shall have the meaning set forth in Clause 10.5.1;

“**User**” means a person or entity who uses or intends to use the sewerage system for discharge of wastewater.

“**Valuation of Unpaid works**” shall have the meaning set forth in Clause 23.5.1;

“**Works**” means all works including survey and investigation, design, engineering, procurement, construction, Plant, Materials, **operation & maintenance**, temporary works and other things necessary to complete the Sewerage Project in accordance with this Agreement; and

“**WPI**” means the wholesale price index for various commodities as published by the Ministry of Commerce and Industry, GOI and shall include any index which substitutes the WPI, and any reference to WPI shall, unless the context otherwise requires, be construed as a reference to the WPI published for the period ending with the preceding month.

IN WITNESS WHEREOF THE PARTIES HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DAY, MONTH AND YEAR FIRST ABOVE WRITTEN.

SIGNED, SEALED AND DELIVERED
For and on behalf of
[MANAGING DIRECTOR, WATCO] by:

SIGNED, SEALED AND DELIVERED
For and on behalf of
THE CONTRACTOR by:

(Signature)

(Signature)

(Name)
(Designation)

(Name)
(Designation)

In the presence of: 1.

2.

{COUNTERSIGNED and accepted by:
Name and particulars of other members of the Consortium}

SCHEDULES

Schedule A & B for “Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation” on Engineering, Procurement & Construction (EPC) Contract”.

SCHEDULE - A

(See Clauses 2.1 and 8.1)

SITE OF THE PROJECT

1 The Site

- 1.1 Site of the Project **Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation”**.
- 1.2 The dates of handing over the site to the Contractor are specified in Annex-II of this Schedule-A.
- 1.3 An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to the Site shall be prepared jointly by the Authority’s Engineer or his Representative and the Contractor; and such inventory shall form part of the memorandum referred to in Clause 8.2.1 of this Agreement.
- 1.4 The alignment plans of the sewerage project are specified in Annexure-III.
- 1.5 The status of the environment clearances (obtained or awaited) is given in Annex IV.

Annexure - I

(Schedule-A)

Site

[Note: Through suitable drawings and description in words, the land, buildings, structures and road works comprising the Site shall be specified briefly but precisely in this Annex-I.]

1. The Site

The Site of the work **“Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation” on Engineering, Procurement & Construction (EPC) Contract**, work comprises of Conversion of 5 Nos Sub-Drain of Main Drain-1 (MD-1) by constructing closed RCC Box Drain along with ancillary works as detailed below:

- i. 3R of (MD-1) Sub drain from Prajatantra office to Khatbin sahi about 1305M having size varying from 2.5Sqm to 8.0Sqm.
- ii. 4R of (MD-1) Sub drain from Commissioner Police office to New Rausapatna about 2797 M having size varying from 3.0 Sqm to 8.0 Sqm.
- iii. 3L of (MD-1) Sub drain from Krishna Mangala Temple to Shanti Memorial hospital, Bajrakabati about 716 M having size varying from 2.50 Sqm to 14.0 Sqm.
- iv. 5R of (MD-1) Sub drain from Backside of Trisha Hospital to Bajrakabati Road about 2422 M having size varying from 2.50 Sqm to 12.5 Sqm.
- v. 6R of (MD-1) Sub drain from Khannagar Sluice Gate to Matrubhawan about 1300 M having size varying from 20.00 Sqm to 25.0 Sqm.

The Box Drain project aims to improve the drainage system for flood mitigation in Cuttack city, improve sanitary environment by converting open drain to box drain and to contribute to improving traffic conditions and safety by constructing the road above the box drain.

The details of locations of Box Drains are given below.

1.1 Box Drain sites

| Sl.No. | Box drain | Location | Place | Area | Remark |
|--------|--|----------|---------|-----------|---|
| 1. | 5 Nos of branch storm water drain | Cuttack | Cuttack | Available | Conversion of existing open drain to Box Drain. |

- For further details about land please contact the **General Manager, WATCO Drainage Division Cuttack, (M) 90402 92568** and the **Assistant Manager, Sub Division (M) 84559 33329**.

Annexure - II

(Schedule-A)

Dates for providing different construction site

The tentative dates on which the Authority will provide site to the Contractor are stated below:

| Sl. No | Sites For | Details of location | Date of providing the site* |
|---------------|-------------------------------------|----------------------------|------------------------------------|
| 1 | 2 | 3 | 4 |
| 1 | 5 Nos of Sub Drain of Main Drain -1 | Cuttack | Within 90 Days |

* The dates specified herein shall in no case be beyond 180 (One hundred and eighty) days after the Appointed Date.

Annexure - III

(Schedule-A)

Alignment Plans

The proposed Layout Plan of Box Drain Project having following maps and as given in Schedule-A.

- (i) Index Map showing 5 Nos of proposed Sub-Drain of Main Drain -1
- (ii) Plan showing catchment area of 5 Nos of proposed Sub-Drain of Main Drain-1 . – shall be provided in Schedule-A

Annex - IV

(Schedule-A)

Environment Clearances

Requirement of any Environment clearance is being assessed.

SCHEDULE - B

(See Clause 2.1)

Development of the Box Drain Project

1 Development of the Box Project

Development of the Box drain Project shall include Topographic survey, Geo-Technical Investigation, Design, Detailed Engineering, and Construction of the Box Drains as described in this Schedule-B and in Schedule-C.

2 Specifications and Standards

The Box drain shall be designed and constructed in conformity with the Specifications and Standards specified in Annex-I of Schedule-D.

Annex - I
(Schedule-B)

Description of the Project

1. General Features of the Project

The intent of this Section is to specify the work items to be covered on ‘EPC Contract Basis’ in conformity with the technical specifications as enumerated in the subsequent clauses for the work **“Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation on EPC Contract (Engineering, Procurement & Construction) basis.**

2. Project Background

Storm water flow in Cuttack is managed mainly by two principal drains, Main Drain-1 and Main Drain-2. The drains flow from northwest to southeast, reaching the Kathajori river through sluice gates. Under the JICA-assisted Odisha Integrated Sanitation Improvement Project (OISIP), these two main drains, along with Five subdrains, were developed and upgraded by OWSSB/WATCO.

The proposed project aims to improve the drainage system for flood mitigation in the city, improve sanitary environment by converting open drain to box drain and to contribute to improving traffic conditions and safety by constructing the road above the box drain.

Indicative details of provisions under the scope of this RFP are for conversion of 5 Nos Sub-Drain of Main Drain-1 (MD-1) to closed RCC box drain along with ancillary works as detailed below:.

| SI No | Particulars of Sub Drains to | Location | Approximate Length (in | No of Culvert crossings | No of Lateral or side drains |
|-------|------------------------------|----------------------------------|------------------------|-------------------------|------------------------------|
| 1 | 3R of MD-1 | Prajantra office to Khatbin sahi | 1305 m | 5 | 23 |
| 2 | 4R of MD-1 | Commissioner Police office to | 2797 m | 23 | 50 |
| 3 | 3L of MD-1 | Krishna Mangala Temple to Shanti | 716 m | 8 | 20 |
| 4 | 5R of MD-1 | Backside of Trisha Hospital to | 2422 m | 15 | 42 |
| 5 | 6R of MD-1 | Khannagar Sluice Gate to | 1300 m | 3 | 15 |

The project will be executed on EPC mode. The successful bidder will be responsible for pre-design, design, construction and commissioning which should be vetted by IIT, Bhubaneswar. The cost for the vetting will be borne by the successful bidder

Making trough connectivity of total length including joining already constructed main drain section to have a continuous smooth flow of storm water/sewage water

inside drain and movement of traffic on top of completed box drain portion will be part of scope of this work. The construction activity shall be done in phased manner keeping in view accessibility, safety, smooth traffic flow, public convenience etc.

2.1 Site Conditions:

The proposed Sub Drains (RCC box type) are situated in habited/partially habited area where movement of heavy machinery may not be allowed in day time. Access to the work site and space availability for machinery and equipment and to perform the work differ from site to site. The same should be ascertained by the bidder after site visit. No further claim to be entertained for any non-accessibility to the site and it is bidder's responsibility to make his own arrangement for approach to the site. In addition, water diversion equipment must be accommodated in every case.

The possible challenges may be encountered for this project during execution are:

1. **Collapsible soils:** Cuttack is situated between two rivers, soil conditions are very poor, ground water table is at very high level, bed level of drain is having huge amount of sludge and silt.
2. **Properties are very close to drain:** The drain is flowing through core area of city. Residential and commercial properties are situated very close to existing drain wall, such properties may get damage during construction activity.
3. **Live Drain:** The drain is running with sewage water in dry season and in rainy season sewage mixed with storm water also. Water diversion for construction activity will require a proper engineering solution.
4. **Restricted access to site, and work space:** Box-drain construction has to be done in core area of city, access to work place is not available at all reaches of site, Contractor has to select construction methodology suiting to available access and space.
5. **Making connections to exiting Main Drain-1:** The Main Drain which have already been constructed partly box type and partly open need to be connected with proper construction to have smooth flow of water and movement of traffic.
6. Co-ordination with utility departments for removal or relocation of service utilities. The bidder has to visit the site of work of each location to get accustomed with site conditions, accessibility etc. and ascertain the methodology to accomplish the work. Soil investigation data provided in bid document is for general idea only to about soil strata conditions and WATCO shall not be held responsible for this soil investigation report if it does not match with soil test which will be conducted by the bidder in subsequent stages. It is suggested to get soil investigation done by the bidder before bidding to have a proper Techno Financial Proposal during bidding. There will be no separate payment for such pre bid investigations.

2.2 Key Design and Construction Criteria:

The work includes the construction of the RCC Box Drain, making connection to Main Drain-1, construction of silt traps before joining to main drain and fixing bar screen with cleaning arrangement of bar screen and silt trap , provision of access ports for cleaning

the box drain with machinery, making interconnection of RCC tertiary/ lateral drains (Box type upto 5.0 m length) from either side of Sub Drain-6R, 3R, 4R, 3L, and 5R, construction of a cement concrete road as per technical specifications upto 10m wide as per availability including drain width, matching the elevations of intersecting roads and providing foot paths as required. Catch water drains has to be constructed at an interval of 5 m along the length on both side of Sub-drains with arrangements for entry of surface runoff to main drain from catch water drain with fixing of screens at entry point to main drain. Provision for precast slab in small pieces up to full width to be made at 100 m interval for cleaning purpose. Street light arrangements shall be done as per technical specifications and relevant IS Code.

The hydraulic design has already been done in relation to the confluence point with Main Drain-1, therefore the invert elevations should not be changed. However, if required, prior approval of the authority as well as IIT, Bhubaneswar shall be obtained. A base design is furnished for reference only and Contractor shall be responsible to modify it to meet the intent of the project.

Pre-design data beyond that furnished in the specifications shall be obtained by the bidder at his own cost. The data furnished is for reference only and Contractor shall adopt it at his own risk. Contractor is responsible for all design, including but not limited to civil, structural and mechanical. Means and methods are the responsibility of the Contractor. The Employer shall not be under any obligation to resolve design methodology issues

During Construction, drain has to be cleaned for smooth operations. It will be mandatory to have mechanical cleaning arrangement for drain constructed for which special care shall be taken during design and construction of box drain. Presently this drain is carrying storm water mixed with sewage hence proper care should be taken from safety and hygiene for its cleaning and water diversion while execution.

Water pipe line, sewer lines and other service utilities which may cross the drain at multiple locations, shifting of such utilities shall be responsibility of Contractor The Bidder shall make provision for such utility shifting in his design and coordinate with appropriate authorities for such issues.

In emergency cases (damage of water supply, electricity, gas line & sewer line affecting public services), if the bidder not attended repair work within 24 hrs., it will be carried out through other agency and the cost incurred towards repair will be recovered from the bills of the contractor.

2.3 Impact to local traffic.

The local traffic will be managed by sufficient number of traffic marshals and directional signs to facilitate the maximum fluidity in the local traffic. Based on the demand of the situation, the Contractor is to coordinate with Police Department for temporary street closure/ traffic diversion etc. Contractor may have to create his own working space off road to maintain local traffic.

2.4 Access and Work Space.

Contractor is responsible for access routes to the site and for creating working space for

his machinery, equipment and materials.

2.5 Third Party Property Protection.

Structures in close proximity to the drain wall may have shallow foundation, soil in Cuttack is collapsible and drain bed may have more depth of silt and slushy soil. Installation of shoring before start and during construction may cause damage to structures situated along the length of drain, hence the Contractor has to use methods and machinery that will minimize or eliminate the possibility of structural damage. After taking all precautions during construction if any property got damage, it is responsibility of Contractor to make his property in good usable condition with no extra cost to employer.

Contractor is required to indemnify and hold harmless the Employer on this type of damage and the Contractor will be expected to use his own resources or insurance to mitigate any problems caused by construction activities.

2.6 Live Flow Management.

It is Contractor's responsibility to reconfirm discharge characteristics while making arrangements for water diversion system. Contractor will have to develop a solution or mix of solutions to address any and all discharge conditions in the drain. Under no circumstances overflows caused by Contractor's operations will be permitted. Additionally, the flow carries an extremely large amount of floating debris, consisting mainly of residential garbage; Contractor will be expected to manage this condition by removing garbage from the drain as required to maintain his water diversion operation in good form.

2.7 Traffic restrictions.

The District Administration in Cuttack prohibit the circulation of heavy machinery and trucks during the daytime hours. However, it is the responsibility of the contractor to obtain permission from appropriate authority for plying of vehicles and machineries. The department officer will coordinate with district administration for the purpose

2.8 Box Drain

The total length of proposed 5 Nos box drain (sub drains) is **about 8540 m length** to be connected to the Main Drain 1. The Contractor will complete the entire 5 Nos of Sub Drains including making through connectivity by joining with Main Drain-1 for smooth flow of storm water and movement of traffic, including design and construction of junctions for smooth movement of traffic with proper street lighting and fixing of traffic signals as and where required.

The box drain consists of single as well as two vents depending upon the width of the box drain for ease of maintenance. The number of vents will be decided at specific stretch will be decided as per design. Manholes shall be installed at every **10-meter** interval to facilitate ventilation and can be used as access during cleaning operation.

The existing drain is made mostly of Laterite stone wall and in some places earthen and

cement concrete, with earthen bed. The existing walls shall be dismantled. The drain is in running conditions from so many years and it may have varying depth of silt and slushy soil. For resting foundation on firm strata, it may require soil replacement or any suitable method for increasing bearing capacity of soil. The methodology for increasing bearing capacity of soil at bed level of drain should be submitted for necessary approval of the authority before commencement of construction work.

2.9 Culverts

There are **about 54 Nos of culvert** exist in the 5 Nos drain alignment. These culverts will be eliminated after construction of box drain. Traffic management during construction will be critical, as roads cannot be completely blocked off. Contractor may require to provide temporary access for movement of traffic at such junctions or divert traffic with proper traffic diversion plan and its implementation by coordinating with traffic authorities. For such permissions, liaisoning has to be done by the Contractor and Contractor is expected to minimize the work duration by detailed planning, accurate logistics and securing all resources in place before starting the work. The list and location of culverts can be found below.

2.10 Junctions of Lateral Drains

There are **about 154 nos. junctions** of lateral drains in the 5 nos drain alignment. The lateral drains are to be connected in a manner consistent with the specifications. A list of lateral junctions is shown below.

| Sl No. | Sub Drain to MD-1 | Nos of Culvert | Nos of Junction lateral |
|--------|-------------------|----------------|-------------------------|
| 1 | 6 R | 3 | 14 |
| 2 | 5 R | 15 | 42 |
| 3 | 4 R | 23 | 50 |
| 4 | 3 R | 5 | 26 |
| 5 | 3 L | 8 | 22 |
| | TOTAL | 54 | 154 |

- N.B.**
- i. If the number of culverts will vary during survey, then it is the responsibility of contractor to eliminate the same after construction of box drain.*
 - ii. If the number of lateral drains will vary during survey, then it is the responsibility of contractor to connect the same with the box drain.*

2.11 Approach foot bridges

All existing foot bridges across the shall be dismantled during construction and temporary access to those served by the foot bridge shall be provided by the Contractor at no extra cost to the project.

2.12 Silt Trap and Bar screens

Silt trap along with bar screens has to be installed at upstream side of branch drain at every junction to the main drain with cleaning arrangement of silt trap and bar screen as per relevant IS code

2.13 Roads and Drains

- 2.13.1 The road design will take into consideration the plinth elevation of the structures along the road. Conflicts with these structures are to be highlighted and specific solutions designed to avoid inundation of the houses by road run-off.
- 2.13.2. The top of box drains and adjacent roads will be converted to a concrete road / Bituminous Top, with footpaths, rain inlets and Catch water drains on both sides with provision of entry of storm water to main drain with fixing of CI/SS 304 grating at each entry point to Main Drain.
- 2.13.2. **Street light arrangements** with energy efficient luminaries shall be done as per technical specifications and relevant IS Code with prior approval of the authority.

2.14 Utility relocation:

The project will require permanent or temporary relocation of utilities and services including but not limited to electricity, telephone, water line, sewer, cables of other services, etc. and drains.

Relocation of utilities for construction purposes is the responsibility of the Contractor, who must program the work with enough advance notice to allow the Government Department or utility company enough time to respond. Liasioning for such issues shall be done by the Contractor and Employer will provide necessary request letters to concern authority. Any shifting charges, fees etc. required by concern department shall be deposited by the contractor which will be reimbursed by the Authority to the Contractor on certification by the entity owning such utility that the work has been satisfactorily executed by the Contractor.

Any damages occurred during shifting of utilities will be responsibility of Contractor and should be rectified with no extra cost to the Employer. In emergency cases (damage of water supply, electricity, gas line & sewer line affecting public services), if the bidder not attended repair work within 24 hrs., it will be carried out through other agency and the cost incurred towards repair will be recovered from the bills of the contractor

2.15 Water Mains crossing drain

The water mains / sewer rising main which are at present crossing the existing drains must be placed below the top slab of the box drain for which provisions with MS casing of appropriate size to be made by the agency at specific locations. The point of pre-fabricated hole to be finalized with the concerned authority.

2.16 Water Diversion and Dewatering

It is Contractor's responsibility to confirm discharge characteristics while making arrangements for water diversion system. Contractor will have to develop a solution or mix of solutions to address any and all discharge conditions in the drain. Under no circumstance's sewage overflows caused by Contractor's operations will be permitted. Dewatering means lowering of water level by pumping in construction zone and surrounding area required for construction activity. The cost of water diversion and dewatering shall be included in the lump sum price. No separate payment will be made for these activities. Contractor has to include

all cost related to this operation in his bid price, including but not limited to any ancillary civil, mechanical or electrical work done; permits, fees, licenses, installation cost by third parties, and all other cost associated with this activity.

2.17 Shoring/ Silent Sheet piling

The nature of soils and depth of excavation will decide the type and arrangement and methodology for shoring shuttering to be used. Soil investigation data given is indicative only and it will be only Contractor's responsibility to get soil investigation data by his own resources before finalizing the type and methodology of shuttering and shoring / silent sheet piling to be used at particular reach. Contractor shall be responsible to develop a shuttering shoring / sheet piling method such that it will not affect the safety and stability of adjacent, surrounding and nearby structures. Contractor is advised that the responsibility for prevention, avoidance and mitigation of structural damages lies with him only. The Employer is to be indemnified and held harmless in accordance with the General Conditions.

2.18 Traffic Control requirements

The work shall be carried out in a manner that causes least interruption to the traffic. The road/street may be closed only after obtaining necessary permissions from relevant authorities such as Police, Local Urban Body etc. Where it is necessary suitable foot crossings shall be provided to cross open trenches. Necessary traffic de-touring, safety signs shall be used for safe and smooth traffic movement.

The Contractor shall provide efficient lighting and safety signs on temporary roads during construction and shall adopt and implement adequate traffic regulation.

The Contractor shall take effective safety and warning measures to reduce accidents and provide suitable temporary crossings to facilitate normal life and business.

2.19 Safety Measures

Contractor shall implement and enforce national safety standards in the work site. The public is to positively be isolated from the work site and equipment maneuvering areas by physical barriers as detailed in the specifications. Bamboo stakes, rails or safety tape will not be acceptable. Contractor's employees and all subcontractors are to be trained in safety and provided Personal Protection Equipment. The Contractor shall not allow any worker (his or his subcontractors' employees) to be in the work area without PPE.

Safety training is to be coordinated with the Engineer and properly documented. Daily review of potential safety issues in each work site is mandatory. Accident information is expected to be shared with the Engineer immediately upon learning about it. Near-accidents and first aid incidents are to be documented and provided to the Engineer.

2.20 Coordination with other contractors and battery limits

Contractor shall coordinate work with other contractors working in the area. They include contractors installing sewer lines in Cuttack, relocating or installing water lines on behalf of

WATCO; and contractors working on the open drain. Facilitation of mutual work is expected from all contractors.

2.21 Testing and Commissioning

Contractor shall clean the drains and provide CCTV documentation of the final state of the drain. Sluice gates and other mechanical elements shall be tested for proper functioning. O&M Manuals and As-Built drawings shall be provided before start Taking Over Certificate is issued.

2.22 Work plan requirements

The Contractor will prepare a general project plan at the onset of the project. The plan will list the initial sequence of work, duration of intended activities, list of resources and expected monthly billing. Upon commencement of work the Contractor will prepare a three-month microplanning schedule, which will be updated every month. This document will be the basis for Engineer's authorization of new work fronts.

2.23 Design Documents.

The Contractor shall carry out the Design in accordance with Technical Specifications meeting all requirements stipulated in the document. The base design provided with the tender documents is for illustration purposes only. The Contractor is to submit his own design if his intended product varies in materials, products or methodology. Design of the preparatory activities of shoring and water diversion must be submitted to the Engineer for approval.

Approval of the Drawings and design shall not relieve the Contractor of his responsibilities under the Contract. The Engineer will not permit construction to start on a part or section of the Works unless Construction Documents for that part or section have been approved.

2.24 Quality Control / Quality Assurance Policy:

In accordance with the Conditions of Contract, the Contractor shall apply the formal requirements of Quality Control/Quality Assurance to the design, supply, construction and maintenance of the requirements of BS: 5750 or an equivalent International Standard. Positive commitment to Quality Control/Quality Assurance shall be expressed in a formal policy statement given in the Contractor's Quality Manual.

2.25 Beautification work along both side of the drains

Beautification work will be executed as per the direction/approval of authority and as per availability of space along the side of the proposed Box drain. The contractor, after verification of the available space, have to submit a detailed proposal for different types of beautification works, for approval of the authority. Basing on actual execution of different types of beautification work payment will be released.

3. Broad Scope of Work

Broad Scope of Work is elaborated in the following paragraphs to be read inter-alia with the detailed scope of works enumerated in the schedule-B and technical specification provided in Schedule-D of the EPCA. An indicative plan of the proposed system is attached as Annexure-**A**.

- 3.1 Detailed survey, investigation, and soil testing shall be carried out as per project requirements for approval by WATCO. Being an EPC contract, the contractor shall undertake detailed planning, engineering, design, and preparation of drawings in a comprehensive manner to ensure that the proposed Box Drain Project. Execution of the project as per the detailed scope of work shall be done strictly in accordance with designs and drawings approved by WATCO.
- 3.2 The contractor shall provide, supply, install, erect, construct, test, trial run, and commission all components of the Box Drain Project, as designed and approved under Clause 3.1, adhering to strict quality assurance and quality control standards, and within the stipulated project duration.

Note: The above-mentioned Scopes / Quantity written anywhere in the documents are indicative only. All ancillary items required to make the Box Drain Project technically feasible & functional to be provided by the bidder within the bid amount.

It is intent of the Engineer-in-Charge to construct a Box Drain work, using highest standards of construction and supply of material and equipment to enable a sustained reliable system for performance over next 30 years.

4.0 General

- 4.0.1 The bidder before bidding shall visit the site at his own cost and shall satisfy himself with the nature and extent of the work involved, actual site conditions, and existing facilities. Shall collect any other information which may be required before submitting the tender. Any claim in this regard shall not be entertained.
- 4.0.2 The scope of work for the STP project covers surveys including Topographical survey, Geo-technical survey, & detailed engineering of all components of the scheme, do the necessary changes as per site condition, develop detail drawing and getting approval from Engineer-in-Charge, supply of equipment and construction materials, testing at manufacturer's works, delivery up to site, erection, execution of works as per the work described under "Scope of Work" clause 16.0 or elsewhere in the tender and as per IS codes, CPHEEO, OPWD specifications and detailed specifications attached hereto, final check-up, painting, testing, commissioning including hydraulic testing etc. as per relevant IS codes and relevant specification.
- 4.0.3 The work shall be carried out according to the design / drawings submitted by bidder and approved by Engineer-in-Charge. For building, facilities, systems, structures, etc., necessary layout and details are furnished with tender document. Any changes, if required, shall be done by the bidder keeping in view the scope, minimum specified requirement, the statutory and functional requirement and providing enough space and access for operation, use and maintenance. The bidder's work shall cover the complete requirement as per tender specification.
- 4.0.4 The work to be performed under the specification consists of providing all labours, supervision, materials, scaffolding, construction power, fuel, construction water, and construction equipment, testing equipment, tools and plants, supplies, transportation and all incidental items not shown or specified but necessary for successful completion of the work.
- 4.0.5 The nature of work generally involves site clearance, excavation in all types of soils, foundation preparation, dewatering and its disposal, backfilling, disposal of surplus excavated material, supply of all construction material and supply of all necessary plant machinery and equipment, etc., construction with the materials of specified quality, constructing drains, embedding, encasement of pipes, cleaning the site from all waste and surplus material after

completion of work and other ancillary work as per specifications, as per drawings submitted by the contractor and approved by the Engineer-in-Charge.

- 4.0.6 The scope of work also includes shifting of electrical/ telephone/ any other type of cable, electric poles, water, sewer or any other type of pipeline or any other facility. Any arrangement for crossing roads, drains, nallah including bypass arrangement and their restoration to the satisfaction of Engineer-in-Charge after completion of particular work also included in the “Scope of work”.

4.1 Services to be Provided by the Contractor

- 4.1.1 The contractor shall open a fully furnished site office with all necessary facilities having office equipment such as computer, printer, etc. A separate room shall be provided to the Engineer-in-Charge or its representative.

- 4.1.2 The contractor shall provide **3 nos. of brand-new Air-conditioned diesel running vehicles (minimum 6-seater) preferably of Mahindra make Scorpio / Toyota make Inova** within three months of issue of work order for use by the Authority’s personnel for inspection of work. The vehicle should be supplied with insurance papers, RC book, Road tax receipt etc. and equipped with all accessories. The model of the vehicle shall be approved by the Authority before procurement. The contractor shall provide Drivers and necessary POL for regular running of the vehicles (average 3000Km/month) during the project construction and operation & maintenance period. The contractor shall maintain the vehicles to keep the vehicles in good running condition and carry out regular repair & maintenance during the above period. After completion of operation & maintenance period, the contractor shall hand over the vehicles to the Authority in good running condition.

Or

The Contractor shall provide **3 Nos. of EV Air-Conditioned Inspection Vehicle**. The Vehicles shall be kept at all the times for duration of construction. After construction the vehicles to be handed over to the department and the ownership to be transferred to WATCO. The Contractor shall submit for approval the detail of Vehicles proposed. Contractor shall be solely responsible for running and maintenance of the Vehicles including Taxes, Insurances, Licenses, Fuel, Oil and Lubricants, Repair and Maintenance. Also provide competent Driver for Running of Vehicle as required by the Engineer

- 4.1.3 The Contractor will make necessary arrangement for power and water required for construction activity
- 4.1.4 The Contractor shall make necessary arrangement for all the testing and inspection to be conducted in a manner as specified in the specifications and as per codes.
- 4.1.5 Transportation of all equipment / raw material / spares from manufacturers work to the project site, inclusive of all intermediate handling and unloading / storage at site and all taxes, etc.
- 4.1.6 Supply, erection as per manufacturers recommendations / specifications, inspection, testing, start up and running of the equipment during trial run / performance guarantee period at rated capacity and speed.
- 4.1.7 Deploying qualified and experienced staff for supervision of all erection and commissioning services. The Contractor shall also arrange for rectifying the defects during defect liability period.

- 4.1.8 During **defect liability period of two years**, the contractor has to replace any equipment, component, etc. for manufacturing defect, malfunctioning and below rated performance. He will make good any structure or part of it if found defective or becomes during functioning.
- 4.1.9 Application of the final paints and final finishing work shall be done by the Contractor after complete erection and testing, trial run but before handing over to the department.
- 4.1.10 The contractor shall also arrange technical experts of equipment from proprietary supplier as and when necessary, till the commissioning, trial run and performance guarantee period of the equipment.
- 4.1.11 The detailed scope of work has been mentioned in clause no 16.0 of this chapter.
- 4.1.12 Nothing extra over the quoted price shall be paid to contractor on account of any financial implications of all the conditions and specifications. It will be treated that necessary financial provisions are deemed to have been kept in the quoted price. Any contiguous item or any provision / requirement, if not included in the general specification and scope of work, special specification and detailed specification but necessary to be provided for the completion of the work and for its functional necessity, shall be provided at no extra cost above quoted price. The decision of the Engineer-in-Charge in such cases shall be final and binding on the contractor.
- 4.1.13 The time is the essence of this contract. The entire work described under “Scope of Work” clause 18.0 or elsewhere in the tender (Design, approval of design & drawings, execution and commissioning) is to be completed within a time frame of **30 (Thirty) calendar months from the date of issue of work order.**

5 Tender Drawings

The Tender drawings shall form the part of tender document. The contractor shall submit detail design and drawings of all component of the sewerage scheme for its sufficiency in all respect before taking up the construction work. The contractor can do addition, modification, alteration or detailing in the drawings as per the prevailing conditions and he has to take approval from Engineer-in-Charge. The structural stability throughout its working life lies with the contractor. The work has to be executed as per the construction drawings (latest revision) with additions, alterations and modifications made from time to time as required and approved by the Engineer-in-Charge and also according to any other drawing prepared by contractor progressively during the execution of the contract.

6 Test for Material/Workmanship

All tests required for all brought out materials as desired by the Engineer-in-Charge shall be carried out by the contractor as per relevant IS code and at his own cost in the presence of authorized representative of the Engineer-in-Charge.

7 Specifications

The detailed specifications, IS codes and OPWD specifications are intended for the general description of the works, quality and workmanship. All works are to be carried out according to the specifications. Wherever reference to the standard codes of practice etc. is made, they shall be taken as the latest edition of the same issued within one month before the date of submission of the Tender.

8 Layout and Levels

The layout and levels of all structures etc. shall be made by the contractor at his own cost from the general grid of the plot and bench marks given by the Engineer-in-Charge. Contractor shall provide all help in instruments, materials and men to the Engineer-in-Charge at no extra cost for checking the detailed layout and correctness of the layout and levels. However, the Contractor shall be solely responsible for correctness of layout and levels.

Permanent reference pillars shall be established by the contractor and under no circumstances

shall the contractor remove or disturb any permanent/reference pillar/ benchmark without the approval of the Engineer-in-Charge. The contractor shall carefully maintain and protect all benchmarks and reference points and shall mark the layout of all his work by accurate reference to the benchmarks and reference points.

9 Construction Method

The bidder shall submit a pert chart along with this tender showing the time schedule for the overall construction activities along with construction methodology. The construction method and mobilization of resources to be adopted by the contractor shall match with this time schedule and shall be approved by the Engineer-in-Charge. After approval of tender the contractor will submit his detailed schedule of work and methodology statement.

10 Quality Assurance Plan

A Quality Assurance plan giving details of necessary tests to be carried out on various materials for construction of work shall be submitted by the contractor for approval before start of the work. The Contractor shall be responsible for carrying out such tests. The contractor shall test the samples of all materials in presence of authorized representative of the Engineer-in-Charge at the specified frequencies as per relevant IS codes or elsewhere given in the tender document and keep proper record of all tests.

11 Testing of Materials

All arrangement shall be made by the contractor to provide testing requirement as specified in the specifications. For the tests for which, equipment required is not available with the contractor shall provide the same or will arrange the test to be done at a Government approved laboratory. No extra claim is admissible in this regard.

12 Approach Roads

The Contractor where required shall make his own arrangement for approach to the work site (including, burrow and disposal area) and for movement of men, machinery, other equipment etc. required for carrying out the work included under this contract. The contractor will also arrange for any land required for burrowing earth or disposal of any dispensable material.

13 Dealing with Water / Dewatering,

Bailing and pumping out of subsoil water may have to be carried out during execution of work. The contractor's program and methods must be capable of dealing with rainfall / subsoil water. The contractor shall supply, install and operate his own temporary pumping equipment wherever required.

14 Prevention of pollution

14.1 Arrangement shall be made by the contractor to prevent Air Pollution and pollution in any stream, nallah or rivers. Arrangements for sprinkling of water in the construction and burrow area to prevent any dust blowing also shall be done by the contractor. The contractor shall be solely responsible and liable for all damage caused by any pollution that may take place during the execution of the works, and he shall make arrangements as the Engineer-in-Charge may approve, for preventing pollution.

14.2 No separate payment shall be made for the pollution control measures.

15 Safety Measures

In respect of all labour directly or indirectly employed in the work for the performance of the contractor's part of this agreement, the contractor shall at his own expense arrange for the safety

provision as per IS 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 the above arrangement Engineer-in-charge shall be at liberty to make arrangements and provide facilities as aforesaid and recover the cost incurred on his behalf from the contractor.

The contractor shall ensure the safety of men, material, machinery, existing structure and any other facilities. Since the work is to be done on road/lanes/by lanes, all necessary safety arrangements including proper barricading and lighting etc. shall be done by the contractor.

The Contractor shall be absolutely and solely responsible for any accident that may occur during the progress of the work and for injury or damage to the men, material, machinery, existing structure and any other facilities of any description whatsoever which may be caused by or result from the execution of work. The Contractor shall make good any damage due to accident or pay any claim arising out of accident and will indemnify the employer of expenses on account thereof. No separate payment shall be made for safety measures.

16 Equipment & Machinery.

The contractor shall have to use his own earth moving equipments & concreting equipment such as dumpers, poclain Hydraulics, dozers, batching & mixing plant, vibrators etc. and any other machinery required for the entire scope of work including the work of excavation and conveyance of earth from the burrow areas to site and also shall have to use his own compaction machinery to compact the fill material such as vibratory /pneumatic rubber typed rollers, water tankers etc. A list of equipment/machinery to be deployed at site as per the requirement of the project schedule shall be submitted by the contractor within one week of award of work. All the equipment/machinery shall be kept in working condition by the contractor during the tenancy of the contract. Contractor will not move any equipment/machinery without written permission of Engineer-in-charge to any other work which is not under the scope of this work.

17 Storage and Handling of Materials

The protection all material and machinery from dirt, clay, rust, theft or damage at any stage of the project is the responsibility of the contractor and no claim will entertain in this regard.

17.1 Reinforcement

Reinforcement steel shall be stored in a manner that no damage/rusting is caused to the material.

17.2 Cement

The Cement shall be stored as per IS code and in a manner that no damage/setting is caused to the material.

17.3 Coarse and Fine Aggregate

Aggregates shall be stored on brick soling or an equivalent platform so that they do not come in contact with dirt, clay, grass or any other foreign substance at any stage. Aggregates of different sizes shall be kept in separate stacks. Aggregates from different sources shall be stacked separately, if so desired by the Engineer-in-Charge with proper care to prevent intermixing.

17.4 Sand

Sand shall be stored on brick soling or an equivalent platform so that they do not come in contact with dirt, clay, grass or any other foreign substance at any stage.

17.5 All other material required for construction will be stored properly by the contractor.

18 Detailed scope of work

The proposed project aims to improve the drainage system for flood mitigation in the city, improve sanitary environment by converting open drain to box drain and to contribute to improving traffic conditions and safety by constructing the road above the box drain.

Indicative details of provisions under the scope of this RFP are for conversion of 5 Nos Sub-Drain of Main Drain-1 (MD-1) to closed RCC box drain along with ancillary works.

The work involved under these specifications is mainly related but not limited to the following:

- 18.1** The work shall be carried out according to the detailed specifications, IS codes and OPWD/CPHEEO/PHEO specifications. The design/drawings shall be submitted by the contractor and approved by Engineer-in-Charge. For building, facilities, systems, structures etc., necessary layout and details are to be developed by the bidder keeping in view the scope, minimum specified requirement, the statutory and functional requirement and providing adequate space and access for operation, use and maintenance. The bidder's work shall cover the complete requirement as per tender specification.
- 18.2** The Geo-technical investigation at locations of other RCC structures shall be carried out by the contractor for structural design of civil structures proposed in the compound or as required.
- 18.3** Preparation of work areas, clearing site, jungle clearance etc. in the entire area including dismantling and removing of any existing above ground and underground structures including existing roads, uprooting of all the trees, debris and vegetation and their disposal, shifting of pipes, cables, electrical poles etc. The dismantled and removed material shall be stacked/ disposed as per direction of Engineer in Charge. The bidders should visit the site prior to submission of bid and make himself conversant with the site conditions to estimate the dismantling/removing work. Shifting of electrical or any other type of cables, electric poles, water, sewer, gas or any other type of pipeline or any other facility, their restoration to the satisfaction of Engineer-in-Charge after completion of work.
 - i. Repair to damages caused during construction to any existing road, bridge, culvert, water supply line, sewerage line, drain, electricity cable & pole, gas pipeline and telephone line, etc. shall be reinstated as per the original specification and satisfaction of concerned Authority/ Authority's Engineer.
 - ii. Cutting of road surface for taking of sewer/pipeline at required depth will be done with making good to the damages by mending & restoring to existing condition.
 - iii. Supplying & Filling in foundation and plinth with sand watered and rammed including cost of sand & labour, T & P all complete.

Dewatering

Attention of the Contractor is drawn to the fact that water table may be high at some places, even during the dry season.

Ground and surface water shall be controlled to the extent that excavation and pipe installation can proceed in the specified manner and such that the trench bottom is not disturbed to the detriment of the pipe installation. Trench water shall not be permitted to enter the pipe being

installed unless approval is received from the Engineer.

If necessary, pumps and well points, or other suitable (subject to the approval of the Engineer) equipment shall be deployed to keep excavations free of water. Caution shall be exercised to make sure that foundations in proximity to sewer excavations are not adversely affected by the excavation or dewatering process.

Discharge from pumps, well points, or other dewatering equipment shall be located and controlled so that loss, damage, nuisance or injury to the public property is not occurred

18.4. General Requirements

The Scope of Work under this Contract includes the supply, construction, installation, testing, trial run, and commissioning of the Box drain project and facilities (hereinafter referred to as “the Works”). The details of the work under this contract will be as per clause described below.

18.4.1 Completeness of The Offer:

The Contractor shall be fully responsible to ensure that the whole of the Works, including each individual component is constructed in a manner so that the plant as a whole operates as a fully integrated system which is capable of achieving the required output in an efficient and economical manner, and to include all plant, equipment and accessories required for the safe and satisfactory operation of the facilities. To achieve this, the Contractor shall ensure that each individual component performs in a manner which is complimentary to that of all other components. Any accessories which are not specifically mentioned in the specifications, but which are usual or necessary for completion of the Works and successful performance of the plant and facilities, shall be provided by the successful Bidder within the tendered cost. The Contractor shall, to the maximum extent practical and feasible, endeavor to standardize on the manufacture and supply of Plant and equipment so as to minimize the operation and maintenance requirements subject to clearance of all punch points.

18.4.2 Trial Run of the System:

After execution of the works the Contractor shall run the plant continuously 24 hours a day for a period of 30 days to demonstrate satisfactory performance to the Employer’s Representative prior to declaration of successful commissioning and starting the operation & maintenance. The cost towards the Contractor’s Engineer and other operating personnel during the said period of trial run, along with cost of tools and spare parts, which are required for operation and maintenance of the Plant and equipment during the trial run period shall be borne by the Contractor and shall be included in Contract Price. In the event that the plant or any of the facilities do not satisfactorily achieve the required performance standards during this period, the trial run period shall be extended until such time as the Contractor has satisfactorily rectified any deficiencies as may be necessary to satisfy the performance requirements.

18.4.3 Commissioning of the System:

On completion of the Trial Run, commissioning of the box drain project shall be done by the Contractor by operating continuously for a period of 60 days.

18.4.4 Training of Employer's Personnel:

The Contractor shall be responsible to provide practical training on all aspects of the operation, maintenance and routine repair of the Plant, equipment and facilities to all personnel selected by the Employer who will ultimately be responsible for the operation, maintenance and repair of the Plant and its facilities. For this purpose the Contractor shall provide a comprehensive training program for the Employers personnel during the entire

period of the trial run and commissioning, and for as long thereafter as may be reasonably required to ensure that the designated personnel are adequately trained to take up their responsibilities.

18.4.5. Time for Completion:

The whole of the Work, including mobilization, reconnaissance, design, manufacturing, transportation, construction, installation, trial runs, testing and commissioning is to be completed within the scheduled Time for Completion as set out in the Appendix to Tender. The duration of the Trial Run and test period is 30 days and the Commissioning Period is 60 days; both periods are included within the scheduled time for completion. The physical completion of the plant and facilities shall be achieved before commissioning. Commissioning of the plant will be deemed to be completed after the plant has been operated trouble free for 60 working days; any intervening breakdown period will not be considered as a part of this period.

18.4.6 Milestones:

The construction work shall start not later than 90 days from the date of issue of work order and shall end at the completion of 900 days from the date of issue of work order. The construction period shall include trial run of 30 days. The satisfactory commissioning of the plant shall be completed in 60 days from the date of completion of the construction work.

The tenderer shall submit a Bar chart showing construction schedule.

| | Description of Milestones | Time for Completion |
|------|--|--|
| i) | Commencement of the Works | : 21 days |
| ii) | Mobilization to the site and establishment of field office and quality control laboratory. | : 90 days |
| iii) | Commencement of submission of design calculations, drawings and other documents | : 75 days |
| iv) | Completion of installation of Plant and equipment | : 90 days before the Time for Completion |
| v) | Completion of Trial Run of the system | : 60 days before the Time for Completion |
| vi) | Completion of Commissioning and Hand over to the Employer | : Time for Completion |

19. SITE REQUIREMENTS

19.1 Space for Contractor

Contractor to build a Temporary Site Office / Camp office and for construction of a godown for storing some Construction Material prior to physical start of work.

19.2 Maintenance of the Site

The Contractor shall maintain the site equipment and related services until expiry of the Contract period or aforementioned facilities are to be maintained until the instruction of the Engineer.

19.3 Project office

The Contractor shall provide a suitable Project Site Office of 90 Square meter area for his own staff, records etc as per his requirement.

19.4 Space for Contractor:

Employer will allocate space to the contractor to build a site office, construction of godown and setting up of plant if available on lease for construction period and any lease fee or any other charges levied by government shall be borne by the contractor, and shall have to hand over the space in original condition to allotter, otherwise the contractor has to arrange above facilities on rent in Cuttack and nearest possible to site only.

19.5 Areas outside the Site

In the event of the Contractor making use of any special or temporary wayleave or accommodation acquired by him or any pit for the disposal of surplus materials, or any borrow pit or quarry, he shall obtain the written consent of the owner, occupier or authority having charge of the land in which such way leave, accommodation or pit is situated, and shall make a record, agreed by the owner, occupier or authority as aforesaid, of the condition of the surface of that land before entering thereon.

The Contractor shall permit the Employer and the Engineer and any person authorized by the Employer, access for the purposes of the Contract to any such special or temporary way leave or additional accommodation.

In the event of the Contractor making use of any special or temporary way leave or additional accommodation made available to him by the Employer for the purpose of the Contract, the land in which such way leave or accommodation is situated shall be deemed to be part of the Site. On Completion of the work at site, the Contractor shall reinstate the area to its original condition to the requirement of the Engineer.

For the purposes of this clause, 'accommodation' shall be deemed to include housing, Offices, workshops, warehouses and storage areas.

19.6 Maintenance of Temporary Access Roads

The Contractor shall prepare and maintain temporary access roads. The Contractor shall be solely responsible for the maintenance of the existing site access roads. This responsibility shall continue until the completion of the Defects Liability Period, or until such earlier date as the Engineer may advise the Contractor in writing. Such maintenance work shall include general upkeep and any necessary repairs to damaged road surfaces, pavement, drainage, associated slopes, etc. to a standard at least equal to their original condition. While carrying out such maintenance work, the Contractor shall make arrangements to maintain through passage for the Employer and Engineer vehicles and also those of other contractors over these access roads, which may comprise temporary diversions all to the approval and requirement of the Engineer.

19.7 Clearance of the Site

The Contractor shall clear the Site to the extent required by the Engineer for checking the setting-out.

Clearance of the Site shall also include demolition and removal of all articles, objects and obstructions which are expressly required to be cleared.

The Contractor shall ensure that the parts of the Site to be occupied by the proposed Permanent Works are clear, and shall maintain the remainder of the Site as may be required for access and temporary works areas required for rehabilitation of the existing works.

The Contractor shall remove the material arising from such clearance and dispose of it in a manner and at a location, to the approval of the Engineer.

The Contractor shall fill and make good with appropriate materials those cavities and losses of soil which result from clearing the parts of the Site not subsequently to be occupied by the Works.

The Contractor shall not clear the Site of any existing structure without the prior written instruction of the Engineer.

19.8 Clearance and Reinstatement of the Site on Completion

On completion of the Works, the Contractor shall clear any temporary works areas and temporary access roads and reinstate the areas to their original condition and to the requirement of the Engineer.

19.9 Access for the Employer and Engineer

The Contractor shall permit the Employer and the Engineer and any person authorized by the Employer or the Engineer including workmen of the Employer, other contractors or utility undertakings access for the purposes of the Contract to all areas of the Site and to any additional accommodation or temporary way leave for the duration of the Contract period.

19.10 Water Supply at Site

The Contractor shall make his own arrangements for water supply during construction at each site and he shall ensure the quality of the water remains suitable for the purpose for which it is intended.

19.11 Latrines, Washing Facilities and Wastewater Disposal at Site

Throughout the period of construction of the Works the Contractor shall provide, maintain and cleanse suitable and sufficient latrines and washing facilities for use by his employees. He shall ensure that his employees do not foul the Site but make proper use of the latrines. Where practicable, the latrines shall be connected to the nearest sewer, or if this is not practical the Contractor shall provide an adequately sized septic tank and soak-pit.

The Contractor shall also provide separate latrines to the above requirements for the entire Engineer's staff.

After completion, the latrines and washing facilities shall be removed, all ground disinfected and the surface reinstated to the requirement of the Engineer.

19.12 Electricity for Contractor's Use on Site

The Contractor shall be responsible for provision and distribution of an electrical supply for the purpose of constructing the Works.

The installation shall comply with all the relevant regulations, Indian Standards and Codes of Practice, and Health and Safety requirements, etc. The Contractor must take every possible precaution to ensure that his installation is safe and injury to personnel or damage to plant and buildings is avoided. The Contractor shall be fully responsible for all safety aspects.

The Contractor shall test the temporary site distribution system every 3 months for compliance with the relevant standards.

19.13 Camp Facilities

The Contractor shall construct and maintain to the Engineer's requirement a camp to provide living accommodation for all Contractor staff and operatives who have no other local accommodation. The Contractor's camp shall be located close to but not on the Site itself and at a location approved by the Engineer.

Responsibility for providing all services to the living quarters and compliance with all sanitary laws and other laws and regulations shall be borne by the Contractor. Security and the fencing of these areas shall be the responsibility of the Contractor.

19.14 Compressed Air Use on Site

The Contractor shall provide the necessary compressed air plant and equipment required for construction of the Works.

Electrically driven compressors connected to the site electricity supply shall not be used. Diesel engine driven compressors shall not be sited within buildings or in a location that may cause a health hazard to personnel owing to exhaust fumes or noise.

19.15 Refuse Disposal on Site

Refuse and rubbish of every kind shall be removed from the Site and disposed off by the Contractor at his own expense, frequently and regularly so as to keep the Site in an approved wholesome, hygienic and tidy condition to the requirement of the Engineer.

19.16 Safety and Security on Site

19.16.1 General

The Contractor shall at all times maintain a safe system of working and working environment and shall comply with all enactments, regulations and working rules relating to safety, security, health and welfare of all persons who may be affected by his work.

In particular, he shall ensure that only persons who are properly trained for their duties are employed, and that the correct tools and procedures are used.

Nothing which has been written into or omitted from this Employer's Requirements shall be taken to relieve the Contractor from his obligations under this clause. No clause in this Employer's Requirements shall prevent the Contractor from drawing the attention of the Engineer to any feature of the Works which is not consistent with normal safety practices nor prevent him from putting forward proposals at any time which would increase the safety of the installations.

Not later than four weeks before work commences on the Site, the Contractor shall submit to the Engineer his comprehensive proposals relating to the safety, health and welfare of all his personnel on the Site.

The Contractor shall appoint a suitably qualified representative as Safety Officer who shall be responsible for the implementation of site procedures which shall include but not be limited to:

1. Safety;
2. Working in hazardous areas;
3. Permit to work;
4. Fire and smoking regulations
5. First aid;
6. Warning signs;
7. Trenching scaffolding and other construction structures;
8. Safety barriers;
9. Protective clothing and equipment;

10. Safety training;
11. Safety meetings and inspections;
12. Health and welfare.

The proposals shall be appropriate for all grades of labour and personnel who will work on or visit the Site on behalf of the Employer, Engineer or Contractor. The Engineer shall have the power to stop any activity or work in any area where there is a breach of the published site safety rules such that health or life is put at risk. The Contractor shall ensure that all other contractors working on the Site are not working in an unsafe manner so as to endanger themselves, the Contractors personnel, other personnel or the Plant and pumping stations. The Contractor shall bring any violation of Site safety rules by others to the attention of the Engineer in writing.

19.16.2 First Aid and Life-saving Apparatus on Site

The Contractor shall provide on the Site such life-saving apparatus as may be appropriate and an adequate and easily accessible first aid outfit or such outfits as may be required by any government ordinances, factories acts, etc, published and subsequently amended from time to time. These outfits shall be suitably labelled for identification. In addition, an adequate number of persons permanently on the Site shall be instructed in their use, and the persons so designated shall be made known to all employees by the posting of their names and designations in a prominent position on Site.

19.16.3 Electrical Safety on Site (by electrical person)

The Contractor shall be responsible for the electrical safety of all Plant and pumping station supplied and installed materials and equipment. Whilst any equipment is being installed or tested, the Contractor shall ensure that all necessary precautions are taken to safeguard personnel working on site. If necessary, this shall include fencing off areas which are considered to pose a risk, and erecting warning notices.

The Contractor shall be responsible for ensuring that the electrical installation is carried out by suitably trained competent personnel and that the work is carried out in a safe manner.

The Contractor shall be responsible for the operation on the Site of a permit to work system during the period of electrical equipment installation and testing. This system shall regulate the installation, the energization and the use of electrical equipment installed and the method of work adopted.

19.16.4 Noise

The Contractor shall minimize noise on site to the extent practical. Operations entailed in the construction of the Works shall be limited only to operation of machinery within the working hours approved for weekdays, weekends and holidays. The noise level shall not exceed the limits prescribed by the governing regulatory authorities for daily construction activities.

19.16.5 Warning and Safety Signs

During construction of the Works, statutory safety signs shall be adequately provided throughout the Works, both indoors and outdoors. These safety signs shall cover mandatory, prohibition, warning, emergency, fire-fighting and general notices. All signs shall be positioned around the Works at highly visible points with fluorescent colours where necessary. Provision of signs, and the positions of signs shall be subject to the Engineers approval. Special attention shall be given to areas designated hazardous. Warning signs shall be in Odia, Hindi and English.

19.16.6 Site Working Hours

The Contractor shall have working hours 24 x 7 and work shall be executed in three shifts round the clock.

19.16.7 Health and Safety Plan

The contractor should follow but not limited to the following HSP guidelines to avoid mishaps.

- a. All workers should wear appropriate personal protective equipment during all operations where exposure to hazardous conditions exists.
- b. Where there is a possibility that an injury could acquire during the performance of assigned duties, the workers is required to use suitable face shields or goggles.
- c. The worker shall wear high top leather work boots which provide the most protection. During summer times appropriate material for size should be chosen to make sure complete foot safety.
- d. All worker working or visiting locations designated by the Employer's representative as Head Project Areas (HPA) shall wear approved (IS specified-industrial standard) protective helmets. These helmets should be inspected on a regular basis and shall be replaced immediately if found to be defective. Helmets shall be worn while working underneath overpasses and at any other time the survey worker head drums it necessary.
- e. Worker must wear high-visibility safety vests of orange/ yellow color and orange rain coats, whenever working within the right of way, at any time when exposed to traffic such as driveways, parking lots, construction sites, etc and at any other time deemed necessary by the Employer's representative. In addition, during night (if permitted by the Employer's representative) operation the safety vests must be light reflecting. If raingear or other outer garment is being worn the reflecting vest must be worn above it.
- f. While working in any spot of water bodies, safety vests must be used

19.16.8 Delivery to Site

The Contractor shall be responsible for the transporting, handling and bringing to site of all the materials and equipment etc. as required and directed by Engineer.

19.16.9 Protection from Weather and Storage

An area and/or building on the Site for use by the Contractor for storage of cement, steel etc. and equipment prior to erection will be subject to the approval of the Engineer.

19.17 Survey Details and Bench-marks

The existing ground levels and the reference bench marks shown on the Drawings (attached). However, contractor shall conduct his own topographic and geo-technical survey, for verification of data attached with the bid document and work accordingly. Any claim by contractor, on account of change in data mentioned in bid-document, shall not be entertained.

19.18 Project Signboards

The Contractor shall supply and erect project signboards at locations to be specified by the Engineer. The layout and dimensions of the signboards and their construction shall be to the approval of the Engineer and the lettering in English, Hindi and Odia shall be black on a white background.

19.19 Advertising

The Contractor shall not use any part of the Site for any form of advertising without the prior written approval of the Engineer.

19.20 Working Space.

The site conditions vary along the 1300-meter route of the project, mainly in the quantum of work space

available, adjacent to the road and access points.

Contractor shall be responsible for creating the working space required to implement his design.

19.20.1 Access to Site

The Contractor is responsible for obtaining the access routes to the various work fronts and to develop the means to carry out the work where access is restricted.

The Employer will be deemed to have been giving the Contractor access to the site when the authorization to carry out the work is given. Under no circumstance will the Employer be liable for providing physical access to the site, as contractor has to develop methodology for access on the alignment of drain

19.20.2 Impact to Local Traffic

The Contractor will maintain sufficient number of traffic marshals, directional signs, and road by-passes to facilitate the movement of local traffic. In the event the traffic is to be restricted for safety or for unavoidable work purposes, the Engineer shall be notified least seven days in advance and subsequently the area residents by posting informational signs with the intended restriction start date and likely duration

SCHEDULE - C
(See Clause 2.1)

PROJECT FACILITIES

DELETED

SCHEDULE - D
(See Clause 2.1)

SPECIFICATIONS AND STANDARDS

1 Construction

The Contractor shall comply with the Specifications and Standards set forth in Annex-I of this Schedule-D for construction of the Sewerage Project.

2 Design Standards

The Sewerage Project shall conform to design requirements set out in the following documents:

a). CPHEEO manual on Sewerage& Sewage Treatment, and b) relevant I.S. Specification

3 Specifications and Standards for construction

All Materials, works and construction operations shall conform to the relevant I.S. Specifications and Standards of CPHEEO manual on Sewerage& Sewage Treatment published by MoUD, GoI. Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority/ Authority's Engineer.

Specifications and Standards for construction

SCOPE & TECHNICAL SPECIFICATION OF CIVIL & STRUCTURAL REQUIREMENT FOR THE BOX DRAIN

4.0 General

The clauses in this section are meant to provide general guidelines and compliance requirements to the Contractor. It does not however relieve the Contractor from taking all other steps and precautions as deemed necessary to complete the construction of box drain successfully within the specified contract period and the bid amount.

The following general requirements shall be followed by the Contractor:

- i. During construction all the conditions as per the Government of Orissa, CPWD / PWD Specification will be applicable.
- ii. Approvals from Railways, National Highway, Orissa PWD (R&B), Water Resources, Telecom Department, GRID Corporation of Orissa, CMC, Forest Department, wherever needed will be obtained by the WATCO, but Contractor has to co-ordinate with WATCO & these organizations.
- iii. All the safety precautions will be taken by the Contractor to avoid any damage/incident. The Contractor will submit a Health and Safety Plan reviewed and approved by the Engineer.
- iv. Electric poles, telephone cables, water supply pipe lines, trees etc. should be protected as far as possible with due care.
- v. Suitable arrangement must be made for street drainage if required at site.
- vi. With reference to Conditions of Contract, claims on account of damage to Private property, shall be borne by the Contractor.
- vii. The Employer's Requirements for all the items covered in this tender are included in this section of the bid documents. In case any item is not covered or is missing, Orissa PWD and PHD specifications, CPWD specification, MORTH specification and relevant IS code shall be followed, as per approval by the Engineer.
- viii. In case of discrepancy between specifications in this document, and Orissa PWD and CPWD/PHD specifications/ relevant IS code, the decision of the Engineer shall be final.
- ix. The cleaning and removal of debris etc. shall be carried out side by side during the execution of work as well as on completion. All debris shall have to be removed by the Contractor and completed work to be handed over free of debris and allied structures created with the construction of work.
- x. The stacking of materials for construction work shall be done as per instructions of Engineer.

- xi. Watch and ward liability of construction/demolished materials during execution of work shall be by the Contractor.
- xii. Surplus earth from excavations & all dismantled materials shall be placed by the Contractor at places approved by the Engineer. No earth & other dismantled materials shall be sold by the Contractor to any private parties.
- xiii. No pits should be dug by the Contractor near the site of work taking out earth for use on the work. In case of default the pits so dug will be filled in by WATCO at the risk & cost of the Contractor.
- xiv. The Contractor shall make his own arrangements for water required for construction purpose at his own cost.
- xv. Actual quantities of completed and accepted work by WATCO will be paid for.
- xvi. The Contractor will arrange his own tools, plant and equipment required for work

4.1 General Specifications, Standards and References

In general, all relevant IRC Codes & BIS Codes shall be followed for design, Construction, Operation and maintenance etc. As a guide line only, a few codes are mentioned below.

- IS: 456-2000: Indian Standard –Plain and Reinforced Concrete-Code of Practice, Fourth Revision.
- IS 3370 Code of practice for concrete structures for storage of liquids (Parts 1 to 4)
- IS 1786: 2008 Specification for high strength deformed steel bars and wires for concrete reinforcement.
- Standard Drawings for Box Cell Culverts published by IRC, Govt. of India, Ministry of surface Transport.
- IS 2314-1986 Specification for Steel piling sections.
- Piling hand book 9th edition arcelor mittal ASTM C 1433, ASTM C 1577 standards for Precast Box Drain.
- All relevant IS & IRC codes.

4.2 Concrete and Allied Works

Applicable Codes

Materials

| | |
|-----------|---|
| IS: 12269 | Specification for 53 Grade Ordinary Portland Cement. |
| IS: 8122 | Specification for 43 Grade Ordinary Portland Cement. |
| IS: 8041 | Specification for Rapid Hardening Portland Cement. |
| IS:383 | Specification for coarse and fine aggregates from natural sources for concrete. |
| IS: 432 | Specification for mild steel and medium (tensile steel bars and hard- drawn steel) wires for concrete reinforcement. (Part 1 and 2) |
| IS: 9103 | Specification for admixtures for concrete. |
| IS: 2645 | Specification for integral cement water- proofing compounds. |
| IS: 4990 | Specification for plywood for concrete shuttering work. |

4.3 Material Testing

| | | | |
|----------|---|----------|--|
| IS: 650 | Specification for standard sand for testing of cement. | IS: 2430 | Methods for sampling of aggregates for concrete. |
| IS: 2386 | Methods of test for aggregates for concrete (Parts 1 to 8) | | |
| IS: 3025 | Methods of sampling and test (physical and chemical) for water. | | |

4.4 Material Storage

IS: 4082 Recommendations on stacking and storing of construction materials at site.

4.5 Concrete Mix Design

IS: 10262 Recommended guidelines for concrete mix design. SP: 23 (S&T) Handbook on Concrete Mixes

4.6 Equipment

IS: 1791 Specification for batch type concrete mixers.

IS: 2438 Specification for roller pan mixer.

IS: 4925 Specification for concrete batching and mixing plant.

IS: 5892 Specification for concrete transit mixer and agitator.

IS: 7242 Specification for concrete spreaders.

IS: 2505 General Requirements for concrete vibrators: Immersion type.

IS: 2506 General Requirements for screed board concrete vibrators.

IS: 2514 Specification for concrete vibrating tables. IS: 3366 Specification for pan vibrators.

IS: 4656 Specification for form vibrators for concrete.

IS: 11993 Code of practice for use of screed board concrete vibrators.

IS: 7251 Specification for concrete finishers.

IS: 2722 Specification for portable swing weigh batchers for concrete (single and double bucket type).

IS: 2750 Specification for steel scaffoldings.

4.7 Concrete Testing

IS: 1199 Method of sampling and analysis of concrete.

IS: 516 Method of test for strength of concrete.

IS: 9013 Method of making, curing and determining compressive strength of accelerated cured concrete test specimens.

IS: 2770 Methods of testing bond in reinforced concrete

IS: 456 Code of practice for plain and reinforced concrete.

IS: 457 Code of practice for general construction of plain and reinforced concrete for dams and other massive structures.

IS: 3370 Code of practice for concrete structures for storage of liquids (Parts 1 to 4)

IS: 3935 Code of practice for composite construction.

IS: 2502 Code of practice for bending and fixing of bars for concrete reinforcement.

| | |
|----------|---|
| IS: 5525 | Recommendation for detailing of reinforcement in reinforced concrete works. |
| IS: 2751 | Code of practice for welding of mild steel plain and deformed bars used for reinforced concrete construction. |
| IS: 9417 | Specification for welding cold worked bars for reinforced concrete construction. |
| IS: 3558 | Code of practice for use of immersion vibrators for consolidating concrete. |
| IS: 3414 | Code of practice for design and installation of joints in buildings. |
| IS: 4326 | Code of practice for earthquake resistant design and construction of building. |
| IS: 4014 | Code of practice for steel tubular scaffolding (Parts 1 & 2) |
| IS: 2571 | Code of practice for laying insitu cement concrete flooring. |
| IS: 7861 | Code of practice for extreme weather concreting: Part 1 Recommended practice for hot weather concreting. |
| IS: 875 | Code of practice for design loads (other than earthquake) for building structures (Parts 1 to 5) |
| IS: 2502 | Code of practice for bending and fixing of bars for concrete reinforcement |
| IS: 1893 | Criteria for earthquake resistant design of structures |
| IS-12592 | Precast Concrete Manhole Covers |

4.8 For Construction of Roads

| | |
|----------------|--|
| IRC:11-1962 | Recommended Practice for the Design and Layout of Cycle Tracks |
| IRC:54-1974 | Lateral and Verbal Clearances at Underpasses for Vehicular Traffic |
| IRC:65-1976 | Recommended Practice for Traffic Rotaries |
| IRC:69-1977 | Space Standards for Roads in Urban Areas |
| IRC:70-1977 | Guidelines on Regulation and Control of Mixed Traffic in Urban Areas |
| IRC:86-1983 | Geometric Design Standards for Urban Roads in Plains |
| IRC:92-1985 | Guidelines for the Design of Interchanges in Urban Areas |
| IRC:98-1997 | Guidelines on Accommodation of Underground Utility Services Along and Across (First Revision) |
| IRC:99-1988 | Tentative Guidelines on the Provision of Speed Breakers for Control of Vehicular Speeds on Minor Roads |
| IRC:103-1988 | Guidelines for Pedestrian Facilities |
| IRC:106-1990 | Guidelines for Capacity of Urban Roads in Plain Areas |
| IRC:SP:12-1973 | Tentative Recommendations on the Provision of Parking Spaces for Urban Areas |
| IRC:35-1997 | Code of Practice for Road Markings (with Paints) (First Revision) |

IRC:67-2001 Code of Practice for Road Signs (First Revision)

IRC:SP-31-1992 New Traffic Signs

IRC:80-1983 Geometric Design Standards for Urban Road

4.9 Construction Safety

IS: 3696 Safety code for scaffolds and ladders. (Parts 1 & 2)

IS: 7969 Safety code for handling and storage of building materials.

IS: 8989 Safety code for erection of concrete framed structures.

All other BIS codes, standards, Manuals and Codes, as are acceptable to WATCO, may be used with prior approval.

4.10 Orissa Govt References

In general, the detailed specification for works issued by PWD, Odisha incorporating the following parts shall be followed.

- Part I-Preliminary specifications dealing with general rules and procedure.
- Part-II-Specifications for materials.
- Part-III-Specifications for building and earth works.
- Part-IV-Specifications for Road works.

The various specifications, mode of measurements etc. shall be followed as specified above & in Public Health Engineering works, wherever applicable. If the above specification are silent on any aspect of the work, the IRC Codes and MORTH specification for Road construction and other standards with the prior concurrence of the Engineer, shall be followed.

4.11 Work Plan Requirements

The Contractor shall provide comprehensive work plans in line with the contract for review and approval.

1. **Work plan.** Within 30 days of the drawl of agreement, a work plan shall be submitted for review and approval by the Engineer. Work Plan will state in the sequence of work the Contractor intends to pursue for timely completion of the work.

The work plan will have basic information not limited to;

- i. Procurement of key equipment and supplies
- ii. Preparation of Status report of adjoining properties before start of works.
- iii. Traffic Diversion plan submission and approval
- iv. Shifting of utilities if required
- v. Installation of shoring
- vi. Establishment of water diversion system and soil investigation.
- vii. Providing soil improvement system, determination of bearing capacity after soil improvement.

- viii. Submission Structural Design of Box Drain and its approval by the Employer after review.
- ix. Start of Construction of box drain and completion of construction activity
- x. Making connection with branch drains, any previously constructed segment of Main Drain, including approach roads and culverts
- xi. Fixing of Air Vents and installation of isolating system for each vent.
- xii. Fixing of Street Light
- xiii. Start of Traffic of Completed Stretch.

The plan will describe the number of work fronts to be open simultaneously and list the resources to be utilized to achieve the work. A financial program will be prepared that reflects the planned activities and resources. After approval of work plan for Phase-I, micro planning shall have to be submitted;

2. **Micro-planning** shall comprise details of activities to be done in next three months and after its approval, authorization shall be given by the Employer to start activity based on approved micro plan:
 - a. **Number of work fronts.** The micro-plan will confirm the number of new work fronts to be opened in the three months with resource mobilization schedule
 - b. **Utility removal schedule.** The micro plan will identify the specific utilities to be removed for the 3-months.
 - c. **Detailed data to be provided.** For every work front, expected start and end dates for activities shall be clearly defined.
3. **Catch up plan for delayed work.** Any delay as per micro plan observed in due course of execution shall have to be achieved in consecutive month for which catch up plan with additional resource mobilization schedule has to be submitted .
4. **Requirement for Critical Methodology and Key Resources**

The Contractor shall provide comprehensive methodologies which are critical for the work, including methodologies for Shoring System, Silent Sheet Piling, Water Diversion, Access to site and other important features.

- a. **Shoring System:** Within 30 days of commencement date, Contractor shall submit the proposed methodology to install the shoring system and to work areas for approval by the Engineer. The methodology shall contain:
 - i. A description of the method to install the shoring system and a statement of how the method avoids disturbing vibrations. The Engineer has the right to refuse any system that does not clearly demonstrate vibrations will be minimized.
 - ii. The method will also describe the contingency measures the Contractor intends to take to mitigate problems arising from the installation of the shoring system, such as claims by adjacent property owners of damages to property.
 - iii. A detailed photographic record of the properties adjacent to the drain, including boundary walls and structures as base data against which future claims can be assessed. Contractor is responsible for contacting owners and obtaining their permission to photograph the desired areas.
 - iv. A list of resources to be used for installation of the shoring system, including materials, machinery and equipment and subcontractors. The list shall contain the resources to be used to achieve the desired productivity target.

- v. Productivity target, clearly stated and in agreement with the Time for Completion.
- b. **Water Diversion** Within 30 days of commencement date Contractor shall submit the water diversion methodology for approval by Engineer. The methodology shall contain:
 - i. A description of the method of water diversion, with expected flow to be handled by gravity and by pumping, as the case maybe.
 - ii. Length of work front to be developed under this methodology.
 - iii. List of equipment to be used in each work front including pumps, screens, power generators, suction and delivery pipes, and anything considered for diversion of water around work front.
 - iv. Pump characteristic curve and delivery line head loss calculation for the varying flow conditions in the 24-hour cycle.
 - v. Discussion of redundant capacity provided and contingency plans.
- c. **Access to Site** Within 30 days from commencement date, the Contractor shall provide the methodology for accessing and working on the site, for each of the Conditions described in the scope of work. The methodology shall describe:
 - i. Safety measures to isolate public from work area.
 - ii. How local pedestrian, motorcycle or car traffic will move in each Condition
 - iii. Actions required to create the required working space and impact on public, if any.
 - iv. Describe the challenges to effective movement of materials and equipment for each reach and how they will be overcome with respect to site conditions.

5. Time of the Essence

- a. The methodologies must be complete in all regards and turned in within the specified time. Approval of these methodologies by Engineer is compulsory before Contractor is allowed to begin operations on site.

6. Change in methodology.

- a. If at any time the Contractor decides to change the methodology for his convenience, the proposed methodology shall comply with all provision of this section and be submitted to the Engineer 15 days before the intended implementation date. **There will be no additional payment for change in the proposed working methodology.**

7. At any time, the Engineer deems pertinent to better coordinate the project activities.

4.12 WORK SCOPE

In this tender, provisions have been made for conversion of 5 Nos Sub-Drain of Main Drain-1 (MD-1) to closed RCC box drain along with ancillary works as detailed below:

| SI No | Particulars of Sub Drains to MD-1 | Location | Approximate Length (in metre) | No of Culvert crossings | No of Lateral or side drains |
|-------|-----------------------------------|------------------------------------|-------------------------------|-------------------------|------------------------------|
| 1 | 3R of MD-1 | Prajatantra office to Khatbin sahi | 1305 m | 5 | 23 |

| | | | | | |
|---|------------|---|--------|----|----|
| 2 | 4R of MD-1 | Commissioner Police office to New Rausapatna | 2797 m | 23 | 50 |
| 3 | 3L of MD-1 | Krishna Mangala Temple to Shanti Memorial hospital, Bajrakabati | 716 m | 8 | 20 |
| 4 | 5R of MD-1 | Backside of Trisha Hospital to Bajrakabati Road | 2422 m | 15 | 42 |
| 5 | 6R of MD-1 | Khannagar Sluice Gate to Matrubhawan | 1300 m | 3 | 15 |

The

project will be executed on EPC mode. The successful bidder will be responsible for pre-design, design, construction and commissioning which should be vetted by IIT, Bhubaneswar. The cost for the vetting will be borne by the successful bidder.

Making trough connectivity of total length including joining already constructed main drain section to have a continuous smooth flow of storm water/sewage water inside drain and movement of traffic on top of completed box drain portion will be part of scope of this work. The construction activity shall be done in phased manner keeping in view accessibility, smooth traffic flow, public convenience etc.

4.12.1 Topographical & Geological Survey

Topographic survey of the project area has been conducted, taking the Reduced Level (RL) of GTS Bench Mark established inside the premises of Mahanadi South Division of Water Resources Department near Mahanadi Barrage at Jobra. The Contractor shall check RLs of these Bench mark for confirmation and establish more number of Bench Marks as required for reference during construction. A permanent baseline along the drain and bench marks shall be established by the Contractor to serve as reference before construction is begun.

Fresh Survey is to be conducted for Topographical and Geological Assessment with cross sections at regular intervals plotted.

Contractor has to visit the site of work of each location to get accustomed with site conditions, accessibility etc. Soil investigation data provided in bid document is for general idea only about soil strata conditions and WATCO shall not be held responsible for this soil investigation report, if it does not match with soil test, which will be conducted by the bidder in subsequent stages. It is suggested to get soil investigation done by the bidder before bidding to have a proper Techno Financial Proposal during bidding. There will be no separate payment for such pre bid investigations.

4.12.2 Design and Drawing of Box Drain

The Contractor shall carry out the Design in accordance with meeting all requirements stipulated in the documents. The base design provided with the tender documents is for illustration purposes only. The Contractor is to submit his own design if his intended product varies in materials, products or methodology. Design of the preparatory activities of shoring and water diversion must be submitted to the Engineer for approval.

The Contractor is responsible and submit all design documents of the project in accordance with conditions of agreement including follows:

- (a) **Topographic Survey Report:** 4 copies, within 15 day after the commencement date.

(b) **Geotechnical Investigation Report including recommendations:** 4 copies, within one month after the commencement date.

(c) **Design Report including drawings:** 4 copies within 45 days after the commencement date.

(d) **Construction Drawings and required documents during execution of work:** 6 copies, 2 weeks prior to start construction segment.

(e) **As-build Documents:** 2 copies of As-Build Documents (all record) prior to commence the Test on Completion, and 6 copies of final As-Build Drawings (Prior to the issue of any Taking-Over Certificate) in accordance with GC 5.6.

(f) **O&M Manual:** 4 copies of provisional operation and maintenance manual (draft O&M Manual), and 6 copies of final O&M manual (Prior to the issue of any Taking-Over Certificate), in accordance with GC 5.7. The draft O&M manual shall be subject to the review and consent of the Engineer who shall have all rights to make any changes and revisions to the O&M Manual as it may deem appropriate. The Contractor shall revise such draft O&M Manual prior to submit the final O&M Manual.

Other all kind of Technical Reports: 4 copies, when instructed by the Engineer or the contractor considers necessary.

Providing soil improvement system below PCC is mandatory, the Bidder is free to adopt any improved / latest technology / methodology for sub soil Improvement at his cost and risk to achieve desired SBC of soil required for structural design purpose.

Minimum Design Criteria (MDC) both cast in situ and Precast box drain and open drains.)

The contractor has to adopt the minimum requirement in the design as described under Minimum Design Criteria.

1. After soil improvement done, bearing capacity has to be determined by plate load soil test at some identified locations inside drain along the drain course confirming to relevant I S code. Based on the result of said soil test, N value and SBC structural design and drawings of box drain should be submitted to the Engineer for review and approval.
2. PCC / Lean concrete / mud mat shall be minimum 150mm thick for all RCC members in contact with soil in foundation.
3. Grade of cement concrete: Minimum RCC – M-30 for cast in situ construction, Minimum RCC – M-35 for pre cast construction. PCC- M-20. This supersedes grade of concrete if mentioned elsewhere in tender documents.
4. Reinforcement: Fe 500 HYSD bars minimum confirming to relevant I.S Code and make of steel shall be of SAIL/ TATA/ VIZAG / any other make to be approved by the authority. Clear cover to reinforcement: base slab - 60mm, wall -60mm, roof slab -50mm, column -50mm, Pile: sides -50mm, bottom -100mm, other- 40 mm.
5. The RCC members are to be designed as un-cracked section as per I.S- 3370 limiting the maximum crack width within 0.15mm (Zero point fifteen millimeters.). The stresses in concrete, steel etc. shall be in conformity with I.S-3370.
6. Minimum reinforcement in section in each direction shall not be less than 0.24 % of gross cross-sectional area in walls, base slab, roof slab and in other allied members and structural components etc.
7. For safety Weep holes of minimum 75mm dia surrounded by graded granite metal is to be provided in outer walls in two layers laterally @ 2.5m c/c for release of water pressure during short flow. But in structural design walls to be designed both for pressure on account of surrounding soil and water / submerged water.

8. Walls to be designed for both conditions: 1. water inside and no earth, water & surcharge outside. 2. inside empty with surrounding soil, water and surcharge loading at outside.
9. Maximum angle of repose of soil after back filling on outer wall is to be considered to be 20 degree in design. An earth cushion of height 0.60 m is to be considered in design on roof slab looking at future development & practical site requirement. A surcharge loading on account of 1.2m height earth at outside wall to be considered in design. Along with vehicular load, impact loading, pressure on account of: earth, water, surcharge, all live load, Dead loads, earth cushion of 0.6m on roof slab for future expansion/ site requirement is to be considered in design apart from other loadings.
10. Screed concrete of 50 to 75mm to be considered on top of base slab of M-30 grade.
11. Ventilating shaft at both sides on wall surface of Box drain shall be provided at regular intervals for general ventilation of box drain. Ventilation shaft shall not be less than 300 mm dia Stainless steel of SS -304 grade with minimum 2.5m height with SS jally at end. Shafts shall be placed with a spacing not more than 45 meters apart at both side of drain apart from openable man holes which are to be provided at regular intervals on roof slab for operation and maintenance requirements. Equivalent or improved methodology if any shall also be accepted.
12. Stainless Steel piping SS 304 grade minimum of 300mm dia are to be provided across drain for serving as utility corridor for passing cables, wires, drinking water pipe lines etc. Pipes shall be provided with flanged ends for capping.
13. Minimum class of loading for Box drain to be considered in design: IRC -Class A and Class AA (both for tracked wheeled vehicles) loading as per IRC-6 playing along direction of drain flow and opposite (across) to the direction of drain flow. Minimum 45 % of respective live loads shall be considered in design of box drains towards impact / dynamic action loading apart from other loadings both for precast and cast in situ box drains.
14. In case of pre cast box drains/ open drains, handling stresses of minimum 15 % of structural weight shall be considered (because of placing of pre cast box sections and aligning them in to correct position) while checking maximum pressure on soil with that of SBC of soil at founding level.
15. All allied latest I. S code of practices and books of reputed authors of national and international standards shall have to be considered in design and drawings apart from the I.S codes referred in the tender documents. But in all cases, it is to be ensured that the minimum technical requirements asked in tender documents at different sections are also adhered to/fulfilled.
16. Expansion joints are to be provided in drain at intervals conforming to relevant Is Code using two layers of PVC water stoppers at joint. Construction joints may be provided as per relevant IS code. In case of pre cast drains, the joints are to be filled with hot bitumen to make it water tight as far as possible.
17. PVC encapsulated MS step iron are to be provided lined with Man holes to be provided in roof slab.

Design Documents

Three (3) copies/ sets of each set of documents, manuals and designs and drawings etc. shall be submitted by the Contractor to the Department for preliminary check and approval. Based on the requirement, the contractor has to depute his design engineer / Geotech expert etc. for clarifications and compliance. If required observations shall be communicated by the Authority to the contractor for compliance and re submission. After preliminary approval, one set of documents shall be returned back to the contractor.

Six (6) copies / sets of each set of documents, manuals and designs and drawings etc. incorporating the corrections made in that of preliminary approval shall be submitted by the Contractor to the Department for final approval and distribution. The Engineer will return two (2) approved copies to the Contractor and retain eight (4) for the Engineer's office, field use and for the record etc. The Engineer will signify his

approval or disapproval of the Preliminary Design (include drawings) within 30 calendar days of submission. Contractors Documents shall be submitted in accordance with the timetable set in the approved work plan.

Checking and Approval of Contractors Design and Drawings by the Client / department / representative of Department/ Authority shall not relieve the Contractor from its responsibility towards structural safety and stability and shall not relieve the contractor of its responsibilities under the Contract. The Engineer will not permit construction to start on a part or section of the Works unless Construction Documents for that part or section have been approved.

4.12.3 Cleaning and Grubbing of Land

The site is to be cleaned of Shrubs and cutting of trees if coming in the alignment.

4.12.4 Demolition of Existing Drain / Culverts

- a) The existing drain laterite lining is to be demolished wherever coming in alignment.
- b) Existing 3 no culverts are also to be demolished coming in the alignment along with private foot bridges across the Sub Drain-6R to MD-1, Usable dismantled material is to be carted to stores and stacked and unserviceable materials shall be disposed of within 5. Km as per directions of Engineer.

4.12.5 Shoring System

The contractor shall propose an appropriate shoring/silent sheet pile system for supporting the sides of excavation, to avoid any collapse of sides, based on geo-technical investigation done by the contractor, site conditions, ensuring safety of nearby buildings/structures, ensuring safety of workers and traffic/people moving on the adjoining roads, and in line with the construction methodology proposed by the contractor. The contractor shall submit the necessary design calculations of the shoring/sheet pile proposed and take approval from the Engineer on the same.

The sheet piles required for installation shall be procured by contractor for construction of drain. The Sheet Piles shall be shifted to site, driven, reused for temporary installation for at least 1 to 3 times and then finally driven for permanent installation. Contractor should use pile caps for temporary installation so that edge of sheet pile is not damaged for reuse. All precautions shall be taken by the contractor, so that no damage occurs to the adjoining buildings while driving or extracting the sheet piles. Cross bracing/anchoring shall be done to piles to avoid tilting of sheet piles.

4.12.5.1 Shoring Design Submittal Requirement.

Contractor shall submit a shoring design duly certified by a competent Structural Engineer for each work front, for approval by the Engineer. The structural design shall be submitted 15 days before the intended start date of each work front. Work will not be authorized prior to shoring design approval.

The submittal will include work front start and end chainage, loading calculations on the intended shoring materials, cross bracing recommendations specific to the site and drawings/diagrams as needed.

4.12.5.2 Driving of Silent Sheet Piles

Silent pile Pressing Machines should be exclusively used for driving of sheet piles. Vibro hammer shall not

be used for pile driving at box drain site.

4.12.5.3 **Sheet Pile (Steel Waling and Strutting)** Typical specifications shall comprise of Cold formed Steel Sheet Piles SS-U16-600C, Steel Grade – E350 conforming IS 2062, having following properties:

- Width of single pile 600 mm
 - Unit weight of single pile 81.92 kg/m
 - Unit weight of wall 136.50 kg/m²
 - Elastic section modulus 1650 cm³/m
1. Contractor should arrange Pile driving Equipment of suitable capacity and suitable type to drive / extractor pulling out of Piles above
 2. **Stacking of Sheet Piles:** It is essential that Piles are stacked safely on firm ground before handling and installation to minimize damage whilst piles are stock piles at site.
 3. Loading and unloading of Piles / should be done using telescopic scope leader rigs.
 4. Greater risk of injury to piling personal occurs during Pile pitching. So, it is important to develop a safety plan and approved method of working should be used.
 5. Driving tolerance: General tolerances for a straight and plump sheet pile wall should be in accordance with the following figures
 - a) Deviation in plan normal to the wall line at the top of the pile ± 50 mm (± 75 mm for silent pressing)
 - b) Finishing level deviation from nominal level of top pile ± 20 mm
 - c) Deviation of verticality for panel driving – all directions 1 in 100
 - d) Deviation of verticality along line of piles for pitch & drive 1 in 75
 6. Extracting: When Piling is to be extracted for reuse by means of suitable extractor by silent type of suitable capacity and while extracting no damage should occur to the new structures, Box Drain and adjoining structures.
 7. Steel waling & Strutting of Sheet Piles are to be designed on the bearing capacity report of soil at that level.

Quantity of water

The discharge of water in the box drain varies according to the reach. The tentative discharge through different drains is as follows: These figures are indicative only and contractor has to confirm water flow to be diverted for construction activity.

| SI No | Sub Drains to MD-1 | Tentative Storm Water Discharge in M ³ /Sec |
|-------|--------------------|--|
| 1 | 3R of MD-1 | 7.51 |
| 2 | 4R of MD-1 | 22.68 |
| 3 | 3L of MD-1 | 11.88 |
| 4 | 5R of MD-1 | 9.84 |
| 5 | 6R of MD-1 | 23.47 |

The water in the drain behaves like sewage in a sewer system. Peak flow is expected to be a short period in the morning and evening; at night minimum flow may be only a fraction of the average flow. For quantification of daily energy requirements, however the daily average flow figure may be used, as this is the expected aggregate quantum of water expected in 24 hours.

Methodology

Contractor shall propose a water diversion methodology suitable for his purposes. Gravity conveyance, full pumping, or a combination of both can be utilized provided that the freeboard requirements specified above is maintained at all times. The method chosen shall take into consideration the complications expected from the floating debris and shall explicitly describe how that will be addressed.

Equipment

The type of pumps to be used is to be decided by the Contractor, however, the pumps shall have minimum design efficiency of 50%. Equipment shall be no more than one year old. For individual delivery pipes the maximum velocity when the pump is working at full speed shall not exceed 2 meters per second. Contractor is free to aggregate the discharge of multiple pumps into a single delivery pipe, however, the maximum velocity of the water at full aggregate capacity shall not exceed 3 meters per second. For electrical driver pumps aggregated in a single delivery pipe, a valve is to be fitted in the discharge to reduce the risk of cavitation when operating singly.

Redundancy

Contractor is to ensure proper, uninterrupted operation of the pumping system and have enough redundancy to absorb equipment maintenance periods. The pumping set shall have enough pumps to provide flexibility of operation and pump the entire peak flow when working together.

In the event electrical pumps are used, redundant power sources will be provided. If a Diesel power generator set is used, the set shall have one (1) redundant unit equivalent to the largest unit in the set. Single power generator with no standby unit is not acceptable.

Floating debris

The quantity of floating debris is considerable and has not been quantified. Contractor shall install a bar screen with openings commensurate to the equivalent object size that can be handled by the pumping equipment, i.e. 60mm. Contractor is responsible for removal of debris affecting his operation and the cost is to be reflected in the bid price. No separate pay item will be provided.

Submittal Requirements

Prior to ordering or mobilizing equipment Contractor shall submit the water diversion methodology for review and approval of the Engineer. Review by Engineer shall be prompt and avoid unnecessary delays. Minimum items to be presented are:

1. Methodology for dealing with floating debris.
2. For each stretch, hydraulic design of gravity, pump or combined solutions.
3. Pump manufacturer, model and type of driver.
4. Delivery pipe hydraulic design including pump characteristic curve for each type proposed.
5. Redundancy preparations
6. Operating strategy for maintaining 24/7 conveyance

Pump efficiency and maximum velocity in delivery pipe to be clearly demonstrated.

Water diversion will not be paid separately. Contractor has to include all cost related to this operation in his bid price, including but not limited to any ancillary civil, mechanical or electrical work done; permits, fees, licenses, installation cost by third parties, and all other cost associated with this activity.

4.12.6 Dewatering

Dewatering means lowering of water level by pumping sub-soil water from excavation to make it dry and workable. The Contractor shall ensure that the excavation and the structures are free from water during construction and shall take all necessary precautions and measures to exclude ground/rain water so as to enable the works to be carried out in reasonably dry conditions in accordance with the construction programme. Sumps made for dewatering must be kept clear of the excavations/trenches required for further work. The method of pumping shall be approved by Engineer, but in any case, the pumping arrangement shall be such that there shall be no movement of subsoil or blowing due to differential head of water during pumping. Pumping arrangements shall be adequate to ensure no delays in construction. The dewatering shall be continued for at least (7) seven days after the last pour of the concrete. The Contractor shall, however, ensure that no damage to the structure results upon stopping the dewatering operation.

The Contractor shall study the sub-soil conditions carefully and shall conduct any tests necessary at the site with the approval of the Engineer to test the permeability and drainage conditions of the sub-soil for excavation, concreting etc., below ground level.

The scheme for dewatering and disposal of water shall be reviewed by the Engineer for general acceptance. The Contractor shall suitably divert the water obtained from dewatering from such areas of site where a buildup of water in the opinion of the Engineer obstructs the progress of the work, leads to insanitary conditions by stagnation, retards the speed of construction and is detrimental to the safety of men, materials, structures and equipment.

The Contractor shall be responsible for making fool-proof dewatering arrangement which will continue to run without any distribution or interruptions and make sure that any sub soil water found during construction shall be lowered by continue pumping and ensure that the pits, trenches, tanks, etc are kept dry until satisfactory completion of installation of all structures and materials. The arrangement for the disposal for the water pumped out from the trenches and pits up to nearby mala/drain shall be the responsibility of the Contractor.

Dewatering or building out of surface water, ground water and accumulated water due to all causes including lowering of ground water table by means of pumps or well-point system etc. The Contractor shall

verify the site conditions and whenever such dewatering is required it is considered that the rates quoted are inclusive of dewatering of surface and sub-surface for the works coming under this turnkey tender.

When there is a continuous inflow of water and the quantum of water to be handled is considered in the opinion of Engineer, to be large, a well point system- single stage or multistage, shall be adopted. The Contractor shall submit to the Engineer, details of his well point system including the stages, the spacing, number and diameter of well points, headers, etc. and the number, capacity and location of pumps for general acceptance.

Dewatering will not be paid separately. Contractor has to include all cost related to this operation in his bid price, including but not limited to any ancillary civil, mechanical or electrical work done; permits, fees, licenses, installation cost by third parties, and all other cost associated with this activity.

4.12.7 Earthwork

The contractor shall do the excavation in correct profile and side slopes, up to full depth as per design including dewatering if required. Any excess excavation shall be filled with lean concrete. If at design depth slush is encountered, the contractor shall excavate till firm bed is met. The excess excavation shall be filled with well compacted sand to maintain the foundation level and achieving the stability of foundation. Contractor shall prepare the excavation drawings and take approval of client for the same.

4.12.8 Sand Filling

Sand filling in foundation compacting and dressing to correct grade.

4.12.9 Laying of PCC

PCC M20 for foundation of drain will be laid as per approved Designed thickness.

4.12.10 Construction of Box Drain

Construction work of drain shall be started preferably from Downstream to upstream side. Box drain construction includes making through connectivity of total length including joining already constructed sections to have a continuous smooth flow of storm water/sewage water inside drain and movement of traffic on top of completed box drain portion will be part of scope of this work.

Box drain construction includes making through connectivity of total length including joining already constructed sections to have a continuous smooth flow of storm water/sewage water inside drain and movement of traffic on top of completed box drain portion.

All branch drains before meeting at Main Drain should be provided a silt trap, manually cleaned bar screen and sluice gate with proper arrangement of maintenance, access to these units.

4.12.11 Back Filling

After extraction of Piles, excavated portion shall be filled by good earth with blending of sand and compacted to achieve dry density 95% of standard proctor density.

4.12.12 Road Work

Providing 200 mm thick with nominal cement concrete wearing coat of M30 grade concrete reinforcement is to be provided. Side drains with pre cast covers along the building line are to be provided on both sides along with footpath. The road will be illuminated with decorative poles fixed in the median as scope and specification specified in the Technical Specification.

Manhole Covers: Providing and fixing of BIS marked RCC EHD35 Manhole Cover and frame .

Expansion Joints: Construction and expansion joint are to be provided as per relevant IRC Code.

4.12.13 Miscellaneous Work

Any other allied work not mentioned above, but as directed by Engineer in-Charge.

4.13 Design Criteria

- 4.13.1 The box drain will be suitable for vehicular movement from one end to other as well as from all cross roads coming to box drain junctions.
- 4.13.2 The contractor has to visit the site of each location to get accustomed with site condition, accessibility etc.
- 4.13.3 The box drains on each location has to be designed based on :-
- 4.13.4 Geo technical investigation report annexed separately / investigation conducted by Contractor and
- 4.13.5 All relevant is I.S codes, IRC codes & other acceptable standards.
- 4.13.6 Minimum class AA loading as per IRC codes & other dead load, live load, impact load etc.
- 4.13.7 The structure of box drain like roof slab, walls, bottom raft etc. shall be with R.C.C in minimum M-30 grade for cast in situ and for precast concrete minimum grade shall be M35 or as per Design approved
- 4.13.8 All reinforcements shall be tor steel, Fe 500 bars, as per relevant BIS codes.
- 4.13.9 Wherever the designed top roof level of box drain is lower than top levels of existing road crossing old culverts, the top shall be filled up with road materials like, sand, metal etc. as per standards and two sides of junction of cross roads shall be finished with road materials & finished properly so that existing culvert top level is maintained for smooth movement of vehicles.
- 4.13.10 For access of rain water from top of box drain, road gullies shall be provided.
- 4.13.11 The existing tertiary drains & sub drains which connect the existing drain shall be reconstructed as per required sizes at confluence point and shall be provided with Stainless Steel Grade 304/316 bar screens as approved by the authority. Similarly road side drains also shall be connected with box drain.
- 4.13.12 The box drain will be suitable for vehicular movement from one end to other as well as from all cross roads coming to box drain junctions.
- 4.13.13 C.I. steps or plastic encapsulated step are to be provided confirming to relevant IS Code 5455 with latest revision.
- 4.13.14 Gradient of Box Drain to be maintained properly.
- 4.13.15 Road Gullies: Road Gullies are to be provided at every 20m or as per standards CD-526. for Road drainage as per IS Code 7440-1985 Construction and maintenance of Road Gullies.

4.14 Execution Conditions:

- 4.14.1 After handing over the site, that contractor will set out the alignment of Box Drain, as per alignment and Constructability drawings as well as according to direction of the Engineer. While doing so, the contractibility zone required for the purpose of the excavation of earthwork, working space required to do the construction below the ground as well as over the ground shall be kept in view.
- 4.14.2 The work of Box Drain shall be carried out strictly as per approved drawings maintaining the required size of the drain i.e depth, width, invert levels, hydraulic gradient level, top of the Box Drain level etc. and also as per direction of the Engineer.
- 4.14.3 The Engineer can modify, change any portion of the drawings and designs and the contractor has to comply with such modification without extra claim.
- 4.14.4 The dismantling work of existing drain and other existing construction will be carried out with utmost care and precision so that there is no damage to other existing properties and installations.
- 4.14.5 The dismantling materials shall be kept and stacked in places to shown by the Engineer. The unused dismantled materials shall be disposed or shall be taken care of, as will be directed by the Engineer.
- 4.14.6 The contractor will engage proper Tools and Plants, Equipment's, vehicles, skilled and non-skilled personnel in such a manner that the work of box drain can be done smoothly and efficiently to have maximum output possible, within given time span.
- 4.14.7 All required construction materials like sand, earth, aggregates, cement, steel reinforcements, centering, shuttering and shoring materials, bricks, cross bracing steel, pump sets including suction delivery, electrical accessories, MS-flats, MS- angles etc, required for construction purpose, shall be brought to the site and got approved for quality and specification by the Engineer in charge before using in the works. The material shall be properly stored and stacked so that these are not damaged by weathering and other effects. Special care shall be taken for storage of cement, reinforcement steel, sheet piles, sand, aggregate etc for the safe storage before use.
- 4.14.8 All Tools and Plants, Equipment, dewatering pumps Mechanical Mixer machine, vibrator, Welding sets etc whatever will be required for smooth and efficient construction work shall be arranged by the contractor at his own cost and risk and shall be got approved by the Engineer before use in the works.
- 4.14.9 Time of completion and quality of works and workmanship etc are the essences of the contact. The contractor shall ensure timely completion of the works if required by working in 2 shifts. Similarly, the specification and the quality of the materials and workmanship etc, shall be followed & done in such a manner that so that there is no compromise about quality, failing which the Engineer shall be at liberty to take the action against the contractor. It is expected the contractor will deploy the latest technology & technique, in construction works. The sand, stone aggregate shall be properly screened so that there is no foreign material including earth.
- 4.14.10 The Cement to be used for RCC M 30 & M 25 work shall be of Grade 53 as per IS 12269. The cement shall be of latest manufacture not more than 1 to 2 months old. Clouding in cement will not be allowed. The cement bags must bear the authorized BIS Certification marks with date of manufacture. The copy of BIS license of the manufacturer shall be submitted to the Engineer with due authenticated signature of the contractor. Similarly, certificate of the manufacturer that the cement conforms to BIS codes for Gr 53 shall be submitted to the Engineer in charge. The quality of cement & other requirements shall conform to IS 12269- 1987 & IS 8112- 1989, respectively, as the case may be. The contractor shall, therefore, provide only specified Cement.

- 4.14.11 The stone aggregate shall be washed graded as per specification for respective nominal gauge. The contractor shall get the quality strength of stone aggregate (Coarse Aggregate) tested in a testing laboratory. The contractor, therefore, shall use only specified quality.
- 4.14.12 The steel reinforcement for RCC shall be High Yield Strength Deformed bars (HYSD) of minimum Fe500 grade as per BIS code IS 1786-2008. The roof stress, tensile strength, yield strength, nominal size, mass per meter, cross section etc. shall conform to relevant BIS code. The name of the manufacturer & BIS certification marks shall be got embossed on steel rods, from the manufacturer. The valid BIS license of manufacturer will be submitted under signature of Manufacturer & contractor to the Engineer. If the Engineer so feels, he may inspect the factory of Manufacturer to satisfy himself about various testing & analysis. The Engineer may also get random samples tested for quality & strength in any testing laboratory & the contractor shall have to arrange such testing. The contractor shall use steel of manufacturer, approved by the Engineer.
- 4.14.13 The quality of the sand from specified lot will be collected jointly with the Engineer and shall be got tested in laboratory as will be specified by the Engineer and test results shall be submitted to the Engineer.
- 4.14.14 The existing laterite lining shall be dismantled with utmost precision so that substantial quantity can be reused. The contractor shall stack the materials as per direction of the Engineer.
- 4.14.15 The contractor shall arrange for proper instruments and fix up the necessary bench marks along the alignment of the drains exhibiting the Reduced level (R.L) co-relating with the G.T.S levels as well as levels to be instructed by the Engineer. After preparation of the site and excavation of the earth, the R.L to be maintain at drain invert, foundation bottom, proposed drain top level etc. shall be maintained co-relating with the hydraulic levels specified in the profile and cross-sections of the drains and sub-drains etc. To avoid mistake the contractor shall fix up concrete blocks along bed of drains, throughout, the top levels of which should be flushed with drain bed invert levels as per profile drawing.
- 4.14.16 The levels at foundation bottom, top of sand filling, top of PCC, R.C.C bottom slab, drain top etc. shall be got checked by the engineer or its representative at each location before proceeding work. If there is any defect in any level at any chainage along drains, sub-drains, , the work shall be rejected by the Engineer and got redone at contractor's own risk and cost.
- 4.14.17 Site of the work is susceptibility to accumulation of the water from below ground level (Sub soil water) and from the surface. The contractor shall make all the necessary own arrangements to bail of the water so that the construction zone remains dry and construction work does not get hampered & damaged due to ingress of water. The capacity of the pumps to be deployed for bailing out of the water shall be got verified by the Engineer and running hours of each shall be maintained the appropriate Log Register which shall be got authenticated & checked by the Engineer his representatives.
- 4.14.18 Since there is substantial flow of water in all the drains and sub-drains, the contractor shall divert the water from Drain by any means suitable to him to make the working site dry.
- 4.14.19 The concrete work by hand mixing will not be allowed. Mixing shall be done by specified capacity of mixture machine. The ingredients like sand, aggregate and cement shall be poured in the mixture machine by the specified sizes of mixing boxes.
- 4.14.20 The bed of drains shall be excavated to firm ground & shall be filled up with sand up to required depth as will be instructed by the Engineer, to have strong base.

- 4.14.21 The underground water which percolates & come inside will be bailed out continuously as already stated earlier. Concreting & RCC work will not be allowed under water.
- 4.14.22 The contractors shall arrange for collection of the sample of the concrete to be used in CC & RCC works in metallic cube moulds as per specifications and corresponding IS Codes and same after proper curing shall be got tested for compressive strength etc. in the testing laboratory specified by the Engineer.
- 4.14.23 After cement concrete and R.C.C are laid & compacted, these will be allowed to harden at least 24 hours after casting, during which time there shall not be any ingress of water to avoid damaging the C.C and R.C.C works.
- 4.14.24 The specified Curing, Providing Centering & shuttering Stripping period thereof, shall be strictly followed as per specifications.
- 4.14.25 The contractor shall co-ordinate with Traffic department for diversion of Traffic vehicles etc from construction zone, Culverts etc.
- 4.14.26 The contractor will erect sign boards in construction zone for general appraisal & also every precaution/arrangement to protect general public, supervisory engineers & staff, contractor's own labourers & staff etc so that accidents do not occur & safety of life is not endangered. If any such accident occurs the contractor shall be responsible for liabilities & consequences.
- 4.14.27 The site should be barricaded with steel barricade made out of steel plates and angles so that site is free from public entry up to a height of two meters all around each and every front.
- 4.14.28 The road side drains and all sub drains and tertiary drains and various outlets shall be connected with Box Drain as per specified levels, sizes, etc. as well as with protection arrangement with MS-bar screens etc.
- 4.14.29 The contractor shall maintain its own office in Cuttack city as well as site offices at suitable locations. The copies of the approved drawings, designs, specifications, etc. shall be maintained for inspection and verification by the Engineer and his representatives.
- 4.14.30 The contractor shall submit his proposal for systems & arrangements to be followed for Quality Assurance and Quality Control of materials, works, testing etc.
- 4.14.31 The contractor shall keep close co-ordination with the Engineer and with other concerned departments representatives of stake holders for expeditious execution of works.
- 4.14.32 The contractor shall submit detailed Work plan & program to the Engineer for construction of the work and completion in specified time. Any hindrance on flimsy ground will not be allowed. The contractor shall maintain Hindrance register cum progress register in which day to day work, hindrance (if any) shall be recorded and got verified by the Engineer.
- 4.14.33 The contractor shall maintain liaison and co-ordination with various departments and organization like Traffic Police, Power department (TPCDOL), Water Supply (WATCO), BSNL, PWD, GAIL, Railway Authority, Water Resources Department, Cuttack Municipal Corporation, Police department etc., for smooth execution of the works.
- 4.14.34 The contractor shall maintain watch and word till completion and handing over the works.
- 4.14.35 The contractor shall pay all central and state taxes duties, royalties, etc, for the supplies and works.
- 4.14.36 Demolition of Existing Culverts & Reconstruction**
- 4.14.36.1 Scope of work**

The existing culverts are to be demolished wherever coming in alignment. Before demolition of existing culverts the traffic should be diverted to suitable way and maintained no inconvenience for the public.

4.14.36.2 Description

This section describes wholly or partially removing or closing existing culverts and bridges, disposing of the resulting materials, or if required, salvaging and storing designated materials.

4.14.36.3 General

Dismantle all existing culverts and bridges within the alignment or interfere with new construction

4.14.36.4 Breaking Down and Removing

Remove those parts of an existing structure that interfere with new construction. Do not use equipment, facilities, or methods that might damage members, portions of the structure to be preserved, or adjacent construction. Before starting new work, complete other operations that might endanger new work. If incorporating portions of existing culverts in the new work, remove the portions not being saved in a way that leaves the remainder of the structure undamaged.

4.14.36.5 Removal Operations

Except as specified below for closing culverts, remove the entire top slab of box culverts and the entire superstructure of other culverts and bridges designated for removal. Completely,

4.14.36.6 Incorporating or Disposing of Materials

Remove materials resulting from culvert or bridge removals not designated for salvage or incorporation in the work, from the right-of-way. Ensure that disposal sites are neatly constructed.

4.14.36.7 Measurement

Since it is an EPC contract nothing is to be measured like quantity of demolition carriage of dismantled material etc, as all costs are to be included in quoted price.

4.14.37 Junctions of Inlets:

Dismantling of existing connection & reconstruction of junction points of all lateral inlets of open drains, Road side drains etc. with Box Drain, at various locations, as per sizes, invert levels, top levels etc. with MS bar screens as the case may be etc. including supply of all materials, labor etc. complete in all respects, as per direction of the Engineer.

4.14.38 Specifications of MS Bar Screens:

Bar Screens

Screening large debris at surface inlets may be very effective in minimizing the need for Bar Screen. It should be provided inside the at outlet of Lateral Drains. Usually the bar screens are inclined with bar spacing at approximately 50mm. Constructing the screens in modules facilitate removal during maintenance. If the grid is relatively small, an emergency bypass of the screens should be provided to protect against clogging and subsequent surcharging of the system.

The existing tertiary drains with sluice gate inlets shall be reconstructed as per required sizes & invert levels and shall be provided with MS bar screens & replaces with new MS sluices, as shown in reference drawings.

4.15 General

The following general requirements shall be followed by the Contractor:

- 4.15.1 During construction all the conditions as per the Government of Orissa, CPWD / PWD Specification will be applicable.
- 4.15.2 Approvals from Railways, National Highway, Orissa PWD (R&B), Water Resources, Telecom Department, GRID Corporation of Orissa, CMC, Forest Department, wherever needed will be facilitated by WATCO, but Contractor has to co-ordinate with WATCO & these organization.
- 4.15.3 All the safety precautions will be taken by the Contractor to avoid any damage/incident. The Contractor will submit a Health and Safety Plan reviewed and approved by the Engineer.
- 4.15.4 Electric poles, telephone cables, water supply pipe lines, trees etc. should be protected as far as possible with due care.
- 4.15.5 Suitable arrangement must be made for street drainage if required at site.
- 4.15.6 With reference to Conditions of Contract, Claims on account of damage to Private property, shall be borne by the Contractor.
- 4.15.7 The Employer's Requirements for all the items covered in this tender are included in this section of the bid documents. In case any item is not covered or is missing, Orissa PWD and PHD specifications, CPWD specification, MORTH specification and relevant IS code shall be followed, as per approval by the Engineer.
- 4.15.8 In case of discrepancy between specifications in this document, and Orissa PWD and CPWD/PHD specifications/ relevant IS code the decision of the Engineer shall be final.
- 4.15.9 The cleaning and removal of debris etc. shall be carried out side by side during the execution of work as well as on completion. All debris shall have to be removed by the Contractor and completed work to be handed over free of debris and allied structures created with the construction of work.
- 4.15.10 The stacking of materials for construction work shall be done as per instructions of Engineer.
- 4.15.11 Watch and ward liability of construction/demolished materials during execution of work shall be by the Contractor.
- 4.15.12 Surplus earth from excavations & all dismantled materials shall be placed by the Contractor at places approved by the Engineer. No earth & other dismantled materials shall be sold by the Contractor to any private parties.
- 4.15.13 No pits should be dug by the Contractor near the site of work taking out earth for use on the work. In case of default the pits so dug will be filled in by WATCO at the risk & cost of the Contractor.
- 4.15.14 The Contractor shall make his own arrangements for water required for construction purpose at his own cost.
- 4.15.15 Actual quantities of completed and accepted work by WATCO will be paid for.
- 4.15.16 The Contractor will arrange his own tools, plant and equipment required for work.

4.16 Health and safety measures

The Contractor is responsible for health and safety of all workers, regardless of rank, company affiliation or position, including all subcontractors, casual labourers and day laborers. Health and safety conditions for work camps/living camps are described in the General Conditions. Health and safety conditions at the job sites shall also comply with all applicable rules and laws of the Orissa State and the Government of India. These rules and laws shall apply and the Contractor shall prepare an H&S plan for review and approval by the Engineer in accordance with these rules and laws.

Access to work sites shall be restricted to unauthorized personnel for the duration of work at any site, without exceptions and without consideration of time of day or day of the week. Only authorized persons shall be allowed in and/or on any work site. All persons within the work site shall be provided with safety equipment appropriate for their work, to the satisfaction of the Engineer.

Should at any time and for any reason the Engineer observes any person on or in a work site without safety equipment the Engineer may direct that the person be removed from the work site immediately.

Additional protective measures and/or equipment shall be available and used for work of known hazards including, but not limited to, work in trenches, work on ladders, elevated work, and welding, grinding, cutting work with extremely hot items, work with cranes, lifting equipment or any other machinery.

On all sites and at all times the public shall be excluded from the work area. The Contractor shall take all precautions necessary and to the satisfaction of the Engineer to ensure that only authorized person are allowed access to work sites. As needed the Contractor shall erect and maintain fences, barricades and other physical barriers. The Contractor shall also erect and maintain caution and warning signs at all work sites. The Contractor shall also post and empower guards as needed. The Contractor shall also provide lights for area illumination, lighted caution/warning signs including power generation as needed during night hours.

In all matters relating to safety including barriers, guards, signs, lights and police interaction the Contractor shall keep the Engineer fully informed and the above shall be to the full and complete satisfaction of the Engineer.

4.17 Survey and quality control

The Contractor shall include all expenses and labor necessary for setting out the work and for all survey necessary for the work. The Contractor shall assist the Engineer in checking all such work including provision of necessary instruments and personnel. The Work plans prepared by the contractor shall be approved by the Engineer before construction work begins.

Topographic survey of the project area has been conducted, taking the Reduced Level (RL) of GTS Bench Mark established inside the premises of Mahanadi South Division of Water Resources Department near Mahanadi Barrage at Jobra. The Contractor shall check RLs of these Bench mark for confirmation and establish more number of Bench Marks as required for reference during construction. A permanent baseline along the drain and bench marks shall be established by the Contractor to serve as reference before construction is begun.

The Contractor's Supervisors, all Foremen and all Leadsman shall be suitably qualified commensurate with the size and complexity of the work. They should speak and understand the Hindi and the English languages.

All testing shall be executed in accordance with requirements detailed in the Specifications including relevant IS Codes. The Engineer may call for additional testing of any portion of the work to verify performance or completion of the work.

4.18 Soil & Geotechnical Data

Geotechnical investigation report for Cuttack is attached for reference. The Employer accepts no responsibility, whatsoever for inferences drawn from this data and the Contractor is deemed to have satisfied on his own as to the extent to which this information represents the conditions to be encountered. If the Contractor as per his soil investigation finds the values differ than those given in soil report available with the Employer, then the more conservative values shall be adopted during final design.

No extra claims on these aspects shall be considered nor accepted by the Employer.

4.19 Project field office

The Contractor shall provide a project field office for his engineers/ supervisors etc. This office shall be conveniently located to the work. The field office should accommodate construction personnel and when required, personnel from the WATCO and/or the Engineer for the purpose of discussions and meetings. The office should be sufficiently furnished with tables, chairs, racks, file cabinets drawing displays, and shelving containing reference codes and other pertinent documents. Sufficient space should also be available for holding discussions/ meetings. The office should also have basic amenities such as electrical outlets, computer, printer, telephone, permanent Internet connection, washrooms with running water and potable water dispenser.

4.20 Project display signs

The Contractor shall provide for the construction and placement of signs of minimum dimensions as stated below.

The following types of signs shall be produced and used as noted:

- Project Information – providing names of government agencies, funding agencies, engineers and contractors (Minimum dimensions: 3 x 2 m).
- 1 number should be provided at Project field office
- Warning / Caution – providing statements of warning caution relative to the construction activities (Minimum dimensions: 1.5 x 1 m).
- Adequate number of Warning/Caution boards should be provided at work site, depending on site characteristics.

The Contractor shall maintain all signs in good condition for the duration of the job, including all extensions and all warranty and/or defects liability periods. The Contractor shall be responsible for removal and disposal of the signs at the end of said period and in accordance with directions of the Engineer.

4.21 As-built drawings

After construction and commissioning of all civil works covered under this contract, the Contractor shall submit

five (5) complete sets of as-built drawings (hard copy as well as soft copy) to WATCO. The As-built Drawings are the Detailed Engineering drawing showing the actual details on which the Construction / Fabrication / Erection has been carried out. The Contractor shall obtain approval of the As-built Drawings from WATCO.

4.22 Activity schedule

The Contractor shall submit an Activity Schedule in shape of a Bar Chart, giving Time Schedule for each activity according to priorities of the Engineer. The construction activities shall be based on this Bar Chart. Wherever there is a deviation from the approved Bar Chart, a revised Bar Chart shall be submitted by the Contractor. During the construction period the updated Bar Chart shall be submitted to the Engineer each month and/or when significant changes occur.

4.23 Reference standards

Wherever, reference to various IS Codes has been made in the Employer's Requirements, it shall mean the latest edition of the relevant Code. In case of ambiguity between the specifications contained in various sections of the bid documents and Indian Standards, the Contractor shall notify the Engineer, who shall determine the prevailing code and his decision shall be final.

4.24 Carriage of Materials

The carriage and stacking of materials shall be done as directed by the Engineer. Any tools and plants, required for the work shall be arranged by the Contractor. The carriage of materials includes loading within a lead of 50 meters, unloading and stacking within a lead of 500 meters.

4.25 General Consideration for stacking and Storage

For any site, there should be proper planning of the layout for stacking and storage of different materials, components and equipments with proper access and proper maneuverability of the vehicles carrying the material. While planning the layout, the requirements of various materials, components and equipments at different stages of construction shall be considered. The storage & stacking should be as per IS- 4082.

Material shall be stored in such a manner as to prevent deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work.

4.26 Protection against atmospheric exigencies:

Materials stored at site, depending upon the individual characteristics, shall be protected from atmospheric actions, such as rain, sun, winds and moisture to avoid deterioration.

4.27 Stacking and Storage of Materials

4.27.1 Cement

- Cement shall be stored at the work site in a building or a shed which is dry, leak proof and as moisture proof as possible. The building or shed for storage should have minimum number of windows and closefitting doors and these should be kept closed as far as possible.

- Cement shall be stored and stacked in bags and shall be kept free from the possibility of any dampness or moisture coming in contact with them. Cement bags shall be stacked off the floor on wooden planks in such a way as to keep about 150 mm to 200 mm clear above the floor. The floor may comprise of lean cement concrete or two layers of dry bricks lay on well consolidated earth. A space of 600 mm minimum shall be left around between the exterior walls and the stacks
- In the stacks the cement bags shall be kept close together to reduce circulation of air as much as possible. Owing to pressure on the bottom layer of bags sometimes ‘warehouse pack’ is developed in these bags. This can be removed easily by rolling the bags when the cement is taken out for use. Lumped bags, if any should be removed and disposed off.
- The height of stack shall not be more than 10 bags to prevent the possibility of lumping up under pressure. The width of the stack shall be not more than four bags length or 3 metres. In stacks more than 8 bags high, the cement bags shall be arranged alternately length-wise and cross-wise so as to tie the stacks together and minimize the danger of topping over. Cement bags shall be stacked in a manner to facilitate their removal and use in the order in which they are received; a label showing date of receipt of cement shall be put on each stack to know the age of cement.
- For extra safety during the monsoon, or when it is expected to store for an unusually long period, the stack shall be completely enclosed by a water proofing membrane such as polyethylene, which shall close on the top of the stack. Care shall be taken to see that the waterproofing membrane is not damaged any time during use.
- Cement in gunny bags, paper bags and polyethylene bags shall be stored separately.

In case cement is received in silos

The silos shall be placed near the concrete batching plant. Proper access shall be provided for the replacement of soils.

Different types of cements shall be stacked and stored separately.

4.27.2 Aggregates

- A. Aggregates shall be stored at site on a hard dry and level patch of ground. If such a surface is not available, a platform of planks or old corrugated iron sheets, or a floor of bricks, or a thin layer of lean concrete shall be made so as to prevent contamination with clay, dust, vegetable and other foreign matter.
- B. Stacks of fine and coarse aggregates shall be kept in separate stock piles sufficient distance from each other to prevent the material at the edges of the piles from getting intermixed. On a large job, it is desirable to construct dividing walls to give each type of aggregates its own compartment. Fine aggregates shall be stacked in a place where loss due to the effect of wind is minimum.

- C. Unless specified otherwise or necessitated by site conditions stacking of the aggregates should be carried out in regular stacks. The suggested sizes for stacks are as follows:

| Sl.no | Material | Size of Stack (in M) | | |
|-------|-------------------|----------------------|---------|--------|
| | | Length | Breadth | Height |
| (i) | Coarse Aggregates | 2.0 | 2.0 | 0.5 |
| | | Or 5.0 | 5.0 | 1.0 |
| | | 2.0 | 1.0 | 0.5 |
| (ii) | Fine Aggregates | 2.0 | 2.0 | 0.5 |
| | | Or 5.0 | 5.0 | 1.0 |
| | | 2.0 | 1.0 | 0.5 |

4.27.3 Steel

- For each classification of steel, separate areas shall be earmarked. It is desirable that ends of bars and sections of each class be painted in distinct separate colours.
- Steel reinforcement shall ordinarily be stored in such a way as to avoid distortion and to prevent deterioration and corrosion. It is desirable to coat reinforcement with cement wash before stacking to prevent scaling and rusting.
- Bars of different classification, sizes and lengths shall be stored separately to facilitate issues in such sizes and lengths so as to minimize wastage in cutting from standard lengths.
- Reinforcement bars shall be stacked above ground level by at least 150 mm. Also a coat of cement wash shall be given to prevent scaling and rusting.
- Structural steel of different classification, sizes and lengths shall be stored separately. It shall be stored above ground level by at least 150 mm upon platforms, skids or any other suitable supports to avoid distortion of sections. In coastal areas or in case of long storage suitable protective coating of primer paint shall be given to prevent scaling and rusting.

4.27.4 Water

Wherever water is to be stored for construction purposes this shall be done in proper storage tanks to prevent any organic impurities getting mixed up with it.

4.27.5 Other Materials

Small articles like nails, screws, nuts and bolts, door and window fittings, , protective clothing, spare parts of machinery, linings, packing, etc, shall be kept in suitable and properly protected store rooms.

4.28 Dismantling and Demolishing

a) Dismantling:

The term 'Dismantling' implies carefully separating the parts without damage and removing. This may consist of dismantling one parts of the building & Culverts, drains, compound wall etc as specified or shown on the drawings as directed by the Engineer.

b) Demolition:

The term 'Demolition' implies breaking up. This shall consist of demolishing whole or part of work including all relevant items as specified or shown on the drawings as directed by the Engineer.

4.28.1 Precautions

- a. All materials obtained from dismantling or demolition shall be the property of the Employer unless otherwise specified and shall be kept in safe custody until they are handed over to the Engineer.
- b. The demolition shall always be well planned before hand and shall generally be done in reverse order of the one in which the structure was constructed. The operations shall be got approved from the Engineer before starting the work. Due care shall be taken to maintain the safety measures prescribed in IS 4130 Safety Code for Demolishing of buildings.(Code of safety)
- c. Necessary propping, shoring and or under pinning shall be provided to ensure the safety of the adjoining work or property before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining work or property. Wherever specified, temporary enclosures or partitions and necessary scaffolding with suitable double scaffolding and proper cloth covering shall also be provided, as directed by the Engineer.
- d. Necessary precautions shall be taken to keep noise and dust nuisance to the minimum. All work needs to be done under the direction of Engineer. Helmets, goggle, safety belts etc. should be used whenever required and as directed by the Engineer. The demolition work shall be proceeded with in such a way that it causes the least damage and nuisance to the adjoining building and the public.
- e. Dismantling shall be done in a systematic manner. Chisels and cutters may be used carefully as directed by the Engineer.
- f. Any serviceable material, obtained during dismantling or demolition, shall be separated out and stacked properly as directed by the Engineer within a lead of 50 meters. All unserviceable materials, rubbish etc. shall be disposed off as directed by the Engineer.
- g. The contractor shall maintain/disconnect existing services, whether temporary or permanent, where required by the Engineer.
- h. No demolition work should be carried out at night especially when the building or structure to be demolished is in an inhabited area.
- i. First-aid equipment shall be kept at all demolition works of any magnitude.

4.28.2 Demolition of Special Types of Structures

4.28.3 In-situ Reinforced Concrete

- a. Before commencing demolition, the nature and condition of the concrete, the condition and position of reinforcement, and the possibility of lack of continuity of reinforcement should be ascertained.
- b. Attention should be paid to the principles of the structural design to determine which parts of the structure depend on each other to maintain overall stability.
- c. Where hard demolition methods are to be used, the following procedures should be used.

I. Reinforced Concrete Beams

For beams, a supporting rope should be attached to the beam. Then the concrete should be removed from both ends by pneumatic drill and the reinforcement exposed. The reinforcement should then be cut in such a way as to allow the beam to be lowered under control to the floor.

II. Reinforced Concrete Columns / Piers

For columns, the reinforcement should be exposed at the base after restraining wire guy ropes have been placed round the member at the top. The reinforcement should then be cut in such a way as to allow the column to be pulled down to the floor under control.

III. Reinforced Concrete Walls / Roof Slabs

Reinforced concrete walls / Roof Slabs should be cut into strips and demolished as for columns.

4.29 Diversion Construction

Contractor shall make diversion of flow by any means, by gravity or by Pumping suitable to him in such a manner that working site is totally free from flow of drain even during monsoon and work of Box Drain could be executed as per good sound practices of construction. The Contractor should get the methodology approved from the Engineer before execution of work

4.30 Specifications of Materials

4.30.1 Sand

- a. Sand shall consist of clean hard, strong, sharp and durable uncoated particles free from injurious amounts of clay, vegetable matter, dust, mica, soft or particles, shall, alkaline material or other harmful substances. It shall be obtained from clean beds in rivers or pits. Sea sand or sand which has remained under saline water shall not ordinarily be used. Requirements differ slightly for various classes of works as noted below.
- b. Sand for reinforced or plain cement concrete - shall be clean, coarse and as well graded as possible but must not

contain too much fine material. The coarser particles shall pass through a mesh with 3/16" square sides in the clear. It should be free from mica and clayey matter. Where all sand is micaceous it should be carefully selected from the coarsest deposits so as to eliminate the mica as far as possible. Sand shall be washed and cleaned if this is considered necessary by the Engineer. In case of any doubt, as to the quality of sand it shall be tested according to the methods prescribed by the I.R.C. specification and code of Practice for Road Bridges in India both for fineness and freedom from clay, salts or other harmful impurities.

- c. Sand for cement mortar - As for cement concrete.
- d. Sand for plinth filling - Any sand coarse or fine which is fairly clean and free from salts may be used without screening or further treatment.
 - a.
- e. Sand for plastering - This will be finer than what is required for cement-concrete but not so fine as dust. All particles of sand should pass through 64 mesh screen.

4.30.2 Portland Cement

Cement shall be of two varieties as required

- (1) Ordinary Portland Cement, (2) Rapid hardening cement.
 - a. General only ordinary Portland cement will be used. Rapid hardening cement on setting attains the same strength in about seven days as the normal cements attains in twenty-eight days and is therefore useful for structures which have to be brought into use very quickly. Because of its greater liability to develop shrinkage cracks, it should be used with caution, greater attention being paid to curing. Normal and rapid hardening cement must never be mixed together.
 - b. All cement (Ordinary Portland Cement) shall be obtained from reputed manufactures who guarantee their product as being fully up to the Indian Standard Specification for cement of Gr 43 as per IS : 8122. It must be fresh and unharmed by exposure to moisture. Cement which has been stored too long or has become lumpy shall not be used. Cement in which only a few small lumps-soft and easily crushable in the fingers have formed may be used with care after screening out all the lumps and subject to satisfactory tests for strength. Cement used for reinforced concrete shall be tested periodically to see that it is up to the specification as regards quality and strength and has not deteriorated. The shed in which the cement is stored should be water tight and bags should be stored on a floor raised above the ground level and packed as tightly as possible to prevent moisture getting at the cement. In proportioning ordinary concrete, the quantity in Cum. of cement should be determined, by weight, taking the volume of 1441.66 Kg. of ordinary cement or 1281.47 Kg. of rapid hardening cement as 1 Cum.

4.30.3 Cement mortar

Cement mortar shall consist of fresh cement and clean sand- see specification for cement and sand-mixed by volume in the proportions 1:2, 1:2 $\frac{1}{2}$, 1:3, 1:4, 1:5, 1:6, 1:8, 1:10, 1:12 as may be specified. Cement and sand shall first be thoroughly mixed by hand in the dry condition. Enough water is then at once to be added by means of a rose so as to produce a fairly still mortar and the whole to, be turned not less than three times. Mortar should be used at once after mixing and it should be finally laid and tamped in position within 20 minutes counting from the time when the cement is moistened, remembering that most sands are initially more or less moist and the so called dry mixing also usually results in moistening of the cement to some extent. To ensure this it is necessary to mix only small quantities at a time which can be quickly handled and placed in the work. The timing shall be strict and particularly rigid in case of mortars

for reinforced brickwork. Once laid the mortar shall not be disturbed again when green or insufficiently hardened. The only exceptions in this respect are cement mortar plasters requiring a smooth surface finish for floors or walls. For these light trowelling of the surface is permissible up to the time that the cement is taking its initial set. This may take place 30 minutes or more after mixing.

- Note-(1) Strong 1:4 mortar is suitable for all kinds of masonry which has to be very strong but is not too heavily loaded also for a strong plaster where smooth finish is not required for example in window sills, jambs and ceilings. 1:5 mortar is fairly strong and generally used for ceiling plaster over brick or tile surfaces. 1:6 mortar is generally quite strong enough for all kinds of ordinary masonry in walls but not in slender pillars. It may also be used for rubble masonry and for wall plaster where a fair strength and matt finish is needed.
- NOTE - (2) When sand and cement are mixed for cement mortar 1:2 or poorer it is found that dry mixing results in a volume not sensible different from the volume of the sand mixed. On wet mixing there may be slight increase in volume due to bulking but the final wet mixed volume is about the same volume of the sand mixed. There may be an increase of about 5 per cent or more if the sand is well graded.

4.30.4 Earth Work

DEFINITIONS

Lead: All distances shall be measured over the shortest practical route and not necessarily the route actually taken. Route other than shortest practical route may be considered in cases of unavoidable circumstances and approved by Engineer along with reasons in writing.

Carriage by manual labour shall be reckoned in units of 50 metres or part thereof.

Carriage by mechanical transport shall be reckoned in one km. unit. Distances of 0.5 km. or more shall be taken as 1 km. and distance of less than 0.5 km. shall be ignored. However, when the total lead is less than 0.5 km., it will not be ignored but paid for separately in successive stages of 50 metres subject to the condition that the rate worked on this basis does not exceed the rate for initial lead of 1 km. by mechanical transport.

Lift: The vertical distance for removal with reference to the ground level. The excavation up to 1.5 metres depth below the ground level and every successive lift of 1.5 meters up to designed depth and depositing the excavated materials upto above the ground level are included in the rate of earth work.

Safety rules: Safety rules as laid down by the statutory authority and as provided in National Building Code (NBC) shall be followed.

4.30.5 Classification of Soils

The earthwork shall be classified under the following categories and measured separately for each category:

- **All kind of soils:** Generally any strata, such as sand, gravel, loam, clay, mud, black cotton moorum, shingle, river or nallah bed boulders, siding of roads, paths etc. and hard core, macadam surface of

any description (water bound, grouted tarmac etc.), lime concrete mud concrete and their mixtures which for excavation yields to application of picks, showels, jumper, sacrifiers, ripper and other manual digging implements.

- **Ordinary rock:** Generally any rock which can be excavated by splitting with crow bars or picks and does not require blasting, wedging or similar means for excavation such as lime stone, sand stone, hard laterite, hard conglomerate and un-reinforced cement concrete below ground level. If required light blasting may be resorted to for loosening the materials but this will not in any way entitle the material to be classified as 'Hard rock'.

4.30.6 Antiquities and Useful Materials

- Any finds of archaeological interest such as relics of antiquity, coins, fossils or other articles of value shall be delivered to the Engineer and shall be the property of the Government.
- Any material obtained from the excavation which in the opinion of the Engineer is useful shall be stacked separately in regular stacks as directed by the Engineer and shall be the property of the Government.

4.30.7 Protections

- Excavation where directed by the Engineer shall be securely barricaded and provided with proper caution signs, conspicuously displayed during the day and properly illuminated with red lights and/or written using fluorescent reflective paint as directed by engineer during the night to avoid accident.
- The Contractor shall take adequate protective measures to see that the excavation operations do not damage the adjoining structures or dislocate the services. Water supply pipes, sluice valve chambers, sewerage pipes, manholes, drainage pipes and chambers, communication cables, power supply cables etc. met within the course of excavation shall be properly supported and adequately protected, so that these services remain functional. However, if any service is damaged during excavation shall be restored in reasonable time.
- Excavation shall not be carried out below the foundation level of the adjacent buildings until under pinning shoring , sheet piling etc. is done as per the directions of the Engineer
- Any damages done by the contractor to any existing work shall be made good by him at his own cost. Existing drains pipes, culverts, over head wires, water supply lines and similar services encountered during the course of execution shall be protected against damage by the contractor. The contractor shall not store material or otherwise occupy any part of the site in manner likely to hinder the operations of such services.

4.30.8 Site Clearance

- Before the earth work is started, the area coming under cutting and filling shall be cleared of shrubs, rank vegetation, grass, brushwood, trees and saplings of girth up to 30cm measured at a height of one metre above ground level and rubbish removed up to a distance of 50 metres outside the periphery of the area under clearance. The roots of trees and saplings shall be removed to a depth of 60cm below ground level or 30 cm below formation level or 15 cm below sub grade level, whichever is lower, and the holes or hollows filled up with the earth, rammed and leveled.
- The trees of girth above 30 cm measured at a height of one metre above ground shall be cut only after permission of the Engineer is obtained in writing. The roots of trees shall also be removed as specified, payment for cutting such trees and removing the roots shall be made separately.
- Existing structures and services such as old buildings, culverts, fencing, water supply pipe lines, sewers, power cables, communication cables, drainage pipes etc. within or adjacent to the area if required to be diverted/removed, shall be diverted/dismantled as per directions of the Engineer and payment for such diversion/dismantling works shall be made separately.
- In case of archaeological monuments within or adjacent to the area, the contractor shall provide necessary fencing around such monuments as per the directions of the Engineer and protect the same properly during execution of works. Payment for providing fencing shall be made separately.
- Disposal of Earth shall be disposed off at the specified location or as decided by the Engineer. The contractor has to take written permission about place of disposal of earth before the earth is disposed off, from Engineer.

4.30.9 Setting out and Making Profiles

- A masonry pillar to serve as a bench mark will be erected at a suitable point in the area, which is visible from the largest area. This bench mark shall be constructed and connected with the standard bench mark as approved by the Engineer. Necessary profiles with strings stretched on pegs, bamboos or 'Burjis' shall be made to indicate the correct formation levels before the work is started. The contractor shall supply labour and material for constructing bench mark, setting out and making profiles and connecting bench mark with the standard bench mark at his own cost. The pegs, bamboos or 'Burjis' and the bench mark shall be maintained by the contractor at his own cost during the excavation to check the profiles.
- The ground levels shall be taken at 5 to 15 metres intervals (as directed by the Engineer) in uniformly sloping ground and at closer intervals where local mounds, pits or undulations are met with. The ground levels shall be recorded in field books and plotted on plans. The plans shall be drawn to a scale of 5 metres to one cm or any other suitable scale decided by the Engineer. North direction line and position of bench mark shall invariable be shown on the plans. These plans shall be signed by the contractor and the Engineer or their authorized representatives before the earth work is started. The labour required for taking levels shall be supplied by the contractor at his own cost.

4.30.10 Excavation in all Kinds of Soils

- All excavation operations manually or by mechanical means shall include excavation and ‘getting out’ the excavated materials. In case of excavation for trenches, basements, water tanks etc. ‘getting out’ shall include throwing the excavated materials at a distance of at least one metre or half the depth of excavation, whichever is more, clear off the edge of excavation. In all other cases ‘getting out’ shall include depositing the excavated materials as specified. The subsequent disposal of the excavated material shall be either stated as a separate item or included with the items of excavation stating lead.
- During the excavation the natural drainage of the area shall be maintained. Excavation shall be done from top to bottom. Undermining or undercutting shall not be done.
- In firm soils, the sides of the trenches shall be kept vertical upto a depth of 2 metres from the bottom. For greater depths, the excavation profiles shall be widened by allowing steps of 50 cms on either side after every 2 metres from the bottom. Alternatively, the excavation can be done so as to give slope of 1:4 (1 horizontal : 4 vertical). Where the soil is soft, loose or slushy, the width of steps shall be suitably increased or sides sloped or the soil shored up as directed by the Engineer. It shall be the responsibility of the contractor to take complete instructions in writing from the Engineer regarding the stepping , sloping or shoring to be done for excavation deeper than 2 metres.
- The excavation shall be done true to levels, slope, shape and pattern indicated by the Engineer. Only the excavation shown on the drawings with additional allowances for centring and shuttering or as required by the Engineer shall be measured and recorded for payment.
- In case of excavation for foundation in trenches or over areas, the bed of excavation shall be to the correct level or slope and consolidated by watering and ramming. If the excavation for foundation is done to a depth greater than that shown in the drawings or as required by the Engineer, the excess depth shall be made good by the contractor at his own cost with the concrete of the mix used for leveling / bed concrete for foundations. Soft/defective spots at the bed of the foundations shall be dug out and filled with concrete as directed by the Engineer.
- In all other cases where the excavation is taken deeper by the contractor, it shall be brought to the required level by the contractor at his own cost by filling in with mainly sand & some extent earth duly watered, consolidated and rammed.
- In case the excavation is done wider than that shown on the drawings or as required by the Engineer, additional filling wherever required on the account shall be done by the contractor at his own cost.
- The excavation shall be done manually or by mechanical means as directed by Engineer considering feasibility, urgency of work, availability of labour /mechanical equipments and other factors involved. Contractor shall ensure every safety measures for the workers. No extra payment will be made on this account.

4.30.11 Excavation in Ordinary/Hard Rock

- All excavation operations shall include excavation and ‘getting out’ the excavated matter. In case of excavation for trenches, basements, water tanks etc. ‘getting out’ shall include throwing the excavated materials at a distance of at least one metre or half the depth of excavation, whichever is more, clear off the edge or excavation. In all other cases ‘getting out’ shall include depositing the excavated materials as specified. The subsequent disposal of the excavated material shall be either stated as a separate item or included with the item of excavation stating lead.
- During the excavation, the natural drainage of the area shall be maintained. Excavation shall be done from top to bottom. Undermining or under cutting shall not be done.
- Where hard rock is met with and blasting operations are considered necessary, the contractor shall obtain the approval of the Engineer in writing for resorting to the blasting operations. Blasting operations shall be done as specified and chiseling shall be done to obtain correct levels, slopes, shape and pattern of excavation as per the drawings or as required by the Engineer and nothing extra shall be payable for chiseling.
- Where blasting operations are prohibited or are not practicable, excavation in hard rock shall be done by chiseling.
- If the excavation for foundations or drains is done to a depth greater than that shown in the drawings or as required by the Engineer. The excess depth shall be made good by the contractor at his own cost with the concrete of the mix used for levelling/ bed concrete for foundations. Soft/ defective spots at the bed of foundations shall be dug out and filled with concrete (to be paid separately) as directed by the Engineer.
- In case the excavation is done wider than that shown on the drawings or as required by the Engineer, filling wherever required on this account shall be done by the contractor at his own cost.
- Only the excavation shown on the drawings or as required by the Engineer shall be measured and recorded for payment except in case of hard rock, where blasting operations have been resorted to, excavation shall be measured to the actual levels, provided the Engineer is satisfied that the contractor has not gone deeper than what was unavoidable.
- The excavation shall be done manually or by mechanical means as desired by Engineer considering feasibility, urgency of work, availability of labour /mechanical equipments and other factors involved Contractor shall ensure every safety measures for the workers. Neither any deduction will be made nor any extra payment will be made on this account.

4.30.12 Earth Work By Mechanical Means

Earth work by mechanical means involves careful planning keeping in view site conditions i.e. type of soil, nature of excavation, distances through which excavated soil is to be transported and working space available for employing these machines. The earth moving equipment should be accordingly selected. The earth moving equipment consists of excavating and transporting equipment. Excavating equipment may be further classified as excavators and tractor based equipment.

Excavators

Excavators generally used at site are as follows:

a. **Dipper–shovel:**

It is used for excavating against a face or bank consisting of open-top bucket or dipper with a bottom opening door, fixed to an arm or dipper stick which slides and pivots on the jib of the crane. It is suitable for excavating all clay chalk and friable materials and for handling rock and stone. However, it is not suitable for surface excavation for which a skimmer is used.

b. **Backhoe:**

It is similar to face shovel except that the dipper stick pivots on the end of the jib and the dipper or bucket works towards the chassis and normally has no bottom door but is emptied by swinging away from the chassis to invert the bucket. It may be designed to carry both a front – mounted bucket loading mechanism and a rear mounted backhoe. It is mainly used to excavate trenches and occasionally used for the excavation of open areas such as small basements. In the backhoe mode the bucket lifts, swings and discharges materials while the undercarriage is stationary. When used in the ‘loader’ mode, the machine loads or excavated through forward motion of the machine, and lifts, transports and discharges materials.

c. **Skimmer:**

This arrangement is similar to the face shovel except that in this case the bucket slides on rollers directly along the jib and thus has a more restricted movement. It is used for surface excavation and levelling in conjunction with transport to haul away the excavated material.

d. **Dragline:**

It is usually fitted with a long slender boom or jib and the bucket, which in operation faces towards the machine and has no door, is supported by cable only as on a crane. It works from the side of the excavation at normal ground level and is used for excavating large open excavations such as basements when the depth is beyond the limit of the boom of a backhoe. It is commonly used for open cast mining operations.

e. **Clamshell:**

It consists of two hinged half-buckets or jaws pivoted to a frame which is suspended by cable from a long jib of an excavation. The grab is used for deep excavations of limited area on all types of soil except rock. Crane and Grab is a variant of this type of equipment.

4.30.13 Tractor–based Equipment

It is a self–propelled crawler or wheeled machine used to exert a push or pull force through mounted equipment. It is designed either as attachments to normal tracked or wheeled tractors or as machines in which the earth moving attachments and the tractor are designed as a single integrated unit. A tractor, which is hydraulically operated, can be rigged as:

- a. **Loaders:**
It is used for loading, light dozing, scraping and grabbing operations, lifting and transporting the materials (loose earth, rubble, sand, gravel aggregate etc) at various sites through forward motion of the machine.
- b. **Tractor Shovel:**
This consists of a tipping bucket at the front attached by strong pivoted arms or booms to the frame of the machine. It is used for stripping top soil, excavating against a face, bulldozing and for loading spoil or loose materials. It is similar to crawler dipper-shovel.
- c. **Trench Digger:**
It operates on the same principle as a backhoe excavator except that the bucket is controlled by hydraulic rams instead of cables and pulleys.
- d. **Scraper:**
Scrapers provide unique capability to excavate, load, haul and dump materials. Scrapers are available in various capacities by a number of manufacturers with options such as self – loading with elevators, twin engines or push-pull capability. They are cost effective where the haul distance is too long for bulldozers, yet too short for trucks. This distance typically ranges from 120 m to 1200 m; however, the economics should be evaluated for each project. Scraper has an open bowl with a cutting edge positioned between the axles, which cuts, loads, transports, discharges and spreads through forward motion of the machine. Loading through forward motion of the machine can be assisted by a powered mechanism (elevator) fixed to the scraper bowl.
- e. **Bulldozer and Angle-dozer:**
The most common equipment used for clearing and leveling activities is a bulldozer. The terms bulldozer is used to define a tractor mounted with a dozing blade. The bulldozer consists of a rectangular steel blade with renewable cutting edge set at right angles (capable of only tilting but not angling) to the direction of travel and attached by steel arms to the side frames of a crawler tractor. It may be used for excavating natural soil or for moving loose soil or debris, which is pushed forward as the tractor forces it ahead.
- f. **Angle dozer** is capable of both tilting and angling.

4.30.14 Transporting Equipment

This implies horizontal movement primarily but it can involve some vertical movement too.

- a. **Dumpers:** These are self-propelled wheeled machines, having an open body. It is designed for the transport of excavated materials and consists of a shallow tipping hopper or skip mounted on a wheeled chassis, such as, power barrow, dumper, multi-skip dumpers, high discharge dumpers, dump truck, etc. These can be rear dump, side dump or bottom dump.
- b. **Vibratory Roller :** It is a single Drum Vibratory Roller for compaction of embankments, etc. The smooth drum version is for compaction of granular and mixed soil. The sheepfoot Roller consists of a hollow cylindrical steel drum or drums on which projecting feet are mounted. These feet penetrate into the fill as a roller moves forward and cause compaction. The geometry

of the foot may be sheep, club pyramid, cone or cylinder foot. Such rollers are employed for compaction (densification) of cohesive and semi-cohesive soils.

4.30.15 Excavation in Water, Mud or Foul position

All water that may accumulate in excavations during the progress of the work from springs, tidal or river seepage, broken water mains or drains (not due to the negligence of the contractor), and seepage from subsoil aquifer shall be bailed, pumped out or otherwise removed. The contractor shall take adequate measures for bailing and/or pumping out water from excavations and/or pumping out water from excavations and construct diversion channels, bunds, sumps, coffer dams etc. as may be required. Pumping shall be done directly from the foundation trenches or from a sump out side the excavation in such a manner as to preclude the possibility of movement of water through any fresh concrete or masonry and washing away parts of concrete or mortar. During laying of concrete or masonry and for a period of at least 24 hours thereafter, pumping shall be done from a suitable sump separated from concrete or masonry by effective means.

Capacity and number of pumps, location at which the pumps are to be installed, pumping hours etc. shall be decided from time to time in consultation with the Engineer.

Pumping shall be done in such a way as not to cause damage to the work or adjoining property by subsidence etc. Disposal of water shall not cause inconvenience or nuisance in the area or cause damage to the property and structure nearby.

To prevent slipping of sides, planking and strutting may also be done with the approval of the Engineer.

- a. **Work in or under water and/or liquid mud:** Excavation, where water is met with from any of the sources shall fall in this category. Steady water level in the trial pits before the commencement of bailing or pumping operations shall be the sub-soil water level in that area.
- b. **Work in or under foul position:** Excavation, where sewage, sewage gases or foul conditions are met with from any source, shall fall in this category. Decision of the Engineer whether the work is in foul position or not shall be final.

4.30.16 Surface Dressing.

Surface dressing shall include cutting and filling upto a depth of 15 cm and clearing of shrubs, rank vegetation, grass, brushwood, trees and saplings of girth upto 30 cm measured at a height of one metre above the ground level and removal of rubbish and other excavated material upto a distance of 50 metres outside the periphery of the area under surface dressing. High portions of the ground shall be cut down and hollows depression filled upto the required level with the excavated earth so as to give an even, neat and tidy look.

4.30.17 Jungle Clearance

Jungle clearance shall comprise uprooting of rank vegetation, grass, brushwood, shrubs, stumps, trees and saplings of girth upto 30 cm measured at a height of one metre above the ground level. Where only

clearance of grass is involved it shall be measured and paid for separately.

4.30.18 Uprooting of Vegetations

The roots of trees and saplings shall be removed to a depth of 60 cm below ground level or 30 cm below formation level or 15 cm below sub-grade level, whichever is lower. All holes or hollows formed due to removal of roots shall be filled up with earth rammed and levelled. Trees, shrubs, poles, fences, signs, monuments, pipe lines, cable etc., within or adjacent to the area which are not required to be disturbed during jungle clearance shall be properly protected by the contractor at his own cost and nothing extra shall be payable.

4.30.19 Stacking and Disposal

All useful materials obtained from clearing and grubbing operation shall be stacked in the manner as directed by the Engineer. Trunks and branches of trees shall be cleared of limbs and tops and stacked neatly at places indicated by the Engineer. The materials shall be the property of the Government. All unserviceable materials which in the opinion of the Engineer cannot be used or auctioned shall be removed up to a distance of 50 m outside the periphery of the area under clearance. It shall be ensured by the contractor that unserviceable materials are disposed off in such a manner that there is no likelihood of getting mixed up with the materials meant for construction.

4.30.20 Clearance of Grass

Clearing and grubbing operation involving only the clearance of grass shall be measured and paid for separately and shall include removal of rubbish upto a distance of 50 m outside the periphery of the area under clearance.

4.30.21 FELLING TREES

4.30.22 Felling

While clearing jungle, growth trees above 30 cm girth (measured at a height of one metre above ground level) to be cut, shall be approved by the Engineer and then marked at site. Felling trees shall include taking out roots upto 60 cm below ground level or 30 cm below formation level or 15 cm below sub-grade level, whichever is lower.

All excavation below general ground level arising out of the removal of trees, stumps etc. shall be filled with suitable material in 20 cm layers and compacted thoroughly so that the surfaces at these points conform to the surrounding area. The trunks and branches of trees shall be cleared of limbs and tops and cut into suitable pieces as directed by the Engineer.

4.30.23 Stacking and Disposal

Wood, branches, twigs of trees and other useful material shall be the property of the Government. The serviceable materials shall be stacked in the manner as directed by the Engineer upto a lead of 500 m.

All unserviceable material, which in the opinion of Engineer cannot be used or auctioned shall be

removed from the area and disposed off as per the directions of the Engineer. Care shall be taken to see that unsuitable waste materials are disposed off in such a manner that there is no likelihood of these getting mixed up with the materials meant for construction.

4.31 Cement Concrete Works

Reinforced cement concrete work may be cast-in-situ or Precast as may be directed by Engineer according to the nature of work. Reinforced cement concrete work shall comprise of the following which may be paid separately or collectively as per the description of the item of work.

- a) Form work (Centering and Shuttering)
- b) Reinforcement
- c) Concreting: (Cast-in-situ)

4.32 Form Work (Centering & Shuttering)

4.32.1 Form Work

Form work shall include all temporary or permanent forms or moulds required for forming the concrete which is cast-in-situ, together with all temporary construction required for their support.

4.32.2 Design & Tolerance in Construction

Form work shall be designed and constructed to the shapes, lines and dimensions shown on the drawings with the tolerance given below.

- (a) Deviation from specified dimension of cross section of columns and beams : - +12mm to – 6mm
- (b) Deviation from dimensions of footings : - +50mm to – 12mm. 0.02 times the width of the footing in the direction of deviation but not more than 50 mm.
 - i) Dimension in Plan
 - ii) Eccentricity in plan
 - iii) Thickness : + 0.05 times the specified thickness.

(Note- These tolerance apply to concrete dimensions only, and not to positioning of vertical steel or dowels).

4.32.3 General Requirement

It shall be strong enough to withstand the dead and live loads and forces caused by ramming and vibrations of concrete and other incidental loads, imposed upon it during and after casting of concrete. It shall be made sufficiently rigid by using adequate number of ties and braces, screw jacks or hard board wedges where required shall be provided to make up any settlement in the form work either before or during the placing of concrete.

Form shall be so constructed as to be removable in sections in the desired sequence, without damaging the surface of concrete or disturbing other sections, care shall be taken to see that no piece is keyed into the concrete.

4.32.4 Material for Form Work

Propping and Centering : All propping and centering should be either of steel tubes with extension pieces or built up sections of rolled steel.

4.32.5 Centering/Staging :

Staging should be as designed with required extension pieces as approved by Engineer to ensure proper slopes, as per design for slabs/ beams etc. and as per levels as shown in drawing. All the staging to be either of Tubular steel structure with adequate bracings as approved or made of built up structural sections made form rolled structural steel sections. In case of structures with two or more floors, the weight of concrete, centering and shuttering of any upper floor being cast shall be suitably supported on one floor below the top most floor already cast.

Form work and concreting of upper floor shall not be done until concrete of lower floor has set at least for 14 days.

4.32.6 Shuttering:

Shuttering used shall be of sufficient stiffness to avoid excessive deflection and joints shall be tightly butted to avoid leakage of slurry. If required, rubberized lining of material as approved by the Engineer shall be provided in the joints. Steel shuttering used or concreting should be sufficiently stiffened. The steel shuttering should also be properly repaired before use and properly cleaned to avoid stains, honey combing, seepage of slurry through joints etc.

(a) Runner Joists: RSJ, MS Channel or any other suitable section of the required size shall be used as runners.

(b) Assembly of beam head over props. Beam head is an adopter that fits snugly on the head plates of props to provide wider support under beam bottoms.

(c) Only steel shuttering shall be used, except for unavoidable portions and very small works for which 12 mm thick water proofing ply of approved quality may be used.

Form work : shall be properly designed for self weight, weight of reinforcement, weight of fresh concrete, and in addition, the various live loads likely to be imposed during the construction process (such as workmen, materials and equipment). In case the height of centering exceeds 3.50 metres, the prop may be provided in multi-stages.

Camber: Suitable camber shall be provided in horizontal members of structure, especially in cantilever spans to counteract the effect of deflection. The form work shall be so assembled as to provide for camber. The camber for beams and slabs shall be 4 mm per metre (1 to 250) or as directed by the Engineer, so as to offset the subsequent deflection, For cantilevers the camber at free end shall be 1/50th of the projected length or as directed by the Engineer.

Walls : The form faces have to be kept at fixed distance apart and an arrangement of wall ties with spacer tubes or bolts is considered best.

Removal of Form work (Stripping Time):

- Forms shall not be released until the concrete has achieved a strength of at least twice the stress to which the concrete may be subjected at the time of removal of formwork. The strength referred to shall be that of concrete using the same cement and aggregates and admixture, if any, with the same proportions and cured under conditions of temperature and moisture similar to those existing on the work.
- While the above criteria of strength shall be the guiding factor for removal of formwork, in normal circumstances where ambient temperature does not fall below 15⁰C and where **ordinary Portland cement** is used and adequate curing is done, following striking period may deep to satisfy the guideline given above.

| Type of Formwork | Minimum Period before Striking Formwork |
|--|---|
| a) Vertical formwork to columns, walls beams | 16-24 h |
| b) Soffit formwork to slabs (Props to be re-fixed immediately after removal of formwork) | 3 days |
| c) Soffit formwork to beams (Props to be re-fixed immediately after removal of formwork) | 7 days |
| d) Props to slabs: | |
| 1) Spanning upto 4.5 m | 7 days |
| 2) Spanning over 4.5 m | 14 days |
| e) Props to beams and arches: | |
| 1) Spanning up to 6 m | 14 days |

| | |
|----------------------|---------|
| 2) Spanning over 6 m | 21 days |
|----------------------|---------|

For other cements and lower temperature, the stripping time recommended above may be suitably modified.

The number of props left under, their sizes and disposition shall be such as to be able to safely carry the full dead load of the slab, beam or arch as the case may be together with any live load likely to occur during curing or further construction.

Where the shape of the element is such that the formwork has re-entrant angles, the formwork shall be removed as soon as possible after the concrete has set, to avoid shrinkage cracking occurring due to the restraint imposed.

4.32.7 Surface Treatment

Oiling the Surface: Shuttering gives much longer service life if the surfaces are coated with suitable mould oil which acts both as a parting agent and also gives surface protections. A typical mould oil is heavy mineral oil or purified cylinder oil containing not less than 5% pentachlorophenol conforming to IS 716 well mixed to a viscosity of 70-80 centipoises. After 3-4 uses and also in cases when shuttering has been stored for a long time, it should be recoated with mould oil before the next use. The second categories of shuttering oils / leavening agents are Polymer based water soluble Compounds. They are available as concentrates and when used diluted with water in the ratio of 1:20 or as per manufacturer specifications. The diluted solution is applied by brush applications on the shuttering both of steel as well as ply wood. The solution is applied after every use.

The design of form work shall conform to sound Engineering practices and relevant IS codes.

4.32.8 Inspection of Form Work

The completed form work shall be inspected and approved by the Engineer before the reinforcement bars are placed in position.

Proper form work should be adopted for concreting so as to avoid honey combing, blow holes, grout loss, stains or discoloration of concrete etc. Proper and accurate alignment and profile of finished concrete surface will be ensured by proper designing and erection of form work which will be approved by Engineer.

Shuttering surface before concreting should be free from any defect/ deposits and full cleaned so as to give perfectly straight smooth concrete surface. Shuttering surface should be therefore checked for any damage to its surface and excessive roughness before use.

4.32.9 Erection of Form Work (Centering and shuttering):

Following points shall be borne in mind while checking during erection.

- (a) Any member which is to remain in position after the general dismantling is done should be clearly marked.

- (b) Material used should be checked to ensure that, wrong items/ rejects are not used.
- (c) If there are any excavations nearby which may influence the safety of form works, corrective and strengthening action must be taken.
- (d) (i) The bearing soil must be sound and well prepared and the sole plates shall bear well on the ground.
 - (ii) Sole plates shall be properly seated on their bearing pads or sleepers.
 - (iii) The bearing plates of steel props shall not be distorted.
 - (iv) The steel parts on the bearing members shall have adequate bearing areas.
- (e) Safety measures to prevent impact of traffic, scour due to water etc. should be taken. Adequate precautionary measures shall be taken to prevent accidental impacts etc.
- (f) Bracing, struts and ties shall be installed along with the progress of form work to ensure strength and stability of form work at intermediate stage. Steel sections (especially deep sections) shall be adequately restrained against tilting, overturning and form work should be restrained against horizontal loads. All the securing devices and bracing shall be tightened.
- (g) The stacked materials shall be placed as catered for, in the design.
- (h) When adjustable steel props are used. They should:
 - 1. be undamaged and not visibly bent.
 - 2. have the steel pins provided by the manufacturers for use.
 - 3. be restrained laterally near each end.
 - 4. have means for centralizing beams placed in the forkheads.
- (i) Screw adjustment of adjustable props shall not be over extended.
- (j) Double wedges shall be provided for adjustment of the form to the required position wherever any settlement/ elastic shorting of props occurs. Wedges should be used only at the bottom end of single prop. Wedges should not be too steep and one of the pair should be tightened/ clamped down after adjustment to prevent shifting.
- (k) No member shall be eccentric upon vertical member.
- (l) The number of nuts and bolts shall be adequate.
- (m) All provisions of the design and/or drawings shall be complied with.
- (n) Cantilever supports shall be adequate.

- (o) Props shall be directly under one another in constructions as far as possible.
- (p) Guy ropes or stays shall be tensioned properly.
- (q) There shall be adequate provision for the movements and operation of vibrators and other construction plant and equipment.
- (r) Required camber shall be provided over long spans.
- (s) Supports shall be adequate, and in plumb within the specified tolerances.

4.33 Reinforcements

4.33.1 General Requirements

Steel conforming for reinforcement shall be clear and free from loose mill scales, dust, loose rust, coats of paints, oil or other coating which may destroy or reduce bond. It shall be stored in such a way as to avoid distortion and to prevent deterioration and corrosion. Prior to assembly of reinforcement on no account any oily substance shall be used for removing the rust.

4.33.2 Assembly of Reinforcement :

Bars shall be bent correctly and accurately to the size and shape as shown in the detailed drawing or as directed by Engineer. Preferably bars of full length shall be used. Necessary cutting and straightening is also included. Overlapping of bars, where necessary shall be done as directed by the Engineer. The overlapping bars shall not touch each other and these shall be kept apart with concrete between them by 25mm or 1 1/4 times the maximum size of the coarse aggregate whichever is greater. But where this is not possible, the overlapping bars shall be bound together at intervals not exceeding twice the dia. of such bars with two strands annealed steel wire of 0.90 mm to 1.6 mm twisted tight. The overlaps/ splices shall be staggered as per directions of the Engineer. But in no case the overlapping shall be provided in more than 50% of cross sectional area at one section.

4.33.3 Bonds and Hooks Forming End Anchorages:

Reinforcement shall be bent and fixed in accordance with procedure specified in IS 2502, code of practice of bending and fixing of bars for concrete reinforcement. The details of bends and hooks are shown below for guidance.

4.33.4 Anchoring Bars in Tension :

Deformed bars may be used without end anchorages provided, development length equipment is satisfied. Hooks should normally be provided for plain bars in tension. Development length of bars will be determined as per IS: 456.

4.33.5 Anchoring Bars in Compression :

The anchorage length of straight bar in compression shall be equal to the 'Development length' of bars in compression as specified in IS: 456. The projected length of hooks, bend and straight lengths beyond bend,

if provided for a bar in compression, shall be considered for development length.

4.33.6 Binders, stirrups, links etc. :

In case of binders, stirrups, links etc. the straight portion beyond the curve at the end shall be not less than eight times and nominal size of bar.

4.33.7 Welding of Bars

Wherever facility for electric arc welding or gas pressure welding is available, welding of bars shall be done in lieu of overlap. The location and type of welding shall be got approved by the Engineer.

4.33.8 Placing in Position

Fabricated reinforcement bars shall be placed in position as shown in the drawings or as directed by the Engineer. The bars crossing one another shall be tied together at every intersection with two strands of annealed steel wire 0.9 to 1.6 mm thickness twisted tight to make the skeleton of the steel work rigid so that the reinforcement does not get displaced during deposition of concrete.

Tack welding in crossing bars shall also be permitted in lieu of binding with steel wire if approved by Engineer.

4.33.9 Tolerance on Placing of Reinforcement :

Unless otherwise specified by the Engineer, reinforcement shall be placed within the following tolerances:

Tolerance in spacing

- (a) For effective depth, 200 mm or less +10 mm
- (b) For effective depth, more than 200 mm + 15 mm

4.33.10 Cover :

The minimum nominal cover to meet durability requirements shall be as under:-

| Exposure | Nominal Concrete cover in mm not less than |
|-------------|--|
| Mild | 20 |
| Moderate | 30 |
| Severe | 45 |
| Very severe | 50 |
| Extreme | 75 |

Notes :

For main reinforcement upto 12 mm diameter bar for mild exposure the nominal cover may be reduced by 5 mm.

Unless specified otherwise, actual concrete cover should not deviate from the required nominal cover by + 10 mm.

For exposure condition 'severe' and 'very severe' reduction of 5 mm may be made, where concrete grade is M35 and above.

Nominal cover to meet specified period of fire resistance shall not be less than as given in Table 16A of IS 456.

4.34 Concrete

4.34.1 General

Concrete grade shall be as designated on drawings. In concrete grade M15, M20 ,M35 etc. the number represents the specified characteristic compressive strength of 150mm cube at 28 days, expressed in N/sq. mm as per IS: 456.

4.34.2 Design mix concrete

Mix Design & Testing: For Design Mix Concrete, the mix shall be designed to provide the grade of concrete having the required workability and characteristic strength not less than appropriate values given in IS: 456. The design mix shall be in addition to such that it is cohesive and does not segregate and should result in a dense and durable concrete and also capable of giving the finish as specified. The Contractor shall exercise great care while designing the concrete mix and executing the works to achieve the desired result.

It will be the Contractor's sole responsibility to adopt appropriate nominal mix proportions to yield the specified strength. The minimum cement content for Design Mix Concrete shall be as per Appendix-A of IS: 456 or as given below, whichever is higher.

| Grade of Concrete | Minimum Cement Content in Kg/cum. of Concrete (for 20mm downgraded aggregates) |
|-------------------|--|
| M15 | 260 |
| M20 | 315 |
| M25 | 360 |
| M35 | 460 |

The Contractor shall submit details of the source of all material and the proposed quantities of each ingredient per cubic meter of fully compacted concrete. The Contractor shall then make trial mixes for each class of concrete using the same Contractor's Equipment and the same materials as are proposed for the Permanent Works. He shall furnish to the Engineer at least 30 days before concreting operations, a statement of proportions proposed to be used for the various concrete

mixes and the strength results obtained. The strength requirements of the concrete mixes ascertained on 150 mm cubes as per IS: 516 shall comply with the requirements of IS: 456.

7days & 28 days Compressive strength of Different Grade of Concrete.

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**Table II Characteristic Compressive Strength Compliance Requirement
(Clauses 16.1 and 16.3)**

| Specified Grade | Mean of the Group 4 Non Overlapping Consecutive Test Results in N/mm ² | Individual Test Results in N/mm ² |
|-----------------|--|--|
| (1) | (2) | (3) |
| M15 | \geq $f_{ck} + 0.825 \times$ established standard deviation (rounded off to nearest 0.5 N/mm ²) Or $f_{ck} + 3$ N/mm ² whichever is greater | $\geq f_{ck}^{-3}$ N/mm ² |
| M20 or above | \geq $f_{ck} + 0.825 \times$ established standard deviation (rounded off to nearest 0.5 N/mm ²) Or $f_{ck} + 4$ N/mm ² whichever is greater | $\geq f_{ck}^{-4}$ N/mm ² |

NOTE: In the absence of established value of standard deviation, the values given in Table 8 may be assumed, and attempt should be made to obtain results of 30 samples as early as possible to establish the value of standard deviation.

Amend No 3 to IS 456 : 2000

(Page 23, Table 9) - Number the existing note as "NOTE 1" and add the following "NOTE 2"

NOTE 2 - Quantity of water required from durability point of view may be less than the value given above.

(Page 29, Clause 15.1.1 last line) - Add in accordance with 16 at the end.

(Page 30, Table II, col 2) -Substitute $f_{ck} + 3$ N/mm² for $f_{ck} +4$ N/mm² against M20 or above.

Page 30 Table II, col 3 (see also Amendment No I)] - Substitute $f_{ck} -3$ N/mm² for $f_{ck} - 4$ N/mm² against M20 or above

Page 42, Clause 26.1.1 - Add the flowing at the end.

Congestion of reinforcement should be avoided during detailing. Various methods such as choosing the diameter and grade of steel carefully and bunding of reinforcement, if required, are available.

[Page 45, clause 26.2.5.1 (a)] - Substitute the following for the existing.

The Contractor shall give 24 hours notice of such trials to enable the Engineer to attend. For each trial mix, three separate and consecutive batches of concrete shall be made by the Contractor and the specimens shall be tested at 7 days and 28 days (9 specimens at 7 days and 9 specimens at 28 days). For 7 days test the acceptance criteria shall be 70% of the corresponding target mean strength.

The Contractor shall not commence concreting in the Permanent Works until details of trial mixes and test results for each class of concrete have been submitted to and approved by the Engineer.

Unless otherwise specified, only medium graded fine aggregate shall be used.

A trial mix design will be approved by the Engineer with respect to strength if the average compressive strength of the nine specimens each at 7 days and 28 days is more than the specified target mean strength appropriate to the grade of concrete.

The Contractor shall not alter the approved mix proportions nor the approved source of supply of any of the ingredients without having previously obtained the approval of the Engineer.

During production, the Engineer may require trial mixes to be made before a substantial change is made in the materials or in the proportions of the materials to be used.

A range of slumps which shall generally be used for various types of construction unless otherwise instructed by the Engineer is given below:

Range of Concrete Slump for Different Structure/Member.

| Structure/Member | Slump in millimeters | |
|--|----------------------|---------|
| | Maximum | Minimum |
| Reinforced foundation walls and footings | 75 | 40 |
| Slabs, Beams and reinforced walls | 100 | 40 |

4.34.3 Batching & Mixing of Concrete

It is expected that batching plants of suitable capacity shall be used. However, the Contractor shall submit monthly program of concrete works to the approval of the Engineer. Proportions of aggregates and cement, as determined by the concrete mix design, shall be preferably by weight. These proportions shall be maintained during subsequent concrete batching by means of weigh batchers capable of controlling the weights within one percent of the desired value.

Based on the adopted nominal mixes, aggregates may be measured by volume. However cement shall be

by weight only

Amount of water added shall be such as to produce dense concrete of required consistency, specified strength and satisfactory workability and shall be so adjusted to account for moisture content in the aggregates. Water- cement ratio specified for use by the Engineer shall be maintained. Each time the work stops, the mixer shall be cleaned out, and while recommencing, the first batch shall have 10% additional cement to allow for sticking in the drum.

Arrangement should be made by the Contractor to have the cubes tested in an approved laboratory or in field with prior consent of the Engineer. Sampling and testing of strength and workability of concrete shall be as per IS: 1199, IS: 516 and IS: 456.

4.34.4 Construction joints

Concreting shall be carried out continuously upto the construction joints, the position and details of which shall be as shown in structural drawing, Construction joints should comply with IS 11817.

4.34.5 Expansion Joints

Expansion joints shall be provided as per the approved structural drawings. The structures exceeding 45 m in length shall be divided by one or more expansion joints. The filling of these joints with bitumen filler, bitumen felt or any such material and provision of copper plate, etc in accordance with MORTH specifications..

4.34.6 Curing

After the concrete has begun to harden i.e. about 1 to 2 hours after its laying, it shall be protected from quick drying by covering with moist gunny bags, sand, canvass Hessian or any other material approved by the Engineer. After 24 hours of laying of concrete, the surface shall be cured by ponding with water for a minimum period of 7 days from the date of placing of concrete.

4.34.7 Finishing

Top surface shall be finished even and smooth with wooden trowel, before the concrete begins to set. Sprinkling of dry cement while finishing shall not be resorted. Immediately on removal of forms, the R.C.C. work shall be examined by the Engineer, before any defects are made good.

The work that has sagged or contains honey combing to an extent detrimental to structural safety or architectural concept shall be rejected as given for visual inspection test. Surface defects of minor nature may be accepted. On acceptance of such a work by the Engineer.

4.35 Testing of Concrete

Regular mandatory tests on the workability of the fresh concrete shall be done to achieve the specified compressive strength of concrete. These will be of two types

- (a) Mandatory Lab, Test
- (b) Mandatory Field Test

Results of Mandatory Field Test will prevail over mandatory Lab. Test.

Cube Test for Compressive Strength of Concrete - Mandatory Lab Test

Additional Test : Additional test, if required, shall be carried out.

Slump Test : This test shall be carried out .

Visual Inspection Test : The concrete will be inspected after removal of the form work .

The concrete is liable to be rejected if:

- (i) It is porous or honeycombed.
- (ii) Its placing has been interrupted without providing a proper construction joint.
- (iii) The reinforcement has been displaced beyond tolerance specified or construction tolerances have not been met.

4.35.1 Standard of Acceptance - for Nominal Mix

Mandatory Lab. Test: For concrete sampled and tested as the following requirement shall apply.

4.35.1.1 7 days' Tests

Sampling: The average of the strength of three specimen shall be accepted as the compressive strength of the concrete provided the variation in strength of individual specimen is not more than + 15% of the average. Difference between the maximum and minimum strength should not exceed 30% of average strength of three specimens. If the difference between maximum and minimum strength exceeds 30% of the average strength, then 28 days' test shall have to be carried out.

Strength: If the actual average strength of sample accepted in para 'sampling' above is equal to or higher than specified strength upto +15% then strength of the concrete shall be considered in order.

In case the actual average strength of sample accepted in the above para is lower than the specified or higher by more than 15% then 28 days' test shall have to be carried out to determine the compressive strength of concrete cubes.

4.35.1.2 28 days' Test

- (a) The average of the strength of three specimen be accepted as the compressive strength of the concrete provided the strength of any individual cube shall neither be less than 70% nor higher than 130% of the specified strength.
- (b) If the actual average strength of accepted sample exceeds specified strength by more than 30% the Engineer, if he so desires, may further investigate the matter. However, if the strength of any individual cube exceeds more than 30% of specified strength, it will be restricted to 130% only for computation of strength.
- (c) If the actual average strength of accepted sample is equal to or higher than specified strength upto 30% then strength of the concrete shall be considered in order and the concrete shall be accepted at full rates.
- (d) If the actual average strength of accepted sample is less than specified strength but not less than 70% of the specified strength, the concrete may be accepted at reduced rate at the discretion of Engineer.
- (e) If the actual average strength of accepted sample is less than 70% of specified strength, the Engineer shall reject the defective portion of work represented by sample and nothing shall be paid for the rejected work. Remedial measures necessary to retain the structure shall be taken at the risk and cost of contractor. If, however the Engineer so desires, he may order additional tests .

4.35.2 Acceptance Criteria of Field Test (Additional Test - Not Mandatory)

- (a) In the beginning the standard test cubes of the specified mix shall be prepared by field units before undertaking any concrete work in each project.
- (b) At least 18 standard cubes necessary for formation of one specimen of specified mix, shall be cast by site staff well in advance. From these 18 cubes any 3 cubes may be selected at random to be tested for crushing strength of 7 days. The crushing strength obtained should satisfy the specified strength for the mix as per specification or agreement. If the strength is satisfactory then the remaining cube will form the standard samples for calibration of rebound hammer. In case of failure, the site staff should totally reject the samples and remove them also and then make another set of samples by fresh mixing or alternatively, out of the remaining 15 cubes, 3 cubes will be tested on 28 days. If the 28 days' tests are found satisfactory then remaining 12 cubes will form the standard sample for calibration at 28 days' strength otherwise all samples shall be rejected and whole procedure repeated to form a fresh specimen. All the results shall be recorded in a register.
- (c) No concreting will be allowed unless the standard specimen cubes are obtained. The criteria for acceptance and calibration of hammer will be 28 days' strength. The 7 days' strength is only to facilitate the work to start.
- (d) No work (for the concrete cast between 8th and 28th day) shall be allowed to be paid unless 28 days' cube strength is obtained. For the concrete cast between 8th and 28th day, the decision to make the payment

may be taken by the Engineer on the basis of existing criteria. Concrete work will be rejected if 28 days' strength falls short as per acceptance criteria. No further work will be allowed till the acceptable standard cubes are obtained.

(e) Frequency: it will be once in each quarter or as per the direction and discretion of Engineer. Whenever the acceptance criteria is changed or concrete mix or type of cement is changed or Engineer feels it necessary for recorded reasons with the approval of the authority according to technical sanction, fresh specimen shall be prepared.

4.35.3 Curing

After having been cast in the mould or form the concrete shall be adequately protected during setting in the first stages of hardening from shocks and from harmful effects of frost, sunshine, drying winds and cold. The concrete shall be cured at least for 7 days from the date of casting.

4.36 Design Mix

4.36.1 Definition

Design mix concrete is that concrete in which the design of mix i.e. the determination of proportions of cement, aggregate & water is arrived as to have target mean strength for specified grade of concrete. The minimum mix of M25 shall be used in all structural elements in both load bearing & RCC framed construction.

4.36.2 Water Cement Ratio and Slump

In proportioning a particular mix, the manufacturer/ producer/ contractor shall give due consideration to the moisture content in the aggregates, and the mix shall be so designed as to restrict the maximum free water cement ratio to less than 0.5.

Due consideration shall be given to the workability of the concrete thus produced. Slump shall be controlled on the basis of placement in different situations. For normal methods of placing concrete, maximum slump shall be restricted to 100 mm when measured in accordance with IS 1199.

4.36.3 Approval of Design Mix

The producer/ manufacturer/ contractor of concrete shall submit details of each trial mix of each grade of concrete designed for various workability conditions to the Engineer for his comments and approval. Concrete of any particular design mix and grade shall be produced/ manufactured for works only on obtaining written approval of the Engineer. For any change in quality/ quantity in the ingredients of a particular concrete, for which mix has been designed earlier and approved by the Engineer, the mix has to be redesigned and approval obtained again.

4.36.4 Batching Plants and Batching Equipment:

Hoppers for weighing cement, mineral admixtures, aggregates and water and chemical admixture (if

measured by mass) shall consist of suitable container freely suspended from a scale or other suitable load-measuring device and equipped with a suitable discharging mechanism. The method of control of the loading mechanism shall be such that, as the quantity required in the weighing hopper is approached the material may be added at controllable rate and shut off precisely within the weighing tolerances specified in Annex C. The weighing hoppers for cement, mineral admixtures aggregate shall be capable of receiving their rated load, without the weighed material coming into contact with the loading mechanism. Where the rated capacity of a batching plant mixing cycle is less than 2.0 m³, additional precautions shall be taken to ensure that the correct numbers of batches are loaded into the truck mixer. The weighing hoppers shall be constructed so as to discharge efficiently and prevent the buildup of materials. A tare adjustment, up to 10 percent of the nominal capacity of the weigh scale, shall be provided on the weighing mechanism so that the scale can be adjusted to zero at least once each day. Dust seals shall be provided on cement hoppers between the loading mechanism and the weigh hopper, and shall be fitted so as to prevent the emission of cement dust and not affect weighing accuracy. The hopper shall be vented to permit escape of air without emission of cement dust.

Vibrator or other attachment, where fitted, shall not affect the accuracy of weighing. There shall be sufficient protection to cement and aggregate weigh hoppers and weighing mechanisms to prevent interference with weighing accuracy by weather conditions or external build-up of materials.

Where chemical admixture dispensers are used, they shall be capable of measurement within the tolerance and calibrated container or weigh scales shall be provided to check the accuracy of measurement at least once a month.

Where a continuous mixer with ribbon loading is used the batching procedure specified by the manufacture of the plant shall be followed.

Each control on the batching console and weigh-dial or display shall be clearly labeled with its function and where concerned with the batching of materials, the materials type.

When more than one type or grade of cement is being used, the weighing device and discharge screw or other parts of the transfer system shall be empty before changing from one type of cement to another.

When pulverized fuel ash and other mineral admixtures are batched through the cement weigh system, the weighing device and discharge screw or other parts of the transfer system shall be empty when the weighing system has returned to zero reading or completed the batch.

Where a back weigh system is utilized to weigh materials a system shall be in place so as to prevent materials being loaded during the process of weighing.

4.37 Concrete Admixtures & Plasticizers

Accelerating, retarding, water-reducing and air entraining admixtures shall conform to IS: 9130 and integral water proofing admixture to IS:2645. Admixtures are to be added before or during mixing with a view to modify one or more properties of concrete in plastic or hardened state. Concrete admixtures are proprietary items of manufacturers and shall be obtained from established manufacturers having proven

track record, with Engineer's approval.

4.37.1 Transporting Concrete

From batching plant concrete to the location of proposed construction shall be transported through transit mixers or concrete pumps only. Contractor shall specify the make & type and number of transit mixers to be deployed along with concrete pumps with their make, capacity. The path to be used by transit mixers will be strictly as per the instructions of Engineer. From the transit mixers concrete shall be transported to the final floor level / position through pumping or builders hoist only. Concrete and mortar shall be transported speedily and deposited in its place in the works without contamination, loss of ingredients or segregation.. Buckets of builders hoist shall be large enough to contain an integral number of batches. No concrete shall be placed in the works until the contractors' proposed method of transporting concrete have been approved. When concrete is conveyed in chutes from transit mixers, the equipment shall be of such size and design as to ensure a continuous flow in the chute. The chute shall be of metal or metal lined, and if two or more lengths are used they all shall have approximately the same slope. If the distance of the discharge end of the chute above the surface of the concrete is more than 1 metre, a spout or "elephant trunk" shall be used and the lower end positioned as near to the surface of deposit as practicable. The chute or "elephant trunk" shall be thoroughly cleaned before and after each run. The debris and any water shall be discharged outside the forms.

4.37.2 Concrete placement

General

Concrete, when deposited, shall have a temperature of not less than 5oC (41oF) and not more than 32oC (90oF).The concrete shall be placed in the positions and sequences indicated on the drawings, in this specification and/or as directed by the Engineer. Contractor shall give adequate notice to the Engineer of his intention to concrete any section of the works.

Except where otherwise directed, concrete shall not be placed unless the representative of the Engineer is present and has previously examined and approved the positioning, fixing and condition of the reinforcement or any other items to be embedded and the cleanliness, positioning and suitability of the concreting surface.

The concrete shall be deposited as nearly as possible in its final position. It shall be placed in such a manner as to avoid segregation of the concrete and displacement of the reinforcement, other embedded items, or formwork. It shall be brought up in horizontal layers not exceeding 450 mm in compacted thickness unless otherwise authorised or directed by Engineer. Concrete shall not be placed simultaneously on each side of large horizontal specified or approved construction joints.

Shutters for walls or thin sections of considerable height shall be provided with openings or other devices that will facilitate the cleaning of the accumulation of hardened concrete on the shutters or on the metal reinforcement above the level of the concrete and the removal of concrete in the case of segregations.

4.37.3 Placing concrete in extreme weather

No concrete shall be mixed or placed while the ambient temperature is above 40 degree C. on a rising thermometer or below 5 degree C. on a falling thermometer. The contractor shall supply an accurate maximum and minimum thermometer and hang it in an approved position on the works. Aggregates that have been exposed to frost shall not be used until completely thawed. Concrete shall be maintained by approved means at a temperature of not less than 4 degree C. during placing, and for a period of three days thereafter. All concrete placed during cold weather or when a frost is predicated or is likely to occur or occurs contrary to expectation, shall be protected from freezing by approved means.

4.37.4 Placing of concrete in wet weather

Concrete shall not be mixed and or placed in rainy weather or when there is likelihood of impending heavy showers. If it becomes necessary to place concrete during rainy weather, the contractor shall provide adequate protection by means of tarpaulin or similar other water proof material to immediately cover fresh concrete to prevent rain falling over it. This protection shall be left on the concrete for a period of 24 hours after placing of concrete.

4.37.5 Concrete placement under water

Concrete placed under water shall be deposited through a pipe the diameter of which shall be at least 8 times the size of the largest aggregate used in the concrete mix. The construction of and the method of handling the pipes shall be approved by the Engineer. The pipes shall be waterproof and sufficiently strong to withstand severe handling conditions and any joints must be sealed with adequate gaskets.

At the commencement of work the bottom of the pipe shall be sealed before being lowered in to position. The seal shall only be broken by the concrete being placed. The concrete placed in contact with a horizontal construction joint shall have a lower proportion of coarse aggregate and a higher proportion of cement than the remainder of the concrete. The proportion shall be agreed with the Engineer's Representative.

All underwater concrete shall be placed in still water within a cofferdam or formwork which shall extend above water level.

The proportions of the mixes shall be agreed in accordance with the strength and workability required by the specification. To allow for losses an addition of 10% of cement shall be added to mixes of concrete scheduled to be placed under water.

4.38 Quality Control

- i) In order to ensure that the quality of materials and the mix proportions are suitable for the particular grade of concrete required are so maintained, sampling and testing shall be carried out regularly during the course of the works.
- ii) As frequently as the Engineer's representative may require and in any case at least once a day while concreting is in progress, the contractor shall sample and carry out a determination of the moisture

content and a mechanical analysis of the fine aggregate and each nominal size of coarse aggregate shall lie within the respective limits specified.

- iii) Workability testing shall be carried out in accordance with IS:456. The results shall lie within the range upon which the accepted mix design is based. Testing shall be carried out at such a frequency that the required workability is consistently achieved.
- iv) Samples of concrete shall be taken at random in accordance with IS: 516 at the time and place of deposition of the concrete.
- v) Notwithstanding the foregoing, additional samples shall be taken by the contractor when directed by the Engineer. The test cube procedure shall be in accordance with IS: 516 throughout.
- vi) Compliance with the specified characteristic strength shall be assumed if :
 - a) Each of the six cubes in a group has a test strength not less than the characteristic strength or,
 - b) Not more than one cube has a test strength less than the specified characteristic strength but not less than 85% of the specified characteristic strength and the average strength of the group of four test results is not less than the specified characteristic strength plus the standard deviation of the group.

4.39 Structural Steel Work

4.39.1 Scope

The fabrication and erection of the steel work consists of accomplishing of all jobs here-in enumerated including providing all labour, tools and plant all materials and consumables such as welding electrodes, bolts and nuts, oxygen and acetylene gases, oils for cleaning etc. of approved quality as per relevant IS. The work shall be executed according to the drawings, specifications, relevant codes etc. in an expeditious and workman like manner, as detailed in the specifications and the relevant Indian Standard Codes and Standard Practice and to the complete satisfaction.

4.39.2 Fabrication Drawings

The contractor shall prepare all fabrication and erection drawings on the basis of design drawings and submit the same in triplicate to the Engineer for review, Engineer shall review and comment, if any, on the same. Such review, if any, by the Engineer, does not relieve the contractor of any of his required guarantees responsibilities. The contractor shall however be responsible to fabricate the structural strictly conforming to specifications and reviewed drawings.

Fabrication drawings shall include the following:

- Member sizes and details
- Types and dimensions of welds and bolts
- Shapes and sizes of edge preparation for welding
- Details of shop and field joints included in assemblies.

Connections, splices etc. other details not specifically detailed in design drawings shall be suitably given on fabrication drawings considering normal detailing practices and developing full member strengths. Where asked for calculations for the merit shall also be submitted for approval.

4.39.3 Fabrication

Fabrication shall be in accordance with IS: 800 Section V in addition to the following:

Fabrication shall be done as per approved fabrication drawings adhering strictly to work points and work lines on the same. The connections shall be welded or bolted as per design drawings. Work shall also include fabricating built up sections.

Any defective material used shall be replaced by the contractor at his own expense, care being taken to prevent any damage to the structure during removal.

All the fabricated and delivered items shall be suitably packed to be protected from any damage during transportation and handling. Any damage caused at any time shall be made good by the Contractor at his own cost.

Any faulty fabrication pointed out at any stage of work shall be made good by the contractor at his own cost.

4.39.4 Cutting

Members shall be cut mechanically (by saw or shear or by oxyacetylene flame).

All sharp, rough, or broken edges, and all edges of joints which are subjected to tensile or oscillating stresses, shall be ground.

No electric metal arc cutting shall be allowed.

All edges cut by oxyacetylene process shall be cleaned of impurities prior to assembly.

Cutting tolerances shall be as follows :

- a) For members connected at both ends + 1 mm.
- b) Elsewhere + 3 mm.

The edge preparation for welding of members more than 12 mm thick shall be done by flame cutting and grinding. Cut faces shall not have cracks or be rough.

Edge preparation shall be as per IS : 823 - 1964.

4.39.5 Drilling

Bolts holes shall be drilled.

Drilling shall be made to the diameter specified in drawings.

No enlarging of holes filling, by mandrolling or oxyacetylene flame shall be allowed.

Allowed variations for holes (out-of-roundness, eccentricity, plumb-line deviation) shall be as per IS: 800.

- Maximum deviation for spacing of two holes on the same axis shall be + 1 mm.
- Two perpendicular diameters of any oval hole shall not differ by more than 1 mm.

Drilling faults in holes may be rectified by reaming the holes to the next upper diameter, provided that spacing of new hole centres and distance of hole centres to the edges of members are not less than allowed

and that the increase of hole diameter does not impair the structural strength. Hole reaming shall be allowed if the number of faulty holes does not exceed 15% of the total number of holes for one joint.

4.39.6 Preparation of Members for Welding

Assembly of structural members shall be made with proper jigs and fixtures to ensure correct positioning of members (angles, axes nodes etc.)

Sharp edges, rust of cut edges, notches, irregularities and fissures due to faulty cutting shall be chipped or ground or filled over the length of the affected area, deep enough to remove faults completely.

Edge preparation for welding shall be carefully and accurately made so as to facilitate a good joint. Generally no special edge preparation shall be required for members under 8 mm thick.

Edge preparation (beveling) denotes cutting of the same so as to result in V, X K or U seam shapes as per IS: 823.

The members to be assembled shall be clean and dry on the welding edges. Under no circumstances shall wet, greasy, rust or dirt covered parts be assembled. Joints shall be kept free from any foreign matter likely to get in to the gaps between members to be welded.

Before assembly the edges to be welded as well as adjacent areas extending for atleast 20 mm shall be cleaned (until metallic polish is achieved).

When assembling members, proper care shall be taken of welding shrinkage and distortions, as the drawing dimensions cover finished dimensions of the structure.

The elements shall be got checked and approved by the Engineer or their authorised representative before assembly.

The permissible tolerances for assembly of members preparatory to welding shall be as per IS: 823-1964.

After the assemble has been checked, temporary tack welding in position shall be done by electric welding, keeping in view finished dimensions of the structure.

4.39.7 Welding procedures

Welding shall be carried out only by fully trained and experienced welders as tested and approved by the Engineer. Any test carried out either by the Engineer or their representative or the inspectors shall constitute a right by them for such tests and the cost involved thereon shall be borne by the contractor himself.

Qualification tests for welders as well as tests for approval of electrodes will be carried out as per IS: 823. The nature of test for performance qualification of welders shall be commensurate with the quality of welding required on this job as judged by the Engineer.

The steel structures shall be automatically, semi-automatically or manually welded.

Welding shall begin only after the checks have been carried out.

The welder shall mark with his identification mark on each element welded by him.

When welding is carried out in open air, steps shall be taken to protect the face of welding against wind or rain. The electrodes, wire and parts being welded shall be dry.

Before beginning the welding operation, each joint shall be checked to ensure that the parts to be welded are clean and root gaps provided as per IS: 823.

For continuing the welding of seems discontinued due to some reason, the end of the discontinued seem shall be melted in order to obtain a good continuity. Before resuming the welding operation, the groove as well as the adjacent parts shall be well cleaned for a length of approx. 50 mm.

For single butt welds (in V, 1/2 V or U) and double butt welds (in K, double U etc.) the rewelding of the root is mandatory but only the metal deposit on the root has been cleaned by back gouging or chipping.

The welding seams shall be left to cool slowly. The contractor shall not be allowed to cool the welds quickly by any other method.

For multi-layer welding, before welding the following layer, the formerly welded layer shall be cleaned metal bright by light chipping and wire brushing. Backing strips shall not be allowed.

The order and method of welding shall be so that -

-No unacceptable deformation appears in the welded parts.

-Due margin is provided to compensate for contraction due to welding in order to avoid any high permanent stresses.

4.40 Road Lighting

4.40.1 Street Lighting

- a. Access and survey the site for number of Pole and location of Feeder Pillar and
- b. Design the Feeder pillar.
- c. Co-coordinate with CESU/Electric Distribution Company for taking the Supply along with applicable fees/charges.
- d. The Feeder requirement for taking supply also contractor's Scope.
- e. Supply and fixing of GI decorative type Street light pole.
- f. Supply fixing of outdoor type Energy efficient Light Fixture (Preferably LED)
- g. Supply fixing of weather proof junction box
- h. Supply Fixing of Feeder pillar
- i. Supply fixing of Incoming power cable (CU) to Feeder Pillar and Feeder pillar to Light Pole JB including Glanding and termination.
- j. Earthing required as per system design.

4.40.2 Street Light Pole:

Double arm lighting poles for street lights shall be of Octagonal GI decorative type steel poles construction as per applicable standard. These poles shall be coated with Galvanized. Outdoor lighting shall be done at adequate height to suit road width and an approximate spacing of 25 m. the installation scope includes excavation required for pole, construction of 600 x 600 mm concrete base for pole etc., earthing of pole,

junction box and luminaire and laying of cable from junction box to luminaire from inside of the pole.

The street light pole erection shall be complete with:

- a. Street light pole of adequate height.
- b. Street lighting luminaire (LED)
- c. 50mm dia. GI conduit sleeves for incoming and outgoing cables up to junction box.
- d. 1.5 M long 20mm dia. Galvanized MS rod earth electrode for earthing of each 5th street lighting pole.
- e. Loop-in-loop-out type weatherproof Junction box with terminal blocks suitable for terminating.
- f. The lighting cable shall be laid underground at a depth of minimum 700mm below ground level with a protection of sand and bricks.

4.40.3 Junction Boxes

Junction boxes with terminals shall be supplied for branching and terminating lighting cables when required for outdoor areas, 3 phase receptacles etc. The junction boxes shall be dust and vermin proof and shall be fabricated from 14-gauge sheet steel or more than 2mm thick PVC and shall be complete with removable cover plate with gaskets, two earthing terminals each with nut, bolt and washer. Boxes shall be additionally weather proof. The boxes shall have provision for wall, column, pole or structure mounting and shall be provided with cable/conduit entry knock outs, terminal blocks, as required.

4.40.4 Feeder Pillar Panel - technical specification

Supply of metal clad, Pedestal mounted 415 volts. Weather proof Feeder Pillar Panel made of CRCA Sheet, Powder coated painting on a suitable size angle iron frame (MS channel base for grouting in the RCC and proper gland in the bottom) with required hardware such as nuts, bolts, washers, provision for earthing with 40mmx5mm GI strip on both sides of the feeder pillar panel, complete with Ammeter & Voltmeter along with selector switches and CTs, LED indicating lamps for each phase with the technical specification as given below-

1. Copper bus bar & Interconnecting copper wires.
2. Feeder pillar panel shall be of class IP-55 & a canopy shall be provided at its top to protect the feeder pillar panel against the rain & sunlight.
3. Feeder pillar panel shall be of double door type with provision of gasket. Provision of transparent sheet shall be made to take reading of Ammeter & Voltmeter without opening the door.
4. Incoming to Feeder Pillar cable size: At least 2x3.5cx50sqmm.
5. Outgoing from FP cable size: at least 3.5cx10sqmm.
6. Cable entry/ outgoing from bottom through PVC glands only.
7. Powder coating shade shall be RAL 7032 with a thickness of 80 micron minimum.
8. Neutral cables for incomer and outgoing will be terminated in neutral bus bar.
9. Lifting hook to be provided for easy handling of Feeder Pillar Panel.
10. Pedestal shall be made of RCC mixture 1:1.5:3.
11. All dimensions are in mm. General tolerances on dimensions ± 10 mm.
12. Manufacturer has to submit GA drawings with exact size and arrangement of all the components of reputed brands for approval.

4.40.5 4.35.5 Lighting Fixtures (Luminaires)

LED Luminaires shall be designed for continuous trouble-free operation without reduction in lamp life or without deterioration of materials and internal wiring. Outdoor fittings shall be weather-proof and rain-proof type. The Luminaires shall be designed to facilitate easy maintenance, including cleaning, replacement of lamps/starters etc. Connections between different components shall be made in such a way that they will not work loose by small vibration. All Luminaires shall be supplied complete with lamps suitable for operation on a supply voltage and the variation in supply voltage and frequency indicated in the Employer's Requirements.

LED type Luminaires shall be complete with accessories like lamps, ballasts, starters. These shall be mounted as far as possible in the luminaire housing only. If these cannot be accommodated integral with the Luminaires then a separate metal enclosed control gear box shall be included to accommodate the control accessories together with a terminal block suitable for loop-in, loop-out connections. Outdoor type fixtures shall be provided with outdoor type weather-proof box. Each luminaire shall have a terminal block suitable for loop-in, loop-out and T-off connection.

4.40.6 Earthing System

To achieve total earth resistance to less than 1-ohm earthing shall be carried out as per IS: 3043. The scope includes supply of earthing conductors, earth electrodes, installation and approval to the satisfaction of electrical inspector under this tender specification. Earthing system shall be provided to ensure equipment safety, personnel safety and to facilitate designed operation of protective switching during earth fault conditions in the associated system.

Each earth pit shall be provided with earth pit marker.

4.40.7 L.T. CABLES

4.40.7.1 General

L.T. Cables shall be supplied, inspected, laid tested and commissioned in accordance with drawings, specifications, relevant Indian Standards specifications and cable manufacturer's instructions. The cable shall be delivered at site in original drums with manufacturer's name clearly written on the drums. The recommendations of the cable manufacturer with regard to jointing and sealing shall be strictly followed.

4.40.7.2 MATERIALS

L.T. Cables shall be XLPE insulated and PVC sheathed copper conductor armored cables conforming to IS: 7098 (Part I)-1988. Cables shall be of 1100volt and with ISI certification mark. Conductor of power cables shall be made of electrical purity conforming to IS 8130-1984.

4.40.7.3 INSTALLATION OF CABLES

Cables shall be laid directly in ground, pipes, masonry ducts, on cable tray, surface of wall/ceiling etc. as indicated on drawings and/or as per the direction of Engineer-in-Charge. Cable laying shall be carried out

as per CPWD specifications.

4.40.7.4 INSPECTION

All cables shall be inspected at site and checked for any damage during transit.

4.40.7.5 JOINTS IN CABLES

The Contractor shall take care to see that the cables received at site are apportioned to various locations in such a manner as to ensure maximum utilization and avoiding of cable joints. This apportioning shall be got approved from Engineer-in-Charge before the cables are cut to lengths.

4.40.7.6 LAYING CABLES IN GROUND

Cable laying shall be as per IS:1255-1983 with up to date amendments and as specifying. Cables shall be laid by skilled experienced workmen using adequate rollers to minimize stretching of the cables. The cable drums shall be placed on jacks before unwinding the cable. With great care it shall be unrolled on over wooden rollers placed in trenches at intervals not exceeding 2 metres. Cables shall be laid at depth of 0.75 metres below ground level. A cushion of sand total of 250mm shall be provided both above and below the cable, joint boxes and other accessories. Cable shall not be laid in the same trench or alongside a water main. The cable shall be laid in excavated trench over 80mm layer of sand cushion. The relative position of the cables laid in the same trench shall preserved. At all changes in direction in horizontal and vertical planes, the cables shall be bent smooth with a radius of bent not less than 12 times the diameter of cables. Minimum 3-metre-long loop shall be provided at both end of cable. Distinguishing marks may be made on the cable ends for identifications of phases. Insulation, tapes of appropriate voltage and in red, yellow and blue colours shall be wrapped just below the sockets for phase identifications.

4.40.7.7 PROTECTION OF CABLES

The cables shall be protected by bricks laid on the top layer of the sand for the full length of underground cable. Where more than one cables is laid in the same trench, the bricks shall cover all the cables and shall project a minimum of approximately 80mm on either side of the cables. Cable under road crossings and any other places subject to heavy traffic, shall be protected by running them through Hume Pipes of suitable size.

4.40.7.8 EXCAVATION & BACK FILL

All excavation and back fill required for the installation of the cables shall be carried out by the Contractor in accordance with the drawings and requirements laid down elsewhere. Trenches shall be dug true to line and grades. Back fill for trenches shall be filled in layer not exceeding 150mm. Each layer shall be properly rammed and consolidated before laying the next layer. The Contractor shall restore all surface, road ways, side walks, kerbs wall or the works cut by excavation to their original condition to the satisfaction of the Engineer-in -Charge.

4.40.7.9 CABLES TAGS

Cable tags shall be made out of 2mm thick aluminium sheets, each tag 1-1/2 inch in dia with one hole of 2.5mm dia, 6mm below the periphery. Cable designations are to be punched with letter/number punches and the tags are to be tied inside the panels beyond the glanding as well as below the glands at cable entries. Trays tags are to be tied at all bends. On straight lengths, tags shall be provided at every 5 metres.

4.40.7.10 TESTING OF CABLES

Prior to installation burying of cables, following tests shall be carried out. Insulation test between phases, phase & neutral, phase & earth for each length of cable.

- a. Before laying.
- b. After laying.
- c. After jointing.

On completion of cable laying work, the following tests shall be conducted in the presence of the Engineer in Charge.

- a. Insulation Resistance Test (Sectional and overall).
- b. Continuity Resistance Test.
- c. Earth Test.

All tests shall be carried out in accordance with relevant Indian Standard code of practice and Indian Electricity Rules. The Contractor shall provide necessary instruments, equipment and labour for conducting the above tests & shall bear all expenses of conducting such tests.

SCHEDULE - E

(See Clauses 2.1 and 14.2)

OPERATION & MAINTENANCE REQUIREMENTS

(Not in the Scope of this Contract)

Annex - I

(Schedule-E)

Rectification of Defects and Deficiencies

Annex - II

(Schedule-E)

Annex - III

(Schedule-E)

ESTIMATE FOR OPERATION & MAINTENANCE OF

SCHEDULE – E

(See Clauses 2.1 and 14.2)

OPERATION & MAINTENANCE REQUIREMENTS

SCHEDULE - F

(See Clause 3.1.7(a))

APPLICABLE PERMITS

1 Applicable Permits

- 1.1 The Contractor shall obtain [permits and clearances](#) as required under the Applicable Laws for smooth execution of works:
- 1.2 Applicable Permits, as required, relating to environmental protection and conservation shall have been procured by the Authority in accordance with the provisions of this Agreement.
- 1.3 The Contractor shall be solely responsible for obtaining the required permits and the Authority will not be liable for payment of compensation on any account for failure in the part of the Contractor to obtain any such permits. However, the authority will facilitate to obtain [permits/clearances](#) from the concerned Department.

SCHEDULE - G
(See Clauses 7.1.1, 7.5.3 and 19.2)
FORM OF BANK GUARANTEE
Annex-I
(See Clause 7.1.1)

Performance Security

To,
General Manager,
WATCO Division, Puri.

WHEREAS:

- (A) _____ [name and address of contractor] (hereinafter called the “**Contractor**”) has executed an agreement (hereinafter called the “**Agreement**”) with the [General Manager, WATCO Division, Puri representing MD, WATCO, Bhubaneswar], (hereinafter called the “**Authority**”) for **Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation** on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement.
- (B) The Agreement requires the Contractor to furnish a Performance Security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the {Construction Period/ Defects Liability Period and operation maintenance period} (as defined in the Agreement) in a sum of Rs..... cr. (Rupees crore) (the “**Guarantee Amount**”).
- (C) We, through our branch at(the “**Bank**”) have agreed to furnish this bank guarantee (*hereinafter called the “**Guarantee**”*) by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor’s obligations during the {Construction Period/ Defects Liability Period and Operation & Maintenance period} under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of [**General Manager, WATCO Drainage Division, Cuttack**], that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further

agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and/ or performance of all or any of the obligations of the Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Agreement or for the fulfillment, compliance and/or performance of all or any of the obligations of the Contractor under the Agreement.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect on ****⁵. Unless a demand or claim under this Guarantee is made in writing before expiry of the Guarantee, the Bank shall be discharged from its liabilities hereunder.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the

⁵ Insert date being 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 7.2 of the Agreement).

Authority that the envelope was so posted shall be conclusive.

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

Signed and sealed this day of, 20..... at

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.
- (iii) The stamp papers of appropriate value shall be purchased in the name of bank who issues the "Bank Guarantee".
- (iv) The bank guarantee shall be from a Nationalised/Scheduled Indian Bank with counter guaranteed by its branch at **Bhubaneswar**.

Annex – II
(Schedule - G)
(See Clause 7.5.3)

Form for Guarantee for Withdrawal of Retention Money

The General Manager,
WATCO Division, Puri.

WHEREAS:

- (A) [name and address of contractor] (hereinafter called the “**Contractor**”) has executed an agreement (hereinafter called the “**Agreement**”) with the [General Manager, WATCO Sewerage Division, Bhubaneswar representing MD, WATCO, Bhubaneswar, (hereinafter called the “**Authority**”) for “**Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation**” on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement.
- (B) In accordance with Clause 7.5.3 of the Agreement, the Contractor may withdraw the retention money (hereinafter called the “**Retention Money**”) after furnishing to the Authority a bank guarantee for an amount equal to the proposed withdrawal.
- (C) We, through our branch at(the “**Bank**”) have agreed to furnish this bank guarantee (hereinafter called the “**Guarantee**”) for the amount of Rs. - ----- cr. (Rs -----crore) (the “**Guarantee Amount**”).

NOW, THEREFORE, the Bank hereby unconditionally and irrevocably guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of [**General Manager, WATCO Drainage Division, Cuttack**], that the Contractor has committed default in the due and faithful performance of all or any of its obligations for under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Retention Money and any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released

from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Retention Money.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect 90 (ninety) days after the date of the Completion Certificate specified in Clause 12.4 of the Agreement.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

Signed and sealed this day of, 20..... at

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.
- (iii) The stamp papers of appropriate value shall be purchased in the name of bank who issues the "Bank Guarantee".
- (iv) The bank guarantee shall be from a Nationalised/ Scheduled Indian Bank with counter guaranteed by its branch at Bhubaneswar.

Form for Guarantee for Advance Payment

The General Manager
WATCO Drainage Division, Cuttack.

WHEREAS:

- (A) [name and address of contractor] (hereinafter called the “**Contractor**”) has executed an agreement (hereinafter called the “**Agreement**”) with the [General Manager, WATCO Sewerage Division, Bhubaneswar representing MD, WATCO, Bhubaneswar, (hereinafter called the “**Authority**”) for “**Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation**” on Engineering, Procurement & Construction (**EPC**) Contract basis, subject to and in accordance with the provisions of the Agreement.
- (B) In accordance with Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest bearing advance payment @10% per Annum (herein after called “**Advance Payment**”) equal to 10% (ten per cent) of the Contract Price; and that the Advance Payment shall be made in four installments subject to the Contractor furnishing an irrevocable and unconditional guarantee by a Nationalised Bank, counter guaranteed by its branch at Bhubaneswar for an amount equivalent to 110% (one hundred and ten percent) of such installment to remain effective till the complete and full repayment of the installment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second/third/fourth} installment of the Advance Payment is Rs. ----- cr. (Rupees ----- crore) and the amount of this Guarantee is Rs. ----- cr. (Rupees crore)(the “**Guarantee Amount**”)⁶.
- (C) We, through our branch at(the “**Bank**”) have agreed to furnish this bank guarantee (*hereinafter called the “**Guarantee**”*) for the Guarantee Amount.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful repayment on time of the aforesaid installment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of [**General Manager, WATCO Drainage Division, Cuttack**], that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the installment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default

⁶ The Guarantee Amount should be equivalent to 110% of the value of the applicable installment.

shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Advance Payment or to extend the time or period of its repayment or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Advance Payment.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect on *****.⁷ Unless a demand or claim under this Guarantee is made in writing on or before the aforesaid date, the Bank shall be discharged from its liabilities hereunder.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

⁷ Insert a date being 90 (ninety) days after the end of one year from the date of payment of the Advance payment to the Contractor (in accordance with Clause 19.2 of the Agreement).

Signed and sealed this day of, 20..... at

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.
- (iii) The stamp papers of appropriate value shall be purchased in the name of bank who issues the "Bank Guarantee".
- (iv) The bank guarantee shall be from a Nationalised/ Scheduled Indian Bank with counter guaranteed by its branch at Bhubaneswar.

SCHEDULE - H
(See Clauses 10.1.4 and 19.3)

Contract Price Weightage

- 1.1 The Contract Price for this Agreement is Rs. *****
- 1.2 Proportions of the Contract Price for different stages of Construction of the Project shall be as specified below:
(In order to closely monitor the execution of the project and to ensure quality, cost and time of the project are not compromised in any manner, the contractor shall provide Bar Chart & PERT Chart in such a realistic manner so that there will be balance between financial & physical progress with reference to cost & completion time.)

A. PAYMENT BREAK-UP SCHEDULE

| Sl No. | Description of Item | Estimated Cost in Rs. | % to Agreement Price |
|--------|--------------------------------|-----------------------|----------------------|
| 1 | Construction Cost (Indicative) | 3950248000.00 | 100.00% |
| | | | |

**B. BOX DRAIN PROJECT COMPONENT-WISE PAYMENT BREAK-UP SCHEDULE
IN PERCENTAGE FOR MAJOR COMPONENTS OF WORK FOR CONSTRUCTION**

| Sl No | Description of Item | % to Total Project Cost |
|-------|--|-------------------------|
| 1 | Construction of RCC Box Sub Drain 3L of Main Drain -1 3L of (MD-1) Sub drain from Krishna Mangala Temple to Shanti Memorial hospital, Bajrakabati about 716 M having size varying from 2.50 Sqm to 14.0 Sqm. | 5.697 |
| 2 | Construction of RCC Box Sub Drain 3R of Main Drain -1 3R of (MD-1) Sub drain from Prajatantra office to Khatbin sahi about 1305M having size varying from 2.5Sqm to 8.0Sqm | 8.594 |
| 3 | Construction of RCC Box Sub Drain 4R of Main Drain -1 4R of (MD-1) Sub drain from Commissioner Police office to New Rausapatna about 2797 M having size varying from 3.0 Sqm to 8.0 Sqm | 25.837 |
| 4 | Construction of RCC Box Sub Drain 5R of Main Drain -1 5R of (MD-1) Sub drain from Backside of Trisha Hospital to Bajrakabati Road about 2422 M having size varying from 2.50 Sqm to 12.5 Sqm | 18.978 |
| 5 | Construction of RCC Box Sub Drain 6R of Main Drain -1 6R of (MD-1) Sub drain from Khannagar Sluice Gate to Matrubhawan about 1300 M having size varying from 20.00 Sqm to 25.0 Sqm | 17.583 |
| 6 | Provision for Electrical Power supply & installation Street light arrangements with energy efficient luminaries as per technical specifications and as approved by the Electrical Authority/ TPCODL | 1.534 |
| 7 | Provision for Insurance | 2.301 |
| 8 | Utility Shifting & Beautification along the side of drain i. The actual cost shifting of any utility (including electric lines, water pipes, Gas line and telephone cables etc.), as approved and communicated by the entity owning the utility, shall be paid by the Contractor and reimbursed by the Authority to the Contractor on certification by the entity owning such utility. ii. Beautification work will be executed as per the direction/approval of the authority and as per availability of space along the side of the proposed Box drain. Basing on actual execution of different types of beautification work payment will be released | 19.172 |
| 9 | Provision for Inspection Vehicle | 0.304 |
| | Total | 100.00 |

(A) SCHEDULE OF BREAK-DOWN PAYMENT AGAINST MAJOR COMPONENTS OF WORKS UNDER ITEM A & B ABOVE.

[To be furnished by the Successful Bidder after due approval of the construction schedule for the period of **30 months** as per Schedule-J by the authority. The decision of the authority i.e., WATCO is final & binding on the proposal of the successful bidder regarding break-down payment schedule]

If payment is on a periodic basis according to pre-estimated construction progress.

| Month | Description | Type of Payment | Amount for INR Portion | | | |
|------------------|-------------|-----------------|------------------------|------------------------|-------------------|-------|
| | | | Civil works | Design & Documentation | Plant & Equipment | Total |
| 1 st | | | | | | |
| 2 nd | | | | | | |
| 3 rd | | | | | | |
| .. | | | | | | |
| .. | | | | | | |
| 24 th | | | | | | |
| Total | | | | | | |

Note:

- (i) The Employer and the Contractor may make necessary **Approval and adjustments** to the payment schedule if the progress of work is substantially ahead of or behind the program.
- (ii) The Contractor shall make necessary break down of Civil works for Payment Schedule with reference to the Table A0.

| Table A0 Break Down of Civil Works Payment Schedule for Interim Valuations | | |
|--|------------------------|--------------------------------------|
| Major Work Category | Type of Payment | Payment (in % of Total Price) |
| 1. Water Retaining Structure Units | | |
| (i) Up to Base slab | LS | 15% |
| (ii) Walls | LS | |
| (a) Half Stage of Design Height | | 25% |
| (b) Full Stage Design Height | | 25% |
| (iii) Other Miscellaneous Works | LS | 25% |
| (iv) Hydraulic Testing | LS | 5% |
| (v) On successful Testing, Commissioning & Stabilization | LS | 5% |
| 2. Landscaping Complete | | |
| (i) Hard Landscaping On completion per Square meter | P | 30% |
| (ii) Soft Landscaping On completion per Square meter | P | 30% |
| (iii) Planting of Trees, Shrubs | P | 20% |
| (iv) Completion | LS | 20% |
| 3. Roads, Pavements Complete | | |
| (i) On completion per square meter | P | 90% |
| (ii) On successful Commissioning | LS | 10% |
| 4. Supplying & Operation & maintenance of Inspection Vehicle | | |
| (i) On Delivery of 3 Nos of Inspection Vehicle duly inspected by Third Party Inspection as per the condition of contract and approved by Engineer-in-Charge in all respect (%age to be paid on the item brought to the site) | P | 40% |
| (ii) During 1 st year of execution | LS | 20% |
| (iii) During 2 nd year of execution | LS | 25% |
| (iv) During 3 rd year of execution | LS | 15% |
| | | |
| | | |

SCHEDULE OF PRICES

| | |
|--------------|--|
| Name of Work | “Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation on EPC Contract (Engineering, Procurement & Construction) basis. |
|--------------|--|

Note: Described full name of work listed in PREAMBLE of Schedules of Rates and Prices

A1 Design, Drawings and Documentation

| Item | Description | Unit | Quantity | Unit Rate | | Total Price | |
|--|-------------|------|----------|-----------|---------------------------------------|-------------|----------------|
| | | | | | Local Currency Portion (INR) | | Local (INR) |
| | | | | | | | |
| Total (to Schedule A-5-a Summary of Work) | | | | | | | |
| | | | | | | | |

A2 Plant & Equipment including mandatory spare parts, to be supplied from within India

| Item | Description | Unit | Quantity | Ex-Factory Price (INR) | GST (INR) | Freight & Insurance (INR) | Total Price (INR) |
|---|-------------|------|----------|------------------------|-----------|---------------------------|-------------------|
| | | | | | | | |
| Total (to Schedule A-5-a Summary of Work) | | | | | | | |
| | | | | | | | |

A3 Civil Works, Installation and Other Services

| Item | Description | Unit | Quantity | Unit Rate | | Total Price | |
|---|-------------|------|----------|-----------|---------------------------------------|-------------|----------------|
| | | | | | Local Currency Portion (INR) | | Local (INR) |
| | | | | | | | |
| Total (to Schedule A-5-a Summary of Work) | | | | | | | |
| | | | | | | | |

A4-(a) Summary of Work

| | |
|--------------|--|
| Name of Work | Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation on EPC Contract (Engineering, Procurement & Construction) basis. |
|--------------|--|

Note: Described full name of work listed in PREAMBLE of Schedules of Rates and Prices

| Item | Description | Total Price | |
|------|---|-------------|-------|
| | | | Local |
| A-1 | Total Schedule A-1: Design, Drawings and Documentation | | |
| | Total Schedule A-2: | | |
| A-2 | Plant and Equipment, including Mandatory spare parts, supplied from within the Employer's Country | | |
| A-3 | Total Schedule A-3: Civil Works, Installation and Other Services | | |
| | Total (to Schedule A-5-b Grand Summary) | | |
| | | | |

A4-(b) Grand Summary

Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation on EPC Contract (Engineering, Procurement & Construction) basis.

| Item | Description | Total Price | |
|--------|---------------------------------|-------------|-------|
| | | | Local |
| (i) | | | |
| (ii) | | | |
| (iii) | | | |
| (iv) | | | |
| (v) | | | |
| (vi) | | | |
| (vii) | | | |
| (viii) | | | |
| (ix) | | | |
| (x) | | | |
| (xi) | | | |
| (xii) | | | |
| | Total (to Letter of Price Bid) | | |

A-5 Schedule of Operation and Maintenance Requirements

Requirements for operation and maintenance of the Sewage Treatment Plant & Pumping Stations, Pipelines etc. for an initial Five year period following completion of the Works.

| | |
|--------------|--|
| Name of Work | |
|--------------|--|

Note: Described full name of work listed in PREAMBLE of Schedules of Rates and Prices

| Description of Operation | Recommended Frequency of Operation (Daily, Weekly, Monthly, Yearly, etc.) | Annual Consumption/ Requirement | Unit Rate(2018 – 2019 rates) | Yearly Fixed Charges (2018 – 2019 rates) | Yearly Variable Cost (2018 – 2019 rates) |
|--|---|---------------------------------|------------------------------|--|--|
| <u>Year 1</u> (a) <u>a-Routine operating costs</u> Electricity Energy (with details of HP, KVA,KWH) Fuel Oil b- Chemicals Other inputs Labour (i) (ii) (iii) <u>c-Periodic maintenance costs</u> (as per manufacturer’s maintenance schedule) Servicing (Labour) Cost of oil, chemicals, lubricants, etc. d-Others (a) <u>Repair and Replacement</u> Replacements: (i) (ii) (iii) Repairs (b) <u>Miscellaneous (Others)</u> Sludge Disposal (i) (ii) | | | | | |
| Total (a)+(b)+(c)+(d)(goes to “Summary of Operation and Maintenance”) | | | | | |

Note: (The Bidder shall provide complete details on all aspects of the operating and maintenance requirements relating to his proposed facilities in the above form or in any other form and detail as may be required for the Employer to properly evaluate the annual costs of operating the facilities with due regard to the particular items of Plant and equipment which the Bidder proposes to supply under the Contract. In preparing this schedule the Bidder shall consider that the Plant and facilities will operate for 22 hours per day, 365 days per year, and shall be operating at the specified design capacity throughout the entire period. Quantities and costs shall be estimated based on the current rates for such activity (i.e. 2016-2017 costs), but the Year in which such expenditure is to be incurred shall be clearly identified.).

A 6 (a) Summary of Operation and Maintenance by Work

| | |
|--------------|--|
| Name of Work | Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation on EPC Contract (Engineering, Procurement & Construction) basis. |
|--------------|--|

Note: Described full name of work listed in PREAMBLE of Schedules of Rates and Prices

| O&M Year | Yearly Expenditure (as Base Year) | | |
|---|------------------------------------|---------------|------------|
| | Fixed Charge | Variable Cost | Total Cost |
| Year 1 | | | |
| Year 2 | | | |
| Year3 | | | |
| Year 4 | | | |
| Year 5 | | | |
| Total for Operation and Maintenance(carried forward to Grand Summary) | In Figure | In Figure | In Figure |
| | In Words | In Words | In Words |

O&M cost: 5 yr. Operation & Maintenance (O&M)

A 6 (b) Grand Summary of Operation and Maintenance

| O&M Year | Yearly Expenditure (as Base Year) | | | | | | | Reserve Fund For Major Maintenance, Repair and replacement | Total Cost |
|--|------------------------------------|--|--|--|--|--|--|--|------------|
| | | | | | | | | | |
| Year-1 | | | | | | | | | |
| Year 2 | | | | | | | | | |
| Year 3 | | | | | | | | | |
| Year 4 | | | | | | | | | |
| Year 5 | | | | | | | | | |
| Total for Operation and Maintenance (carried forward to letter of Price Bid) | | | | | | | | | In Figure |
| | <i>Total Cost In Words</i> | | | | | | | | |

O&M cost: 5 yr. Operation & Maintenance (O&M)

Reserve Fund for Major Maintenance, Repair and replacement: minimum 5% of the Fixed component of annual O&M cost for each year.

SCHEDULE - I
(See Clause 10.2.4)

DRAWINGS

1 Drawings

In compliance of the obligations set forth in Clause 10.2 of this Agreement, the Contractor shall furnish to the Authority/ Authority's Engineer, free of cost, all Drawings listed in Annex-I of this Schedule-I.

2 Additional Drawings

If the Authority/ Authority's Engineer determines that for discharging its duties and functions under this Agreement, it requires any drawings other than those listed in Annex- I, it may by notice require the Contractor to prepare and furnish such drawings forthwith. Upon receiving a requisition to this effect, the Contractor shall promptly prepare and furnish such drawings to the Authority/ Authority's Engineer, as if such drawings formed part of Annex-I of this Schedule-I.

Annex - I
(Schedule - I)

List of Drawings

The contractor is required to furnish the following drawing to the Authority Engineer free of cost under clause 10.2 including the details as attached in the Annexure herewith describing the scope of work during survey, investigation and design stage.

1. Index Plan for Proposed Drainage Scheme
2. Catchment area of Sub Drain 3L of (MD-1)
3. Catchment area of Sub Drain 3R of (MD-1)
4. Catchment area of Sub Drain 4R of (MD-1)
5. Catchment area of Sub Drain 5R of (MD-1)
6. Catchment area of Sub Drain 6R of (MD-1)
7. L. Section of Sub Drain 3L of (MD-1)
8. L. Section of Sub Drain 3R of (MD-1)
9. L. Section of Drain 4R of (MD-1)
10. L. Section of Drain 5R of (MD-1)
11. L. Section of Drain 6R of (MD-1)
12. Cross Section of different section of Box Drains
13. Structural design of RCC Box Drains
14. Electrical Layouts
15. System Architecture
16. All necessary drawings which are required to complete the works

SCHEDULE – J

See Clause 10.3.2)

PROJECT COMPLETION SCHEDULE

[In order to closely monitor the execution of the project and to ensure quality, cost and time of the project are not compromised in any manner, the contractor shall provide bar chart & PERT Chart in such a realistic manner so that there will be balance between financial & physical progress with reference to cost & completion time]

1 Project Completion Schedule

During Construction period, the Contractor shall comply with the requirements set forth in this Schedule-J for each of the Project Milestones and the **Scheduled Completion Date**. Within **15 (fifteen)** days of the date of each Project Milestone, the Contractor shall notify the Authority of such compliance along with necessary particulars thereof.

2 Project Milestone-I

2.1 Project Milestone-I shall occur on the date falling on the 4th* month from the Appointed Date (the “**Project Milestone-I**”).

2.2 Prior to the occurrence of Project Milestone-I, the Contractor shall have commenced construction of the Sewerage Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 10% (Ten per cent) of the Contract Price.

3 Project Milestone-II

3.1 Project Milestone-II shall occur on the date falling on the 8th* month from the Appointed Date (the “**Project Milestone-II**”).

3.2 Prior to the occurrence of Project Milestone-II, the Contractor shall have continued with construction of the Sewerage Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 30% (thirty per cent) of the Contract Price.

4 Project Milestone-III

4.1 Project Milestone-III shall occur on the date falling on the 12th* month from the Appointed Date (the “**Project Milestone-III**”).

4.2 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Sewerage Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 50% (fifty per cent) of the Contract Price.

5 Project Milestone-IV

5.1 Project Milestone-III shall occur on the date falling on the 16th* month from the Appointed Date (the “**Project Milestone-IV**”).

5.2 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Sewerage Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 70% (seventy per cent) of the Contract Price.

6 Project Milestone-V

6.1 Project Milestone-V shall occur on the date falling on the 20th* month from the Appointed

Date (the “**Project Milestone-V**”).

- 6.2 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Sewerage Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 90% (Ninety per cent) of the Contract Price.

7 Scheduled Completion Date

- 7.1 The Scheduled Completion Date shall occur on the last day of 24^{th**} month from the Appointed Date.
- 7.2 On or before the Scheduled Completion Date, the Contractor shall have completed construction in accordance with this Agreement.

8 Extension of time

Upon extension of any or all of the aforesaid Project Milestones or the Scheduled Completion Date, as the case may be, under and in accordance with the provisions of this Agreement, the Project Completion Schedule shall be deemed to have been amended accordingly.

* The milestone has to be proportionately fixed considering the period of completion.

** Period of completion.

SCHEDULE - K

(See Clause 12.1.2)

Tests on Completion

1 Schedule for Tests

- 1.1 The Contractor shall, no later than 30 (thirty) days prior to the likely completion of construction, notify the Authority/ Authority's Engineer and the Authority of its intent to subject the Box Drain Project to Tests, and no later than 10 (ten) days prior to the actual date of Tests, furnish to the Authority/ Authority's Engineer and the Authority detailed inventory and particulars of all works and equipment forming part of Works.
- 1.2 The Contractor shall notify the Authority/ Authority's Engineer of its readiness to subject the Sewerage Project to Tests at any time after 10 (ten) days from the date of such notice, and upon receipt of such notice, the Authority/ Authority's Engineer shall, in consultation with the Contractor, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority/ Authority's Engineer shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with Article 12 and this Schedule-K.

2 Tests

- 2.1 Visual and physical test: The Authority/ Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include hydraulic test of pipelines, water tightness of water retaining structures, duty of pump sets, flow measurement and head loss test, operation of valves and any other physical tests required as per scope of work.
- 2.2 Effluent standard test: Quality of raw sewage and effluent from STP shall be checked according to CPCB norms.
- 2.3 Tests for Pipe lines: Rising main and sewer networks shall be subjected to the tests to be conducted as per relevant IS specification.
- 2.4 Other tests: The Authority/ Authority's Engineer may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good Industry Practice, for determining the compliance of the Sewerage Project with Specifications and Standards.
- 2.5 Environmental audit: The Authority/ Authority's Engineer shall carry out a check to determine conformity of the Sewerage Project with the environmental requirements set forth in Applicable Laws and Applicable Permits.
- 2.6 Safety Audit: The Authority/ Authority's Engineer shall carry out, or cause to be carried out, a safety audit to determine conformity of the Sewerage Project with the safety requirements and Good Industry Practice.

3 Agency for conducting Tests

All Tests set forth in this Schedule-K shall be conducted by the Authority/ Authority's Engineer or such other agency or person as it may specify in consultation with the Authority.

4 Completion Certificate

Upon successful completion of Tests, the Authority/ Authority's Engineer shall issue the Completion Certificate in accordance with the provisions of Article 12.

SCHEDULE - L
(See Clause 12.2 and 12.4)

PROVISIONAL CERTIFICATE

- 1 I, (Name of the Authority/ Authority’s Engineer), acting as the Authority/ Authority’s Engineer, under and in accordance with the Agreement dated (the “**Agreement**”), for construction of the work (Name of the Project) on Engineering, Procurement and Construction (EPC) basis through (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been undertaken to determine compliance of the Sewerage Project with the provisions of the Agreement.
- 2 Works that are incomplete on account of Time Extension have been specified in the Punch List appended hereto, and the Contractor has agreed and accepted that it shall complete all such works in the time and manner set forth in the Agreement. In addition, certain minor works are incomplete and these are not likely to cause material inconvenience to the Users of the Sewerage Project affect their safety. The Contractor has agreed and accepted that as a condition of this Provisional Certificate, it shall complete such minor works within 30 (thirty) days hereof. These minor works have also been specified in the aforesaid Punch List.
- 3 In view of the foregoing, I am satisfied that the Sewerage Project can be safely and reliably placed in service of the Users thereof, and in terms of the Agreement, the Sewerage Project is hereby provisionally declared fit for entry into operation on this the day of 20.....

ACCEPTED, SIGNED, SEALED
AND DELIVERED
For and on behalf of
CONTRACTOR by:

SIGNED, SEALED AND
DELIVERED
For and on behalf of
AUTHORITY’S ENGINEER by:

(Signature)
(Name and Designation)
(Address)

(Signature)
(Name and Designation)
(Address)

COMPLETION CERTIFICATE

- 1 I, (Name of the Authority/ Authority’s Engineer), acting as the Authority/ Authority’s Engineer, under and in accordance with the Agreement dated (the “**Agreement**”), for construction of the work (Name of the Project) on Engineering, Procurement and Construction (EPC) basis through..... (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Sewerage Project with the provisions of the Agreement, and I am satisfied that the Sewerage Project can be safely and reliably placed in service of the Users thereof.

- 2 It is certified that, in terms of the aforesaid Agreement, all works forming part of Sewerage Project have been completed, and the Sewerage Project is hereby declared fit for entry into operation on this the day of 20.....

SIGNED, SEALED AND DELIVERED by

For and on behalf of the Authority/ Authority’s Engineer b

(Signature)

(Name)

(Designation)

(Address)

SCHEDULE - M
(See Clauses 14.6, 15.2 and 19.7)

PAYMENT REDUCTION FOR NON-COMPLIANCE

- 1. Payment reduction for non-compliance with the Operation & Maintenance Requirements**
- 1.1 Monthly lump sum payments for Operation & maintenance shall be reduced in the case of non-compliance with the Operation & Maintenance Requirements set forth in Schedule-E.
- 1.2 Any deduction made on account of non-compliance with the Operation & Maintenance requirements shall not be paid even after compliance subsequently. The deductions shall continue to be made every month until compliance is done.
- 1.3 The Authority shall calculate the amount of payment reduction on the basis of weightage assigned to non-conforming items as given in Paragraph 2.
- 2. Reductions in lump sum payments**
- 2.1 The following shall govern the payment reduction:
 - [A] REDUCTION TO BE MADE FROM LUMP-SUM PAYMENT FOR NON-PERFORMANCE OF DAILY MAINTENANCE**

| Sl. No. | Items | Penalties |
|-----------|---|---|
| 1. | Pumps, Motors , Control Panels, PLC/SCADA, Screens, Classifiers, Centrifuge and Blowers etc. | |
| a) | If daily checks are not undertaken | Rs.50.00/each /day |
| b) | If steps are not taken to rectify defects | Rs.100.00/each day beyond the day on which the defects were noticed. |
| c) | If defects are not rectified within the time as prescribed in Schedule – E or within a justified time frame in the opinion of the Authority Engineer, whichever is later. | The defects may be rectified by the Department by engaging any other suitable agency and the cost thereof & damages shall be recovered from the contractor as per clause 14.7. |
| 2. | Transformers/Sub-stations | |
| a) | If daily checks are not undertaken | Rs.50.00/each Transformer or Sub-station/day |
| b) | If steps are not taken to rectify defects | Rs.100.00/each day beyond the day on which the defects were noticed. |
| c) | If defects are not rectified within the time as prescribed in Schedule – E or within a justified time frame in the opinion of the Authority Engineer, whichever is later. | The defects may be rectified by the Department by engaging any other suitable agency and the cost thereof & damages shall be recovered from the contractor as per clause 14.7. |
| 3. | Rising main | |
| a) | If daily checks are not undertaken | Rs.100.00/each Km./day |
| b) | If leakages are not rectified within 24 hours. | <ul style="list-style-type: none"> • Rs.200.00/each leakage/ day for pipe lines upto 300 mm dia. • Rs.400.00/each leakage/ day for pipe lines beyond 300 mm dia & upto 600 mm dia. • Rs.800.00/each leakage/ day for pipe lines beyond 600 mm dia. |

| | | |
|-----------|--|--|
| c) | If leakages are not rectified within the time as prescribed in Schedule – E or within a justified time frame in the opinion of the Authority Engineer, whichever is later. | The defects may be rectified by the Department by engaging any other suitable agency and the cost thereof & damages shall be recovered from the contractor as per clause 14.7. |
| 4. | Sewer network/ Gravity sewers | |
| a) | If daily checks against complaints received are not undertaken | Rs.50.00/each complaint/day |
| b) | If corrective measures against complaints/leakages are not rectified within 24 hours. | Rs.100.00/each complaint or leakage/ day |
| c) | If leakages are not rectified within the time as prescribed in Schedule – E or within a justified time frame in the opinion of the Authority Engineer, whichever is later. | The defects may be rectified by the Department by engaging any other suitable agency and the cost thereof & damages shall be recovered from the contractor as per clause 14.7. |
| 5. | STP –Instrumentations & Control System (excluding items covered in Sl.No.1 to 4 above) | |
| a) | If daily checks are not undertaken | Rs.400.00/each/day |
| b) | If corrective measures/steps against defects are not undertaken within 24 hours. | Rs.800.00/each defect/ day |
| c) | If defects are not rectified within the time as prescribed in Schedule – E or within a justified time frame in the opinion of the Authority Engineer, whichever is later. | The defects may be rectified by the Department by engaging any other suitable agency and the cost thereof & damages shall be recovered from the contractor as per clause 14.7. |

[B] REDUCTION TO BE MADE FROM LUMP-SUM PAYMENT FOR NON-PERFORMANCE OF PREVENTIVE MAINTENANCE AS DETAILED IN CLAUSE NO.19.3.8 OF ANNEXURE-I, SCHEDULE-B OF EPC AGREEMENT.

| Sl. No. | Items | Penalties |
|-----------|--|------------------|
| 1. | Monthly | |
| a) | Pumps, Panels, Circuit Breakers, Starters, PLC/SCADA, Screens, Classifiers, Centrifuge, Decanters & Blowers etc. | Rs.800.00/month |
| b) | Transformers/Sub-stations | Rs.400.00/month |
| 2. | Quarterly | |
| a) | Pumps, Panels, Circuit Breakers, Starters, PLC/SCADA, Screens, Classifiers, Centrifuge, Decanters & Blowers etc. | Rs.1200.00/month |
| b) | Transformers/Sub-stations | Rs.800.00/month |
| 3. | Semi-Annually (Half Yearly) | |
| a) | Pumps, Panels, Circuit Breakers, Starters, PLC/SCADA, Screens, Classifiers, Centrifuge, Decanters & Blowers etc. | Rs.1600.00/month |
| b) | Transformers/Sub-stations | Rs.1600.00/month |
| 4. | Annually | |

| | | |
|-----------|--|---|
| a) | Pumps, Panels, Circuit Breakers, Starters, PLC/SCADA, Screens, Classifiers, Centrifuge, Decaners & Blowers etc.. | Rs.2000.00/month |
| b) | Transformers/Sub-stations | Rs.2000.00/month |
| c) | Cleaning of tanks and de-silting | These items of works will be taken up by the Department by engaging any other suitable agency and the cost thereof & damages shall be recovered from the contractor as per clause 14.7. |
| 5. | Bi-Annually | |
| a) | Transformers/Sub-stations | The complete examination including internal connections, core & windings etc., as may be required & rectifications will be taken up by the Department by engaging any other suitable agency and the cost thereof & damages shall be recovered from the contractor as per clause 14.7. |

SCHEDULE - N
(See Clause 18.1.1)

SELECTION OF AUTHORITY'S ENGINEER

1 Selection of Authority's Engineer

- 1.1 The provisions of the Model Request for Proposal for Selection of Technical Consultants, issued by the Ministry of Finance in May 2009, or any substitute thereof shall apply for selection of an experienced firm to discharge the functions and duties of an Authority's Engineer.
- 1.2 In the event of termination of the Technical Consultants appointed in accordance with the provisions of Paragraph 1.1, the Authority shall appoint another firm of Technical Consultants forthwith and may engage a government-owned entity in accordance with the provisions of Paragraph 3 of this Schedule-N.

2 Terms of Reference

The Terms of Reference for the Authority's Engineer (the "TOR") shall substantially conform with Annex 1 to this Schedule N.

3 Appointment of Government entity as Authority's Engineer

Notwithstanding anything to the contrary contained in this Schedule, the Authority may in its discretion appoint a government-owned entity as the Authority's Engineer; provided that such entity shall be a body corporate having as one of its primary functions the provision of consulting, advisory and supervisory services for engineering projects; provided further that a government-owned entity which is owned or controlled by the Authority shall not be eligible for appointment as Authority's Engineer.

Annex – I
(Schedule - N)

TERMS OF REFERENCE FOR AUTHORITY’S ENGINEER

1 Scope

- 1.1 These Terms of Reference (the “**TOR**”) for the Authority’s Engineer are being specified pursuant to the EPC Agreement dated.....(the “**Agreement**), which has been entered into between the [name and address of the Authority] (the “**Authority**”) and.....(the “**Contractor**”) for the work (Name of the Project) in the State of Odisha on Engineering, Procurement, Construction (EPC) basis, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.
- 1.2 The TOR shall apply to construction and Operation & Maintenance of the Sewerage Project.

2 Definitions and interpretation

- 2.1 The words and expressions beginning with or in capital letters and not defined herein but defined in the Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the Agreement.
- 2.2 References to Articles, Clauses and Schedules in this TOR shall, except where the context otherwise requires, be deemed to be references to the Articles, Clauses and Schedules of the Agreement, and references to Paragraphs shall be deemed to be references to Paragraphs of this TOR.
- 2.3 The rules of interpretation stated in Clauses 1.2, 1.3 and 1.4 of the Agreement shall apply, *mutatis mutandis*, to this TOR.

3. General

- 3.1 The Authority’s Engineer shall discharge its duties in a fair, impartial and efficient manner, consistent with the highest standards of professional integrity and Good Industry Practice.
- 3.2 The Authority’s Engineer shall perform the duties and exercise the authority in accordance with the provisions of this Agreement, but subject to obtaining prior written approval of the Authority before determining:
- (a) any Time Extension;
 - (b) any additional cost to be paid by the Authority to the Contractor;
 - (c) the Termination Payment; or
 - (d) any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or liability on either Party for a sum exceeding Rs. 5,000,000 (Rs. fifty lakh).
- 3.3 The Authority’s Engineer shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions under this Agreement. Such reports shall be submitted by the Authority’s Engineer within 10 (ten) days of the beginning of every month.
- 3.4 The Authority’s Engineer shall inform the Contractor of any delegation of its duties and responsibilities to its suitably qualified and experienced personnel; provided, however, that it shall not delegate the authority to refer any matter for the Authority’s prior approval in accordance with the provisions of Clause 18.2.

3.5 The Authority's Engineer shall aid and advise the Authority on any proposal for Change of Scope under Article 13.

3.6 In the event of any disagreement between the Parties regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the Agreement, the Authority's Engineer shall specify such meaning, scope and nature by issuing a reasoned written statement relying on good industry practice and authentic literature.

4 Construction Period

4.1 During the Construction Period, the Authority's Engineer shall review the Drawings furnished by the Contractor along with supporting data, including the geo-technical and hydrological investigations, characteristics of materials from quarry sites, topographical surveys, and the recommendations of the Safety Consultant in accordance with the provisions of Clause 10.1.6. The Authority's Engineer shall complete such review and send its observations to the Authority and the Contractor within 15 (fifteen) days of receipt of such Drawings; provided, however that in case of a Major Structures, the aforesaid period of 15 (fifteen) days may be extended upto 30 (thirty) days. In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.

4.2 The Authority's Engineer shall review any revised Drawings sent to it by the Contractor and furnish its comments within 10 (ten) days of receiving such Drawings.

4.3 The Authority's Engineer shall review the Quality Assurance Plan submitted by the Contractor and shall convey its comments to the Contractor within a period of 21 (twenty- one) days stating the modifications, if any, required thereto.

4.4 The Authority's Engineer shall complete the review of the methodology proposed to be adopted by the Contractor for executing the Works, and convey its comments to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor.

4.5 Deleted.

4.6 The Authority's Engineer shall review the monthly progress report furnished by the Contractor and send its comments thereon to the Authority and the Contractor within 7 (seven) days of receipt of such report.

4.7 The Authority's Engineer shall inspect the Construction Works of the Sewerage Project and shall submit a monthly Inspection Report bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. In particular, the Authority's Engineer shall include in its Inspection Report, the compliance of the recommendations made by the Safety Consultant.

4.8 The Authority's Engineer shall conduct the pre-construction review of manufacturer's test reports and standard samples of manufactured Materials, and such other Materials as the Authority's Engineer may require.

4.9 For determining that the Works conform to Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practice for quality assurance. For purposes of this Paragraph 4.9, the tests specified in the relevant IS specification and CPHEEO manual on Sewerage & Sewage Treatment issued by MoUD or any modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.

- 4.10 The Authority's Engineer shall test check at least 20 (twenty) percent of the quantity or number of tests prescribed for each category or type of test for quality control by the Contractor.
- 4.11 The timing of tests referred to in Paragraph 4.9, and the criteria for acceptance/ rejection of their results shall be determined by the Authority's Engineer in accordance with the Quality Control Manuals. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.
- 4.12 In the event that results of any tests conducted under Clause 11.10 establish any Defects or deficiencies in the Works, the Authority's Engineer shall require the Contractor to carry out remedial measures.
- 4.13 The Authority's Engineer may instruct the Contractor to execute any work which is urgently required for the safety of the Sewerage Project, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work required on account of a Force Majeure Event, the provisions of Clause 21.6 shall apply.
- 4.14 In the event that the Contractor fails to achieve any of the Project Milestones, the Authority's Engineer shall undertake a review of the progress of construction and identify potential delays, if any. If the Authority's Engineer shall determine that completion of the Sewerage Project is not feasible within the time specified in the Agreement, it shall require the Contractor to indicate within 15 (fifteen) days the steps proposed to be taken to expedite progress, and the period within which the Project Completion Date shall be achieved. Upon receipt of a report from the Contractor, the Authority's Engineer shall review the same and send its comments to the Authority and the Contractor forthwith.
- 4.15 The Authority's Engineer shall obtain from the Contractor a copy of all the Contractor's quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.4.
- 4.16 Authority's Engineer may recommend to the Authority suspension of the whole or part of the Works if the work threatens the safety of the Users. After the Contractor has carried out remedial measure, the Authority's Engineer shall inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the suspension hereunder may be revoked.
- 4.17 In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and Users, and requires the Authority's Engineer to inspect such works, the Authority's Engineer shall inspect the suspended works within 3 (three) days of receiving such notice, and make a report to the Authority forthwith, recommending whether or not such suspension may be revoked by the Authority.
- 4.18 The Authority's Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-K and issue a Completion Certificate or Provisional Certificate, as the case may be. For carrying out its functions under this Paragraph 4.18 and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-K.

5. Operation & Maintenance Period

- 5.1 Deleted
- 5.2 Deleted
- 5.3 Deleted
- 5.4 Deleted
- 5.5 Deleted

6 Determination of costs and time

- 6.1 The Authority's Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.
- 6.2 The Authority's Engineer shall determine the period of Time Extension that is required to be determined by it under the Agreement.
- 6.3 The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 18.5.

7. Payments

- 7.1 The Authority's Engineer shall withhold payments for the affected works for which the Contractor fails to revise and resubmit the Drawings to the Authority's Engineer in accordance with the provisions of Clause 10.2.4 (d).
- 7.2 Authority's Engineer shall -
 - (a) within 10 (ten) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 19.4, determine the amount due to the Contractor and recommend the release of 90 (ninety) percent of the amount so determined as part payment, pending issue of the Interim Payment Certificate; and
 - (b) within 15 (fifteen) days of the receipt of the Stage Payment Statement referred to in Clause 19.4, deliver to the Authority and the Contractor an Interim Payment Certificate certifying the amount due and payable to the Contractor, after adjustments in accordance with the provisions of Clause 19.10.
- 7.3 Deleted
- 7.4 Deleted

8. Other duties and functions

The Authority's Engineer shall perform all other duties and functions as specified in the Agreement.

9. Miscellaneous

- 9.1 A copy of all communications, comments, instructions, Drawings or Documents sent by the Authority's Engineer to the Contractor pursuant to this TOR, and a copy of all the test results with comments of the Authority's Engineer thereon, shall be furnished by the Authority's Engineer to the Authority forthwith.
- 9.2 The Authority's Engineer shall retain at least one copy each of all Drawings and Documents received by it, including 'as-built' Drawings, and keep them in its safe custody.
- 9.3 Within 90 (ninety) days of the Project Completion Date, the Authority's Engineer shall obtain a complete set of as-built Drawings, in 2 (two) hard copies and in micro film form or in such other medium as may be acceptable to the Authority, reflecting the Sewerage Project as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Sewerage Project and setback lines, if any, of the buildings and structures forming part of Project Facilities; and shall hand them over to the Authority against receipt thereof.

- 9.4 The Authority's Engineer, if called upon by the Authority or the Contractor or both, shall mediate and assist the Parties in arriving at an amicable settlement of any Dispute between the Parties.
- 9.5 The Authority's Engineer shall inform the Authority and the Contractor of any event of Contractor's Default within one week of its occurrence.

SCHEDULE - O
(See Clauses 19.4.1, 19.6.1, and 19.8.1)

Forms of Payment Statements

1. Stage Payment Statement for Works

The Stage Payment Statement for Works shall state:

- (a) the estimated amount for the Works executed in accordance with Clause 19.3.1 subsequent to the last claim;
- (b) amounts reflecting adjustments in price for the aforesaid claim;
- (c) the estimated amount of each Change of Scope Order executed subsequent to the last claim;
- (d) amounts reflecting adjustment in price, if any, for (c) above in accordance with the provisions of Clause 13.2.3 (a);
- (e) total of (a), (b), (c) and (d) above;
- (f) Deductions:
 - (i) Any amount to be deducted in accordance with the provisions of the Agreement except taxes;
 - (ii) Any amount towards deduction of taxes; and
 - (iii) Total of (i) and (ii) above.
- (g) Net claim: (e) – (f) (iii);
- (h) The amounts received by the Contractor upto the last claim:
 - (i) For the Works executed (excluding Change of Scope orders);
 - (ii) For Change of Scope Orders, and
 - (iii) Taxes deducted

2. Monthly Operation & Maintenance Payment Statement

The monthly Statement for Operation & Maintenance Payment shall state:

- (a) the monthly payment admissible in accordance with the provisions of the Agreement;
- (b) the deductions for Operation & maintenance work not done;
- (c) net payment for Operation & maintenance due, (a) minus (b);
- (d) Deleted
- (e) amount towards deduction of taxes

3. Contractor's claim for Damages

Note: The Contractor shall submit its claims in a form acceptable to the Authority.

SCHEDULE - P
(See Clause 20.1)

INSURANCE

1. Insurance during Construction Period

1.1 The Contractor shall effect and maintain at its own cost, from the Appointed Date till the date of completion of Operation and Maintenance period, the following insurances for any loss or damage occurring on account of Non Political Event of Force Majeure, malicious act, accidental damage, explosion, fire and terrorism:

- (a) insurance of Works, Plant and Materials and an additional sum of [15 (fifteen)] per cent of such replacement cost to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature; and
- (b) insurance for the Contractor's equipment and Documents brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.

1.2 The insurance under paragraph 1.1 (a) and (b) above shall cover the Authority and the Contractor against all loss or damage from any cause arising under paragraph 1.1 other than risks which are not insurable at commercial terms.

2. Insurance for Contractor's Defects Liability

The Contractor shall effect and maintain insurance cover for the Works from the date of issue of the Completion Certificate until the end of the Defects Liability Period for any loss or damage for which the Contractor is liable and which arises from a cause occurring prior to the issue of the Completion Certificate. The Contractor shall also maintain other insurances for maximum sums as may be required under the Applicable Laws and in accordance with Good Industry Practice.

3. Insurance against injury to persons and damage to property

3.1 The Contractor shall insure against its liability for any loss, damage, death or bodily injury, or damage to any property (except things insured under Paragraphs 1 and 2 of this Schedule or to any person (except persons insured under Clause 7.20.9), which may arise out of the Contractor's performance of this Agreement. This insurance shall be for a limit per occurrence of not less than the amount stated below with no limit on the number of occurrences.

The insurance cover shall be not less than: Rs. [*****]

3.2 The insurance shall be extended to cover liability for all loss and damage to the Authority's property arising out of the Contractor's performance of this Agreement excluding:

- (a) the Authority's right to have the construction works executed on, over, under, in or through any land, and to occupy this land for the Works; and
- (b) damage which is an unavoidable result of the Contractor's obligations to execute the Works.

4. Insurance to be in joint names

The insurance under paragraphs 1 to 3 above shall be in the joint names of the Contractor and the Authority.

SCHEDULE - Q
(See Clause 1.2.3. of RFP)

FEASIBILITY REPORT

The present scheme **“Construction of 5 Nos of branch storm water drain (Box Drain) namely Drain No.3L, 3R, 4R, 5R & 6R of MSWC-1 of Cuttack Municipal Corporation” on Engineering, Procurement & Construction (EPC) Contract**, it comprises of:

1. **Status of Existing System:** There is not existing sewerage treatment plant or **Waste Water Treatment Plant** at Project Area.
2. **Availability of Land for Construction of major structures:** Land for most of the locations are available for execution of the project.
3. **Feasibility of Construction:** The Box Drain project aims to improve the drainage system for flood mitigation in Cuttack city, improve sanitary environment by converting open drain to box drain and to contribute to improving traffic conditions and safety by constructing the road above the box drain.

Hence the Project is feasible.