

कार्यालयीन टिपणी

पाणीपुरवठा विभाग

दि.२१/१२/२०१५

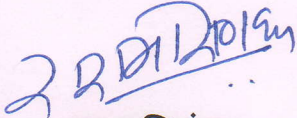
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२४x७ पाणीपुरवठा योजना राबविणेकरिता ठेकेदार नेमणे करिता निविदा मुदतवाढी
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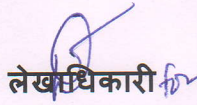
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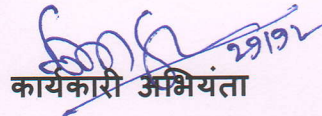
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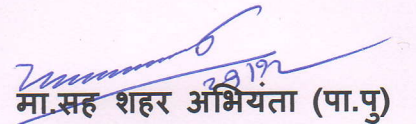
विषयांकित कामाची निविदा भरणेची अंतिम तारीख दि.२१/१२/२०१५
रोजीपर्यंत ठेवणेत आली होती. परंतु, Prebid Meeting चे CSD जाहीर करणे करिता
अजून एक-दोन दिवसांचा कालावधी लागणार आहे. व तसेच, दि.२१/१२/२०१५ रोजी दुपारी
३.०० वाजेच्या आत सदर कामाची निविदा भरणेची अंतिम तारीख मनपाच्या संकेतस्थळी
जाहीर करणे अनिवार्य आहे. या सर्व बाबींचा विचार करून, सदर कामाची निविदा भरणेची
अंतिम तारीख दि.१२/०१/२०१६ पर्यंत मुदतवाढ देणेस योग्य वाटते आहे.

तरी, सदर प्रस्ताव मान्य असल्यास स्वक्षरीस्तव सविनय सादर.


उप अभियंता


लेखसहायक अधिकारी


कार्यकारी अभियंता


मा.सह शहर अभियंता (पा.पु)



Pimpri Chinchwad Municipal Corporation

Request for Proposal (RFP) for Selection of Operator for Implementation of Continuous (24x7) Pressurized Water Supply in 40% area of Pimpri Chinchwad and Operation & Maintenance of the system for five years.

TENDER NO 15 / 01 / 2015-16

Pimpri Chinchwad Municipal Corporation (PCMC) invites proposals for the Selection of Operator for Implementation of Continuous (24x7) Pressurized Water Supply in 40% area of Pimpri Chinchwad and Operation & Maintenance of the system for five years. A Detailed Project Report was prepared by PCMC and is approved by Government of India for funding under JnNURM. The indicative cost of the continuous water supply project is about Rs. 143.17 crore.

More details about the bid submission procedure, qualification criteria & experience and the selection methodology are available in the Request for Proposal (RFP) document. Interested Applicants are requested to download (www.pcmcindia.gov.in) the RFP document from 06/11/2015. The cost of RFP document is Rs.50,000/- (Rupees Fifty Thousand only).

Pre bid meeting date is :- 24/11/2015.

Last date for the submission of the bid is :- 21/12/2015.

Contact Person: For any further information / clarifications please contact

Joint City Engineer, Water Supply

1st Floor, Pimpri Chinchwad Municipal Corporation, Head Office, Old Pune-Mumbai Road, Pimpri, Pune – 411018. Phone:020-67331401 Fax: 020-27425600 Email: To – m.kamble@pcmcindia.gov.in Cc – p.ladkat@pcmcindia.gov.in

Advertise No. 446

No. PAPU/6/KAVI/ 841 /2015

Date- 05/11/2015.

Sign/-
Commissioner, PCMC

Pimpri Chinchwad Municipal Corporation

BIDDING DOCUMENT

for the

Selection of Contractor for Implementation of Continuous (24 x 7) Pressurised Water Supply in 40% area of Pimpri-Chinchwad and Operation & Maintenance of the System for the Period of Five Years

(Following single stage two envelope bidding procedure)

**Section 1 to 9
Vol-1 (Part I) – Technical Bid**

Issued on: 8/11/2015

Invitation for Bids No.: PCMC/TENDER NO 15/01/2015-16

Employer: Pimpri-Chinchwad Municipal Corporation

State : Maharashtra

Country: India

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This Section contains the Price Bid which includes Price Bid form, Preamble to Bill of Quantities and Bill of Quantities.

Section 1 - Instructions to Bidders

Section 1 - Instructions to Bidders

This Section specifies the procedures to be followed by Bidders in the preparation and submission of their Bids. Information is also provided on the submission, opening, and evaluation of bids and on the award of contract.

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Section 1 - Instructions to Bidders

A. General

- 1. Scope of Bid**
 - 1.1 In connection with the Invitation for Bids indicated in the Bid Data Sheet (BDS), the Employer, as indicated in the BDS, issues this Bidding Document for the procurement of Works as specified in Section 6 (Employer's Requirements). The name, identification, and number of contracts of the Competitive Bidding (TENDER) are provided in the BDS.
 - 1.2 Throughout this Bidding Document:
 - (a) the term "in writing" means communicated in written form and delivered against receipt;
 - (b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and
 - (c) "day" means calendar day.
- 2. Source of Funds**
 - 2.1 The Employer indicated in the BDS has applied for or received Grant (hereinafter called "grants") under the Jawaharlal Nehru Urban Renewal Mission (hereinafter called "JnNURM") toward the cost of the project named in the BDS. The employer intends to contribute a portion of the funds (Other than grants to eligible payments under the contract(s) for which this Bidding Document is issued.
 - 2.2 Not used
- 3. Fraud and Corruption**
 - 3.1 . In pursuance of anticorruption policy, Employer:
 - (a) defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) "corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party;
 - (ii) "fraudulent practice" means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
 - (iii) "coercive practice" means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
 - (iv) "collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party;
 - (v) Anticorruption Policy including corrupt, fraudulent, coercive, or collusive practice, abuse, and obstructive practice.
 - (vi) "obstructive practice" means (a) deliberately destroying, falsifying, altering or concealing of evidence material to an EMPLOYER investigation; (b) making false statements to investigators in order to materially impede an Employer investigation; (c) failing to comply with requests to provide information, documents or records in connection with an

OAI investigation; (d) threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or (e) materially impeding Employer's contractual rights of audit or access to information.

(b) will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations in competing for the Contract;

(c) Not Used

(d) will have the right to require that a provision be included in bidding documents and in contracts funded by Employer, requiring Bidders, suppliers and contractors to permit Employer or its representative to inspect their accounts and records and other documents relating to the bid submission and contract performance and to have them audited by auditors appointed by Employer.

3.2 Furthermore, Bidders shall be aware of the provision stated in Sub-Clause 1.15 and 15.6 of the Conditions of Contract.

4. Eligible Bidders

4.1 A Bidder may be a natural person, private entity, government-owned entity—subject to ITB 4.5—or any combination of them with a formal intent to enter into an agreement or under an existing agreement in the form of a Joint Venture (JV). In the case of a JV:

(a) all partners shall be jointly and severally liable, and

(b) the JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution.

4.2 A Bidder, and all parties constituting the Bidder, shall have the nationality of an eligible country, in accordance with Section 5 (Eligible Countries). A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, or incorporated, and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services.

4.3 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to be in a conflict of interest with one or more parties in the bidding process if including but not limited to:

(a) they have controlling shareholders in common; or

(b) they receive or have received any direct or indirect subsidy from any of them; or

(c) they have the same legal representative for purposes of this bid; or

(d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to material information about or improperly influence the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or

(e) a Bidder participates in more than one bid in this bidding process, either individually or as a partner in a joint venture, except for

alternative offers permitted under ITB Clause 13 of the Bidding Document. This will result in the disqualification of all Bids in which it is involved. However, subject to any finding of a conflict of interest in terms of 4.3 (a) - (d) above, this does not limit the participation of a Bidder as a Subcontractor in another bid or of a firm as a Subcontractor in more than one bid; or

- (f) a Bidder or any affiliated entity, participated as a Consultant in the preparation of the design or technical specifications of the works that are the subject of the bid; or
- (g) a Bidder was affiliated with a firm or entity that has been hired (or is proposed to be hired) by the Employer or Borrower as Engineer for the contract.

4.4 A firm shall not be eligible to participate in any procurement activities under an EMPLOYER-funded or EMPLOYER-supported project

4.5 Government-owned enterprises in the Employer's country shall be eligible only if they can establish that they (i) are legally and financially autonomous, (ii) operate under commercial law, and that they (iii) are not a dependent agency of the Employer.

4.6 Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer, as the Employer shall reasonably request.

4.7 Not Used.

4.8 Not Used

5. Eligible Materials, Equipment and Services

5.1 Not Used.

5.2 Not Used

B. Contents of Bidding Document

6. Sections of Bidding Document

6.1 The Bidding Document consist of Parts I in Volume 1 & Volume 2, and II, which include all the Sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITB 8.

PART I Bidding Procedures (Vol-1)

Section 1 - Instructions to Bidders (ITB)

Section 2 - Bid Data Sheet (BDS)

Section 3 - Evaluation and Qualification Criteria (EQC)

Section 4 - Bidding Forms (BDF)

Section 5 - Eligible Countries (ELC)

PART I Requirements

Section 6 - Employer's Requirements (ERQ) (Vol-1)

Section 6 – Employer's Requirements (ERQ) (Vol-2)

PART I Conditions of Contract and Contract Forms (Vol-1)

Section 7 - General Conditions of Contract (GCC)

Section 8 - Particular Conditions of Contract (PCC)

Section 9 - Contract Forms (COF)

PART II Price Bid

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- 6.2 The Invitation for Bids issued by the Employer is not part of the Bidding Document.
 - 6.3 The Employer is not responsible for the completeness of the Bidding Document and their Addenda, if they were not obtained directly from the source stated by the Employer in the Invitation for Bids.
 - 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the bid.

7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting

- 7.1 A prospective Bidder requiring any clarification of the Bidding Document shall contact the Employer in writing at the Employer's address indicated in the BDS or raise his inquiries during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer will respond in writing to any request for clarification, provided that such request is received no later than twenty-one (21) days prior to the deadline for submission of bids. The Employer shall forward copies of its response to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. Should the Employer deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so following the procedure under ITB 8 and ITB 22.2.
- 7.2 The Bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.
- 7.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 7.4 The Bidder's designated representative is invited to attend a pre-bid meeting, if provided for in the BDS. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 7.5 The Bidder is requested to submit any questions in writing, to reach the Employer not later than one week before the meeting.
- 7.6 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3. Any modification to the Bidding Document that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-bid meeting.
- 7.7 Nonattendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.

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- 8. Amendment of Bidding Document**
- 8.1 At any time prior to the deadline for submission of bids, the Employer may amend the Bidding Document by issuing addenda.
 - 8.2 Any addendum issued shall be part of the Bidding Document and shall be communicated in writing to all who have obtained the Bidding Document from the Employer in accordance with ITB 6.3.
 - 8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at its discretion, extend the deadline for the submission of bids, pursuant to ITB 22.2

C. Preparation of Bids

- 9. Cost of Bidding**
- 9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
- 10. Language of Bid**
- 10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the language specified in the BDS. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the BDS, in which case, for purposes of interpretation of the Bid, such translation shall govern.
- 11. Documents Comprising the Bid**
- 11.1 The Bid shall comprise two envelopes submitted simultaneously, one called the Technical Bid containing the documents listed in ITB 11.2 and the other the Price Bid containing the documents listed in ITB 11.3, both envelopes enclosed together in an outer single envelope.
 - 11.2 The Technical Bid shall comprise the following:
 - (a) Letter of Technical Bid;
 - (b) Bid Security or Bid Securing Declaration, in accordance with ITB 19;
 - (c) alternative bids, if permissible, in accordance with ITB 13;
 - (d) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.2;
 - (e) documentary evidence in accordance with ITB 17 establishing the Bidder's qualifications to perform the contract;
 - (f) Technical Proposal in accordance with ITB 16;
 - (g) Any other document required in the BDS.
 - 11.3 The Price Bid shall comprise the following:
 - (a) Letter of Price Bid;
 - (b) completed Price Schedules, in accordance with ITB 12 and 14;
 - (c) alternative price bids, at Bidder's option and if permissible, in accordance with ITB 13;
 - (d) Any other document required in the BDS.
 - 11.4 In addition to the requirements under ITB 11.2, bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all partners. Alternatively, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all

partners and submitted with the bid, together with a copy of the proposed agreement.

- 12. Letters of Bid, and Schedules**
- 12.1 The Letters of Technical Bid and Price Bid, and the Schedules, including the Bill of Quantities, shall be prepared using the relevant forms furnished in Section 4 (Bidding Forms). The forms must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested.
- 13. Alternative Bids**
- 13.1 Unless otherwise indicated in the BDS, alternative bids shall not be considered.
- 13.2 When alternative times for completion are explicitly invited, a statement to that effect will be included in the BDS, as will the method of evaluating different times for completion.
- 13.3 Except as provided under ITB 13.4 below, Bidders wishing to offer technical alternatives to the requirements of the Bidding Document must first price the Employer's design as described in the Bidding Document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the lowest evaluated Bidder conforming to the basic technical requirements shall be considered by the Employer.
- 13.4 When specified in the BDS, Bidders are permitted to submit alternative technical solutions for specified parts of the Works. Such parts will be identified in the BDS and described in Section 6 (Employer's Requirements). The method for their evaluation will be stipulated in Section 3 (Evaluation and Qualification Criteria).
- 14. Bid Prices and Discounts**
- 14.1 The prices and discounts quoted by the Bidder in the Letter of Price Bid and in the Bill of Quantities shall conform to the requirements specified below.
- 14.2 The Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.
- 14.3 The price to be quoted in the Letter of Price Bid, in accordance with ITB 12.1, shall be the total price of the Bid, excluding any discounts offered.
- 14.4 The Bidder shall quote any discounts and the methodology for their application in the Letter of Price Bid, in accordance with ITB 12.1.
- 14.5 Unless otherwise provided in the BDS and the Contract, the rates and prices quoted by the Bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract. In such a case, the Bidder shall furnish the indices and weightings for the price adjustment formulae in the Tables of Adjustment Data included in Section 4 (Bidding Forms) and the Employer may require the Bidder to justify its proposed indices and weightings.
- 14.6 If so indicated in ITB 1.1, bids are being invited for individual contracts or for any combination of contracts (packages). Bidders wishing to

offer any price reduction for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Price reductions or discounts shall be submitted in accordance with ITB 14.4, provided the bids for all contracts are submitted and opened at the same time.

14.7 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 28 days prior to the deadline for submission of bids, shall be included in the rates and prices and the total Bid Price submitted by the Bidder.

15. Currencies of Bid and Payment

15.1 The unit rates and the prices shall be quoted by the bidder entirely in the currency specified in the BDS.

15.2 Bidders shall indicate the portion of the bid price that corresponds to expenditures incurred in the currency of the Employer's country in the Schedule of Payment Currencies included in Section 4 (Bidding Forms).

15.3 Bidders expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer's country and wishing to be paid accordingly may indicate up to three foreign currencies in the Schedule of Payment Currencies included in Section 4 (Bidding Forms).

15.4 Not Applicable.

15.5 Foreign currency requirements indicated by the bidders in the Schedule of Payment Currencies shall include but not limited to the specific requirements for

- (a) expatriate staff and labor employed directly on the Works;
- (b) social, insurance, medical and other charges relating to such expatriate staff and labor, and foreign travel expenses;
- (c) imported materials, both temporary and permanent, including fuels, oil and lubricants required for the Works;
- (d) depreciation and usage of imported Plant and Contractor's Equipment, including spare parts, required for the Works;
- (e) foreign insurance and freight charges for imported materials, Plant and Contractor's Equipment, including spare parts; and
- (f) overhead expenses, fees, profit, and financial charges arising outside the Employer's country in connection with the Works.

15.6 Bidders may be required by the Employer to clarify their foreign currency requirements, and to substantiate that the amounts included in the unit rates and prices and shown in the Schedule of Payment Currencies are reasonable and responsive to ITB 15.3 above, in which case a detailed breakdown of its foreign currency requirements shall be provided by the Bidder.

15.7 Not Applicable

16. Documents Comprising the Technical Proposal

16.1 The Bidder shall furnish, as part of the Technical Bid, a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section 4 (Bidding Forms), in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the

completion time.

17. Documents Establishing the Qualifications of the Bidder

17.1 To establish its qualifications to perform the Contract in accordance with Section 3 (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding information sheets included in Section 4 (Bidding Forms).

17.2 Domestic Bidders, individually or in joint ventures, applying for eligibility for domestic preference shall supply all information required to satisfy the criteria for eligibility as described in ITB 35.

18. Period of Validity of Bids

18.1 Bids shall remain valid for the period specified in the BDS after the bid submission deadline date prescribed by the Employer. A bid valid for a shorter period shall be rejected by the Employer as nonresponsive.

18.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITB 19, it shall also be extended twenty-eight (28) days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its Bid.

19. Bid Security/Bid Securing Declaration

19.1 Unless otherwise specified in the BDS, the Bidder shall furnish as part of its bid, in original form, either a Bid Securing Declaration or a bid security as specified in the BDS. In the case of a bid security, the amount shall be as specified in the BDS.

19.2 A Bid Securing Declaration shall use the form included in Section 4 (Bidding Forms). The Employer will declare a Bidder ineligible to be awarded a Contract for a specified period of time, as indicated in the BDS, if the Bid Securing Declaration is executed.

19.3 If a bid security is specified pursuant to ITB 19.1, the bid security shall be, at the Bidder's option, in any of the following forms:

- (a) an unconditional bank guarantee;
- (b) an irrevocable letter of credit; or
- (c) a cashier's or certified check;

all from a reputable source from an eligible country as described in Section 5 (Eligible Countries). In the case of a bank guarantee, the bid security shall be submitted either using the Bid Security Form included in Section 4 (Bidding Forms) or another form acceptable to the Employer. The form must include the complete name of the Bidder. The bid security shall be valid for twenty-eight days (28) beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 18.2.

19.4 Any Bid not accompanied by a substantially compliant bid security or bid securing declaration, if one is required in accordance with ITB 19.1, shall be rejected by the Employer as nonresponsive.

19.5 If a bid security is specified pursuant to ITB 19.1, the bid security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's furnishing of the performance security pursuant to ITB 42.

19.6 If a bid security is specified pursuant to ITB 19.1, the bid security of the successful Bidder shall be returned as promptly as possible once the

successful Bidder has signed the Contract and furnished the required performance security.

19.7 The bid security may be forfeited or the Bid Securing Declaration executed:

(a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letters of Technical Bid and Price Bid, except as provided in ITB 18.2; or

(b) if the successful Bidder fails to:

(i) sign the Contract in accordance with ITB 41; or

(ii) furnish a performance security in accordance with ITB 42;

(iii) accept the arithmetical correction of its Bid in accordance with ITB 33; or

(iv) furnish a domestic preference security, if so required.

19.8 The Bid Security or Bid Securing Declaration of a JV shall be in the name of the JV that submits the Bid. If the JV has not been legally constituted at the time of bidding, the Bid Security or Bid Securing Declaration shall be in the names of all future partners as named in the letter of intent mentioned in ITB 4.1.

20. Format and Signing of Bid

20.1 The Bidder shall prepare one original of the Technical Bid and one original of the Price Bid comprising the Bid as described in ITB 11 and clearly mark it "ORIGINAL - TECHNICAL BID" and "ORIGINAL - PRICE BID". Alternative bids, if permitted in accordance with ITB 13, shall be clearly marked "ALTERNATIVE". In addition, the Bidder shall submit copies of the Technical and Price Bids, in the number specified in the BDS, and clearly mark each of them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.

20.2 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the BDS and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Bid, except for unamended printed literature, shall be signed or initialed by the person signing the bid.

20.3 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Bid.

D. Submission and Opening of Bids

21. Sealing and Marking of Bids

21.1 Bidders may always submit their bids by mail or by hand. When so specified in the BDS, Bidders shall have the option of submitting their bids electronically. Procedures for submission, sealing and marking are as follows:

(a) Bidders submitting bids by mail or by hand shall enclose the original of the Technical Bid, the original of the Price Bid, and each copy of the Technical Bid and each copy of the Price Bid, in separate sealed envelopes, duly marking the envelopes as "ORIGINAL - TECHNICAL BID", "ORIGINAL - PRICE BID" and "COPY NO... - TECHNICAL BID" and "COPY NO.... - PRICE BID." These envelopes, the first containing the originals and the

others containing copies, shall then be enclosed in one single envelope per set. If permitted in accordance with ITB 13, alternative bids shall be similarly sealed, marked and included in the sets. The rest of the procedure shall be in accordance with ITB 21.2 and 21.5.

(b) Bidders submitting bids electronically shall follow the electronic bid submission procedures specified in the BDS.

21.2 The inner and outer envelopes shall:

- (a) bear the name and address of the Bidder;
- (b) be addressed to the Employer in accordance with BDS 22.1; and
- (c) bear the specific identification of this bidding process indicated in the BDS 1.1.;

21.3 The outer envelopes and the inner envelopes containing the Technical Bid shall bear a warning not to open before the time and date for the opening of Technical Bid, in accordance with ITB Sub-Clause 25.1.

21.4 The inner envelopes containing the Price Bid shall bear a warning not to open until advised by the Employer in accordance with ITB Sub-Clause 25.7.

21.5 If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the bid.

22. Deadline for Submission of Bids

22.1 Bids must be received by the Employer at the address and no later than the date and time indicated in the BDS.

22.2 The Employer may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Document in accordance with ITB 8, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

23. Late Bids

23.1 The Employer shall not consider any bid that arrives after the deadline for submission of bids, in accordance with ITB 22. Any bid received by the Employer after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.

24. Withdrawal, Substitution, and Modification of Bids

24.1 A Bidder may withdraw, substitute, or modify its Bid – Technical or Price – after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 20.2, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the bid must accompany the respective written notice. All notices must be:

(a) prepared and submitted in accordance with ITB 20 and ITB 21 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked “WITHDRAWAL,” “SUBSTITUTION,” “MODIFICATION;” and

(b) received by the Employer no later than the deadline prescribed for submission of bids, in accordance with ITB 22.

24.2 Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders.

24.3 No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letters of Technical Bid and Price Bid or any extension thereof.

25. Bid Opening

25.1 The Employer shall open the Technical Bids in public at the address, date and time specified in the BDS in the presence of Bidders' designated representatives and anyone who choose to attend. Any specific electronic bid opening procedures required if electronic bidding is permitted in accordance with ITB 21.1, shall be as specified in the BDS. The Price Bids will remain unopened and will be held in custody of the Employer until the specified time of their opening. If the Technical Bid and the Price Bid are submitted together in one envelope, the Employer may reject the entire Bid. Alternatively, the Price Bid may be immediately resealed for later evaluation.

25.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening.

25.3 Second, outer envelopes marked "SUBSTITUTION" shall be opened. The inner envelopes containing the Substitution Technical Bid and/or Substitution Price Bid shall be exchanged for the corresponding envelopes being substituted, which are to be returned to the Bidder unopened. Only the Substitution Technical Bid, if any, shall be opened, read out, and recorded. Substitution Price Bid will remain unopened in accordance with ITB Sub-Clause 25.1. No envelope shall be substituted unless the corresponding Substitution Notice contains a valid authorization to request the substitution and is read out and recorded at bid opening.

25.4 Next, outer envelopes marked "MODIFICATION" shall be opened. No Technical Bid and/or Price Bid shall be modified unless the corresponding Modification Notice contains a valid authorization to request the modification and is read out and recorded at the opening of Technical Bids. Only the Technical Bids, both Original as well as Modification, are to be opened, read out, and recorded at the opening. Price Bids, both Original as well as Modification, will remain unopened in accordance with ITB Sub-Clause 25.1.

25.5 All other envelopes holding the Technical Bids shall be opened one at a time, and the following read out and recorded:

- (a) the name of the Bidder;
- (b) whether there is a modification or substitution;
- (c) the presence of a Bid Security or Bid Securing Declaration, if required; and
- (d) any other details as the Employer may consider appropriate.

Only Technical Bids and alternative Technical Bids read out and recorded at bid opening shall be considered for evaluation. Unless otherwise specified in the BDS, all pages of the Letter of Technical Bid are to be initialed by at least three representatives of the Employer attending bid opening. No Bid shall be rejected at the opening of Technical Bids except for late bids, in accordance with ITB Sub-Clause 23.1.

25.6 The Employer shall prepare a record of the opening of Technical Bids that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, substitution, or modification; alternative proposals; and the presence or absence of a bid security or bid securing declaration, if one was required. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

25.7 At the end of the evaluation of the Technical Bids, the Employer will invite bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend the opening of the Price Bids. The date, time, and location of the opening of Price Bids will be advised in writing by the Employer. Bidders shall be given reasonable notice of the opening of Price Bids.

25.8 The Employer will notify Bidders in writing who have been rejected on the grounds of their Technical Bids being substantially non-responsive to the requirements of the Bidding Document and return their Price Bids unopened.

25.9 The Employer shall conduct the opening of Price Bids of all Bidders who submitted substantially responsive Technical Bids, in the presence of Bidders' representatives who choose to attend at the address, date and time specified by the Employer. The Bidder's representatives who are present shall be requested to sign a register evidencing their attendance.

25.10 All envelopes containing Price Bids shall be opened one at a time and the following read out and recorded:

- (a) the name of the Bidder;
- (b) whether there is a modification or substitution;
- (c) the Bid Prices, including any discounts and alternative offers; and
- (d) any other details as the Employer may consider appropriate.

Only Price Bids discounts, and alternative offers read out and recorded during the opening of Price Bids shall be considered for evaluation. Unless otherwise specified in the BDS, all pages of the Letter of Price Bid and Bill of Quantities are to be initialed by at least three representatives of the Employer attending bid opening. No Bid shall be rejected at the opening of Price Bids.

25.11 The Employer shall prepare a record of the opening of Price Bids that shall include, as a minimum: the name of the Bidder, the Bid Price (per lot if applicable), any discounts, and alternative offers. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

E. Evaluation and Comparison of Bids

26. Confidentiality

26.1 Information relating to the examination, evaluation, comparison, and post qualification of bids and recommendation of contract award, shall not be disclosed to Bidders or any other persons not officially concerned with such process until information on the Contract award is communicated to all Bidders.

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- 26.2 Any attempt by a Bidder to influence the Employer in the evaluation of the bids or Contract award decisions may result in the rejection of its Bid.
- 26.3 Notwithstanding ITB 26.2, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it may do so in writing.
- 27. Clarification of Bids**
- 27.1 To assist in the examination, evaluation, and comparison of the Technical and Price Bids, the Employer may, at its discretion, ask any Bidder for a clarification of its bid. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change in the substance of the Technical Bid or prices in the Price Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Price Bids, in accordance with ITB 33.
- 27.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the Employer's request for clarification, its bid may be rejected.
- 28. Deviations, Reservations, and Omissions**
- 28.1 During the evaluation of bids, the following definitions apply:
- (a) "Deviation" is a departure from the requirements specified in the Bidding Document;
 - (b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and
 - (c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.
- 29. Preliminary Examination of Technical Bids**
- 29.1 The Employer shall examine the Technical Bid to confirm that all documents and technical documentation requested in ITB Sub-Clause 11.2 have been provided, and to determine the completeness of each document submitted.
- 29.2 The Employer shall confirm that the following documents and information have been provided in the Technical Bid. If any of these documents or information is missing, the offer shall be rejected.
- (a) Letter of Technical Bid;
 - (b) written confirmation of authorization to commit the Bidder;
 - (c) Bid Security or Bid Securing Declaration, if applicable; and
 - (d) Technical Proposal in accordance with ITB 16.
- 30. Responsiveness of Technical Bid**
- 30.1 The Employer's determination of a Bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB11.
- 30.2 A substantially responsive Technical Bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,
- (a) if accepted, would:
 - (i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or
 - (ii) limit in any substantial way, inconsistent with the Bidding Document, the Employer's rights or the Bidder's obligations

under the proposed Contract; or

(b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive bids.

30.3 The Employer shall examine the technical aspects of the Bid submitted in accordance with ITB 16, Technical Proposal, in particular, to confirm that all requirements of Section 6 (Employer's Requirements) have been met without any material deviation or reservation.

30.4 If a bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

31. Nonmaterial Nonconformities

31.1 Provided that a bid is substantially responsive, the Employer may waive any nonconformities in the Bid that do not constitute a material deviation, reservation or omission.

31.2 Provided that a Technical Bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Technical Bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the Price Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

31.3 Provided that a Technical Bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made using the method indicated in Section 3 (Evaluation and Qualification Criteria).

32. Qualification of the Bidder

32.1 The Employer shall determine to its satisfaction during the evaluation of Technical Bids whether Bidders meet the qualifying criteria specified in Section 3 (Evaluation and Qualification Criteria).

32.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17.1.

32.3 An affirmative determination shall be a prerequisite for the opening and evaluation of a Bidder's Price Bid. A negative determination shall result into the disqualification of the Bid, in which event the Employer shall return the unopened Price Bid to the Bidder.

33. Correction of Arithmetical Errors

33.1 During the evaluation of Price Bids, the Employer shall correct arithmetical errors on the following basis:

(a) if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected;

(b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected;

(c) if there is a discrepancy between the bid price in the Summary of Bill of Quantities and the bid amount in item (c) of the Letter of

Price Bid, the bid price in the Summary of Bill of Quantities will prevail and the bid amount in item (c) of the Letter of Price Bid will be corrected; and

- (d) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a), (b) and (c) above.

33.2 If the Bidder that submitted the lowest evaluated bid does not accept the correction of errors, its Bid shall be disqualified and its bid security may be forfeited or its bid securing declaration executed.

34. Conversion to Single Currency

34.1 For evaluation and comparison purposes, the currency(ies) of the bid shall be converted into a single currency as specified in the BDS.

35. Margin of Preference

35.1 Unless otherwise specified in the BDS, a margin of preference shall not apply.

36. Evaluation of Price Bids

36.1 The Employer shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.

36.2 To evaluate the Price Bid, the Employer shall consider the following:

- (a) the bid price, excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including Day work items, where priced competitively;
- (b) price adjustment for correction of arithmetic errors in accordance with ITB 33.1;
- (c) price adjustment due to discounts offered in accordance with ITB 14.4;
- (d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 34;
- (e) adjustment for nonconformities in accordance with ITB 31.3;
- (f) application of all the evaluation factors indicated in Section 3 (Evaluation and Qualification Criteria);

36.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.

36.4 If this Bidding Document allows Bidders to quote separate prices for different contracts, and the award to a single Bidder of multiple contracts, the methodology to determine the lowest evaluated price of the contract combinations, including any discounts offered in the Letter of Price Bid, is specified in Section 3 (Evaluation and Qualification Criteria).

36.5 If the Bid, which results in the lowest Evaluated Bid Price, is seriously unbalanced or front loaded in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, taking into consideration the schedule of estimated Contract payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the

successful Bidder under the Contract.

- 37. Comparison of Bids** 37.1 The Employer shall compare all substantially responsive Bids to determine the lowest evaluated bid, in accordance with ITB 36.2.
- 38. Employer's Right to Accept Any Bid, and to Reject Any or All Bids** 38.1 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all bids submitted and specifically, bid securities, shall be promptly returned to the Bidders.

F. Award of Contract

- 39. Award Criteria** 39.1 The Employer shall award the Contract to the Bidder whose offer has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.
- 40. Notification of Award** 40.1 Prior to the expiration of the period of bid validity, the Employer shall notify the successful Bidder, in writing, that its Bid has been accepted.
- 40.2 At the same time, the Employer shall also notify all other Bidders of the results of the bidding. The Employer will publish in an English language newspaper or well-known freely accessible website the results identifying the bid and lot numbers and the following information: (i) name of each Bidder who submitted a Bid; (ii) bid prices as read out at bid opening; (iii) name and evaluated prices of each Bid that was evaluated; (iv) name of bidders whose bids were rejected and the reasons for their rejection; and (v) name of the winning Bidder, and the price it offered, as well as the duration and summary scope of the contract awarded. After publication of the award, unsuccessful bidders may request in writing to the Employer for a debriefing seeking explanations on the grounds on which their bids were not selected. The Employer shall promptly respond in writing to any unsuccessful Bidder who, after Publication of contract award, requests a debriefing.
- 40.3 Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.
- 41. Signing of Contract** 41.1 Promptly after notification, the Employer shall send the successful Bidder the Contract Agreement.
- 41.2 Within twenty-eight (28) days of receipt of the Contract Agreement, the successful Bidder shall sign, date, and return it to the Employer.
- 42. Performance Security** 42.1 Within twenty-eight (28) days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the conditions of contract, subject to ITB 36.5, using for that purpose the Performance Security Form included in Section 9 (Contract Forms), or another form acceptable to the Employer.
- 42.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or to sign the Contract Agreement shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security or execution of the bid securing declaration. In that event the Employer may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive and is determined by the Employer to be qualified to perform the Contract satisfactorily.

42.3 The above provision shall also apply to the furnishing of a domestic preference security if so required.

Section 2

Bid Data Sheet

Section 2 - Bid Data Sheet

This Section consists of provisions that are specific to each procurement and supplement the information or requirements included in Section 1, Instructions to Bidders.

A. General

ITB 1.1	The number of the invitation for Bids is:15/01/2015-16
ITB 1.1	The Employer is: Pimpri Chinchwad Municipal Corporation
ITB 1.1	The name of the Bid is: Selection of Operator for Implementation of Continuous (24 x 7) Pressurised Water Supply in 40% area of Pimpri Chinchwad and Operation and Maintenance of the system for five years The Identification number of the Bid is: 15/01/2015-16 The number and identification of lots comprising this TENDER is: None
ITB 2.1	Pimpri Chinchwad Municipal Corporation
ITB 2.1	Grants Approved under JnNURM for 40% area of Pimpri Chinchwad Municipal Corporation
ITB 4.1	(i) JV is allowed (Maximum Two including lead member) (ii) Lead Member shall have holding majority of 51% or more and other member shall have minimum 26% holding)

B. Contents of Bidding Documents

ITB 6.1	<p>Add following at end of para 6.1:</p> <p>The Bidding Document is in Two Parts. Part-I is for Technical bid. Part -I is divided in 2 Volumes. Volume 1 includes Section 1 to 6 and Section 7, 8 & 9. Volume 2 includes Section 6.23:Detailed Technical Specifications.</p> <p>Part-II is for Price Bid which includes Price Bid form, Preamble to Bill of Quantities and Bill of Quantities. .</p>
ITB 6.3	<p>Clarifications and addendum etc. will be posted at the official website of the PCMC, www.pcmcindia.gov.in</p> <p>(Note: please open the page 'Tenders' and then page 'View Tenders' to access all the posted and uploaded documents related to this RFP)</p>
ITB 6.4	<p>Not applicable</p>
ITB 7.1	<p>For clarification purpose only, the Employer's address is:</p> <p>Joint City Engineer (Water Supply), Water Supply, 1st Floor, Pimpri-Chinchwad Municipal Corporation, Head Office, Old Pune-Mumbai Road, Pimpri, Pune-411018, Maharashtra, INDIA Phone:020-67331401 Fax:020-2745600 Electronic mail address: m.kamble@pcmcindia.gov.in, Cc p.ladkat@pcmcindia.gov.in; Web site : www.pcmcindia.gov.in</p>
ITB 7.4	<p>A pre-bid meeting shall take place at the following date, time, and location:</p> <p>Date :24/11/2015 Time: 15:00 hrs Place: PCMC Office, Pimpri</p> <p><i>Bidders are advised to either attend the pre-bid meeting, or to submit their queries by fax letter to Jt. City Engineer (Water Supply) or by e-mail to m.kamble@pcmcindia.gov.in.</i></p> <p>There will be no online pre-bid meeting.</p> <p>A site visit shall be organized by the Employer at the following date, time:</p> <p>Date :25/11/2015 Time: 10:00 hrs</p>
ITB 8.2	<p>Add the following at end of ITB 8.2:</p> <p>Clarification to Bidder's queries and amendment will be notified either through writing / e-mail or posting on web sites www.pcmcindia.gov.in In e-bidding process, it is not possible to have correspondence in writing with the bidders who have downloaded the bid documents; Bidders are informed to check the portal at regular intervals for any such amendments to the Bid document. Employer will not be responsible, if bidder did not download the addendum from the website.</p>

C. Preparation of Bids

ITB 10.1	The language of the bid is: English
ITB 11	<p>Replace sub clause 11.2 entirely with following:</p> <p>Technical bid shall be submitted in Envelope “A” and Envelope “B” and shall comprise the following:</p> <p>Envelope “A” - Bidder shall upload scanned copies of the following:</p> <ul style="list-style-type: none"> • Letter of Technical Bid • Power of Attorney in original duly attested by Notary. In case of partnership firm / limited company / group of companies, a power of attorney for the person authorised to sign shall be issued by all the partners. • Bid document - Documentary proof for bid document cost paid for INR 50,000/- (Non- refundable) via electronically. Bid document cost shall be paid through e-payments method of PCMC. Visit to www.pcmcindia.gov.in/e_help and download power point presentation for more details. • Bid Security - Documentary proof of Bid Security as per ITB 19 of ITB. (It is to be paid through e-payments method of e-tendering of PCMC) • If applicable, a valid Joint Venture (JV) agreement legally notarized or attested by an appropriate authority in the bidder’s home country, specifying the work responsibility and financial stakes of each of Joint venture partners under the contract. <p>Documents submitted in envelope 'A' of www.pcmcindia.gov.in website must be submitted in original in office of the Jt City Engineer, PCMC, Address</p> <p>Submission of above specified tender fees with the bid is required but bid will not be rejected because of non submission of tender fees with the bid. If bidder does not submit the tender fees with the technical bid, bidder will be asked to submit the tender fees during technical evaluation process.</p> <p>Envelope –“B” will contain following:</p> <ul style="list-style-type: none"> • documentary evidence in accordance with ITB 17 establishing the Bidder’s qualifications to perform the contract; • Technical Proposal in accordance with ITB 16; • Memorandum of Agreement (MOA) for making Annual Maintenance Contract (AMC) with the equipment supplier
ITB 11	<p>Add the following at end of ITB 11.3:-</p> <p>Price bid comprising scanned copies of letter of price bid and completed price schedule and others as applicable shall be submitted on line at the web site www.pcmcindia.gov.in and shall be digitally signed.</p> <p>www.pcmcindia.gov.in is a website established by PCMC for e tendering purposes.</p>
ITB 13.1	Alternative bids shall not be permitted.

ITB 13.2	Alternative time for completion shall not be permitted.
ITB 13.4	Alternative technical solutions shall be permitted for the following parts of the Works: None
ITB 14.2	<p>A) Bidders shall quote the fees / rates as per following</p> <p>i)DMA Establishment Cost shall be minimum 10% of the Contract Price (Evaluated Bid Price)</p> <p>ii) Operation & Maintenance service fees shall be minimum 25% of total contract Price. As per BOQ,</p> <p>iii) The ratio of DMA Establishment Fees, Construction Works cost& Operation and maintenance fees shall be in the ratio of 1:6.5:2.5</p> <p>Any increase in Construction Works cost shall be subject to comparison to the ratio above. In that case, Construction works cost will be reduced and adjusted with DMA Establishment Fees and Operation and Maintenance Fees proportionately by keeping the total Bid Price unchanged.</p> <p>B) The Bill of Quantities consists of three (3) Schedules:</p> <ol style="list-style-type: none"> 1. DMA Establishment (R2 Item 1 & 2) 2. Construction Works (R3 Item 3 to 76) 3. Operation & Maintenance Service Cost (R4 Item 77 & 78)
ITB 14.5	The Price quoted by the bidder shall be subject to adjustment.
ITB 14.7	<p>Add the following at end of Sub ITB 14.7</p> <p><i>The bidders are informed that certain tax and duty exemptions are available as per the following GOI notifications:</i></p> <p>Excise Exemption as per Central Excise Notification no. 12/2012-CE dated 17-03-2012 issued & updated by Government of India time to time is available on the materials like pipes, valves, specials, flow meter, instrument, etc. shall be availed under this project. Contractor shall be responsible to get the Exemption and liaison with concerned department. However, PCMC shall assist Contractor to obtain certification towards Exemption of Excise Duties. The responsibility for obtaining any such exemptions from the Competent Authority will remain with the Contractor and the Employer shall not in any way be responsible for admissibility of the claims or eligibility of the Contractor.</p>
ITB 15.1	The unit rate and the prices shall be quoted by the bidder in Indian Rupees (INR) only
ITB 15.4	Not Applicable
ITB 18.1	The bid validity period shall be 180 (One hundred eighty) days.
ITB 19.1	<p>A bid security shall be required. Bid securing declaration shall not be accepted.</p> <p>Amount and currency of bid security shall be: INR 143 Lacs. as a part of the bid in its original form.</p>

ITB 19.2	Clause not applicable.
ITB 19.3	Replace ITB 19.3 with the following:- The bid security shall be, paid e-payments method of e-tendering process of PCMC. Visit to www.pcmcindia.gov in/e_help and download power point presentation for more details.regarding e-payments process
ITB 20.1	In addition to original of the bid, number of copies is: NA
ITB 20.2	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: Power of attorney

D. Submission and Opening of Bids

ITB 21.1	Replace the paragraph with following: Bidders will submit their bids electronically only.
ITB 21.1 (b)	<p>“E-Tendering” means submission of a digitally signed bid (by a valid digital certificate which has been issued by a licensed Certifying Agency, as approved by Controller of Certifying Agency) which is stored in Time Stamped electronic sealed tender box.</p> <p>E tendering process of PCMC For submitting the Bid, the applicant has to enroll with e-tendering system of PCMC. For any other queries e-tendering, Applicant can contact Help Line No. +919922501200 While submitting the Bid through e-tendering system, the Applicant shall pay the cost of the RFP document Bidders has to submit the technical (part-I) and financial (Part-II) bid online</p>
	Employer reserves the right to verify original copies of scanned documents uploaded by bidders. Employer may seek additional documentary evidence on their technical proposals, which the bidders shall provide either online using the e-Procurement or in manual form.
ITB 22.1	<p>Replace ITB 22.1 with the following: Bids shall be submitted electronically on website http://www.pcmcindia.gov.in not later than 15:00 hours on 21/12/ 2015 Bid opening date specified in the e-Procurement site shall be taken as the final date. Employer reserves the right to open bids on or after the announced bid opening date and time specified in the website. Bid submission and bid opening timelines will be defined as per the e-tendering server clock only.</p>
ITB 25.1	<p>Delete ITB 25.1, 25.2, 25.3, 25.4 and 25.5 and replace with the following:-</p> <ol style="list-style-type: none"> 1. The Employer shall open the technical bids online in public in the presence of Bidders or designated representative of the Bidders, who chose to attend at:- Date :21/12,2015 Time: 15:30 hours 2. Location: Office of the Joint Commissioner, Pimpri-Chinchwad Municipal Corporation, Pimpri, Pune-18, Maharashtra, INDIA 3. Bids are electronically opened in the presence of authorized Bid Openers. In first stage, Envelope A of the tenders, will be opened. The bidders' names, the presence (or absence) of Bid Security, Tender Fee and e bid Fee, will be announced by the Tender Opening Committee at the opening. Then the Envelope 'B' of technical proposals will be opened and evaluated. 4. The technical bids recorded and opened at the time of opening shall be considered for evaluation. 5. The Price Bids will remain unopened in the e-proc website and will remain encrypted, until the specified time of its opening 6. The letter of technical bid shall be initialed by the representatives of the employer attending the bid opening.

ITB 25.10

Add the following at the end of ITB 25.10

The Price bids will be opened electronically in the presence of authorized officials of Employer and the letter of price bids and the bill of quantities shall be initialed at the time of bid opening.

E. Evaluation and Comparison of Bids

ITB 27.1	Add the following at the end of ITB 27.1:- Communication during bid evaluation for the purpose of clarification will be done electronically / in writing
ITB 34.1	The currency that shall be used for bid evaluation and comparison purposes to convert all bid prices expressed in various currencies into a single currency is: Indian Rupee The source of the selling exchange rate shall be: Reserve Bank of India The date for the selling exchange rate shall be: 28 days prior to bid submission deadline.
ITB 35.1	A margin of preference shall not apply.

Section 3

Evaluation and Qualification Criteria

Section 3 - Evaluation and Qualification Criteria - Without Prequalification -

This Section contains all the criteria that the Employer shall use to evaluate bids and qualify Bidders. In accordance with ITB 32 and ITB 36, no other methods, criteria and factors shall be used. The Bidder shall provide all the information requested in the forms included in Section 4 (Bidding Forms).

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1. Evaluation

In addition to the criteria listed in ITB 36.2 (a) – (e) the following criteria shall apply:

1.1 Adequacy of Technical Proposal

Evaluation of the Bidder's Technical Proposal will include an assessment of the Bidder's technical capacity to mobilize key equipment and personnel for the contract consistent with its proposal regarding work methods, scheduling, and material sourcing in sufficient detail and fully in accordance with the requirements stipulated in Section 6 (Employer's Requirements).

Non-compliance with equipment and personnel requirements (other than mandatory experts manpower requirements) described in Section 6 (Employer's Requirements) shall not be grounds for bid rejection and such non-compliance will be subject to clarification and rectification prior to contract award. However non compliance with mandatory experts Manpower described in Section6 result in to bid rejection..

1.2 Multiple Contracts

Not Applicable

1.3 Completion Time

An alternative Completion Time, if permitted under ITB 13.2, will be evaluated as follows:
NOT PERMITTED.

1.4 Operating and Maintenance Costs:

Shall be as per quoted value in price bid

1.5 Technical Alternatives

Technical alternatives , if permitted under ITB 13.4, will be evaluated as follows:
NOT PERMITTED.

1.6 Quantifiable Nonconformities, Errors and Omissions

The evaluated cost of quantifiable nonconformities, errors and/or omissions are determined as follows:

Pursuant to ITB 31.3, the cost of all quantifiable nonmaterial nonconformities or omissions shall be evaluated. The Employer will make its own assessment of the cost of any nonmaterial nonconformities and omissions for the purpose of ensuring fair comparison of bids.

1.7 Domestic Preference

If a margin of preference shall apply under ITB 35.1, the procedure will be as follows:
Not applicable

2. Qualification

Unless specifically indicated otherwise, it is the legal entity or entities comprising the Bidder, and not the Bidder's parent companies, subsidiaries or affiliates, that must satisfy the qualification criteria described below.

2.1 Eligibility

Criteria	Compliance Requirements				Documents
	Single Entity	Joint Venture			Submission Requirements
All Partners Combined		Each Partner	One Partner		
2.1.1 Nationality					
Nationality in accordance with ITB Sub-Clause 4.2.	must meet requirement	must meet requirement	must meet requirement	not applicable	Forms ELI - 1; ELI - 2 with attachments
2.1.2 Conflict of Interest					
No conflicts of interest in accordance with ITB Sub-Clause 4.3.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid
2.1.3 Employer Eligibility					
Not having been declared ineligible by EMPLOYER, as described in ITB Sub-Clause 4.4.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid
2.1.4 Government-owned Entity					
Bidder required to meet conditions of ITB Sub-Clause 4.5.	must meet requirement	must meet requirement	must meet requirement	not applicable	Forms ELI - 1; ELI - 2 with attachments
2.1.5 United Nations (UN) Eligibility					
Not having been excluded by an act of compliance with UN Security Council resolution in accordance with ITB Sub-Clause 4.7.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid

2.2 Pending Litigation: Pending Litigation Criterion shall apply:

Criteria	Compliance Requirements			Documents	
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	

2.2.1 Pending Litigation and Arbitration

All pending litigation shall be treated as resolved against the Bidder and so shall in total not represent more than 50 percent of the Bidder's net worth calculated as the difference between total assets and total liabilities.	must meet requirement by itself or as partner to past or existing JV	not applicable	must meet requirement by itself or as partner to past or existing JV	not applicable	Form LIT - 1
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2.3 Financial Requirements

2.3.1 Historical Financial Performance

Criteria	Compliance Requirements			Documents	
	Single Entity	Joint Venture		Submission Requirements	
All Partners Combined		Each Partner	One Partner		
Submission of audited financial statements or, if not required by the law of the Bidder's country, other financial statements acceptable to the Employer, for the last 6 years (FY 2009-10 to 2014-15 or as per International practice) to demonstrate the current soundness of the Bidder's financial position.	must meet requirement	not applicable	must meet requirement	not applicable	Form FIN - 1 with attachments
Return on investment (ratio of annual profit before taxes and the net worth of previous year) should be positive for the last year (FY 2014-15) and atleast for two more years in last five years.					
Bidder's net worth for the last year calculated as the difference between total assets and total liabilities should be minimum INR 2800 Lacs.					
Bidding capacity – as per $(A*N*2) - B$					Fin 6 Affidavit

2.3.2 Average Annual Construction Turnover

Criteria	Compliance Requirements			Documents	
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Minimum average annual turnover of last three years shall be INR 14300 Lacs	must meet requirement	must meet requirement	must meet 25 percent of the requirement	must meet 50 percent of the requirement	Form FIN – 2

Note: The present price level for turnover of the previous years' value shall be given weightage of 10% per year as follows:

S. No	Financial Year	Weightage
(i)	2014-15	1.00
(ii)	2013-14	1.10
(iii)	2012-13	1.21

2.3.3 Financial Resources Requirement

Criteria	Compliance Requirements			Documents	
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Using Forms FIN – 3 and FIN - 4 in Section 4 (Bidding Forms), the Bidder must demonstrate access to, or availability of, liquid assets, ¹ lines of credit, or other financial resources (other than any contractual advance payments) to meet the Bidder's financial resources requirement indicated in Form FIN-4.	must meet requirement	must meet requirement	must meet 25 percent of the requirement	must meet 50 percent of the requirement	Form FIN – 3 & FIN – 4

¹ *Liquid Assets mean cash and cash equivalents, short-term financial instruments, short term available-for-sale-securities, marketable securities, trade receivables, short-term financing receivables and other assets that can be converted into cash within ONE YEAR.*

2.4 Construction Experience

Bidder or Bidder's Parent Companies, Subsidiaries, Special Purpose Vehicle (SPV) or Affiliates, must satisfy the qualification criteria described below:

2.4.1 Contracts of Similar Size and Nature

Criteria	Compliance Requirements			Documents	
	Requirement	Single Entity	Joint Venture		Submission Requirements
All Partners Combined			Each Partner	One Partner	
1.Participation in at least (i) one contract in water supply distribution network where the value of the completed or substantially completed* work exceeds INR 11500 Lacs or (ii) Two contract in water supply sector where the value of the each completed or substantially completed work exceeds INR 7200 Lacs of Project cost or (iii) three contracts in water supply sector where the value of the each completed or substantially completed work exceeds INR 5700 Lacs of Project cost, within the last 7 years (from 1 April 2008 to date)	must meet requirement	must meet requirement	not applicable	not applicable	Form EXP - 1

* substantially completed means (i) the contractor has completed the works but could not commission the same because of hindrances beyond the control of contractor or (ii) contractor has completed and commissioned the works atleast for the amount required for qualification, out of large size contract.

Note: 1. Experience of the bidder earned by him as the JV partner or subsidiary or SPV will be considered only if bidder was holding majority (51% or more) share in JV or in subsidiary or in SPV.

2. For present price level of cost of completed and commissioned works, the previous year value shall be given weightage of 10% per year as follows:

S. No	Financial Year*	Weight age
(i)	2014-15	1.00
(ii)	2013-14	1.10
(iii)	2012-13	1.21
(iv)	2011-12	1.33
(v)	2010-11	1.46
(vi)	2009-10	1.61
(vii)	2008-09	1.77
(viii)	2007-08	1.95

*Financial Year 2007-08 means 1 April 2007 to 31 March 2008

2.4.2 Construction Experience in Key Activities

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
For the above or other contracts executed during the period stipulated in 2.4.1 above, a minimum construction experience in the following key activities: ----- Experience in Water Consumer meter replacement or installation for atleast 22,000 numbers in a single order ----- Experience in Construction, Commissioning single or multiple DMAs and covering minimum 22,000 numbers water connections with successful NRW reduction to 30% or less ----- Successful experience of conversion and or O&M of 24x7 water supply for minimum 22,000 connections with in the Project area. ----- Experience in Construction, Commissioning and O& M for a period of minimum three years of distribution network of 68 km length in a city ----- Experience in replacement or installing new House service connection of minimum 22,000 numbers ----- Experience in Instrumentation and SCADA installation & operation in water sector including flow, pressure, water quality etc..	must meet requirements	must meet requirements	Must meet 2 key Activities	not applicable	Form EXP - 2

Note: 1.Experience of the bidder earned by him as the JV partner will be considered to the limit of its share in the completed works shown in that JV or consortium agreement.

Section4 – Bidding Forms

Section 4 - Bidding Forms

This Section contains the forms which are to be completed by the Bidder and submitted as part of his Bid.

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Letter of Technical Bid

Date:
TENDER No.: 15/01/2015-16

Invitation for Bid No.:

To:
Joint City Engineer (Water Supply),
Pimpri Chinchwad Municipal Corporation,
Pimpri, Pune-18,

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) 8;
- (b) We offer to execute in conformity with the Bidding Documents the following Works:
- (c) Our Bid consisting of the Technical Bid and the Price Bid shall be valid for a period of 180 days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (d) Our firm, including any subcontractors or suppliers for any part of the Contract, have nationalities from eligible countries in accordance with ITB 4.2. *[insert the nationality of the Bidder, including that of all parties that comprise the Bidder if the Bidder is a consortium or association, and the nationality of each Subcontractor and Supplier]*,
- (e) We, including any subcontractors or suppliers for any part of the contract, do not have any conflict of interest in accordance with ITB 4.3;
- (f) We are not participating, as a Bidder in more than one bid in this bidding process in accordance with ITB 4.3(e).
- (g) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has not been declared ineligible by Employer, under the Employer's country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council;
- (h) We are not a government owned entity / We are a government owned entity but meet the requirements of ITB 4.5; *
- (i) We agree to permit Employer or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by Employer.
- (j) If our Bid is accepted, we commit to mobilizing key equipment and personnel in accordance with the requirements set forth in Section 6 (Employer's Requirements) and our technical proposal, or as otherwise agreed with the Employer.
- (k) In case we are determined as substantially responsive and lowest evaluated bidder, we undertake to form a company under Companies Act 2013 within 60 days time of receipt of letter of acceptance (applicable for JV bidder only)

Name

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date

* *Use one of the two options as appropriate.*

Letter of Price Bid

Date:

TENDER No.: 15/01/2015-16

To
Joint City Engineer (Water Supply),
Pimpri Chinchwad Municipal Corporation,
Pimpri, Pune-18

Invitation for Bid No.:

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) 8;
- (b) We offer to execute in conformity with the Bidding Documents and the Technical Bid submitted for the following Works:
- (c) The total price of our Bid, excluding any discounts offered in item (d) below is:
- (d) The discounts offered and the methodology for their application are:
- (e) Our Bid shall be valid for a period of 180 days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (f) If our Bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents;
- (g) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract: *

Name of Recipient	Address	Reason	Amount
.....
.....

- (h) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed; and
- (i) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.
- (j) We agree to permit Employer or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by Employer.

Name

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date

* If none has been paid or is to be paid, indicate "none".

Bid Security
(To be paid Electronically)
(Bank Guarantee- Not Applicable here)

.....*Bank's Name, and Address of Issuing Branch or Office*.....

Beneficiary: Municipal Commissioner PCMC, Pimpri Chinchwad Municipal Corporation,
Pimpri, Pune-18

Date:

Bid Security No.:

We have been informed that *name of the Bidder* (hereinafter called "the Bidder") has submitted to you its bid dated (hereinafter called "the Bid") for the execution of
. . . *name of contract* under Invitation for Bids No. ("the TENDER").

Furthermore, we understand that, according to your conditions, bids must be supported by a bid guarantee.

At the request of the Bidder, we *name of Bank* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *amount in figures*
(. *amount in words*) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

- (a) has withdrawn its Bid during the period of bid validity specified by the Bidder in the Letter of Technical Bid and Letter of Price Bid; or
- (b) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB"); or
- (c) having been notified of the acceptance of its Bid by the Employer during the period of bid validity, (i) fails or refuses to execute the Contract Agreement, or (ii) fails or refuses to furnish the Performance Security, in accordance with the ITB or (iii) fails or refuses to furnish a domestic preference security, if required.

This guarantee will expire: (a) if the Bidder is the successful Bidder, upon our receipt of copies of the Contract Agreement signed by the Bidder and the performance security issued to you upon the instruction of the Bidder; or (b) if the Bidder is not the successful Bidder, upon the earlier of (i) our receipt of a copy of your notification to the Bidder of the name of the successful Bidder; or (ii) 28 days after the expiration of the Bidder's bid.

Consequently, any demand for payment under this guarantee must be received by us at the office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458¹.

.....*Bank's seal and authorized signature(s)*.....

Note: All italicized text is for use in preparing this form and shall be deleted from the final document.

¹Or 758 as applicable.

Technical Proposal

Personnel

Equipment

Site Organization

Method Statement

Mobilization Schedule

Construction Schedule

Others

Personnel

Form PER – 1: Proposed Personal

Bidder shall provide the details of the proposed personnel and their experience records in the relevant Information Forms below for each candidate:

1.	Title of position*
	Name
2.	Title of position*
	Name
3.	Title of position*
	Name
4.	Title of position*
	Name
5.	Title of position*
	Name
6.	Title of position*
	Name
etc.	Title of position*
	Name

*As listed in Section 6 (Employer's Requirements).

Form PER – 2: Resume of Proposed Personnel

The Bidder shall provide all the information requested below.

Position		
Personnel information	Name	Date of birth
	Professional qualifications	
Present employment	Name of employer	
	Address of employer	
	Telephone	Contact (manager / personnel officer)
	Fax	E-mail
	Job title	Years with present employer

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

From	To	Company / Project / Position / Relevant technical and management experience

Equipment

Form EQU: Equipment

The Bidder shall provide adequate information and details to demonstrate clearly that it has the capability to meet the equipment requirements indicated in Section 6 (Employer's Requirements), using the Forms below. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder.

Item of Equipment					
Equipment Information	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%; padding: 5px;">Name of manufacturer</td> <td style="padding: 5px;">Model and power rating</td> </tr> <tr> <td style="padding: 5px;">Capacity</td> <td style="padding: 5px;">Year of manufacture</td> </tr> </table>	Name of manufacturer	Model and power rating	Capacity	Year of manufacture
	Name of manufacturer	Model and power rating			
Capacity	Year of manufacture				
Current Status	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Current location</td> </tr> <tr> <td style="padding: 5px;">Details of current commitments</td> </tr> </table>	Current location	Details of current commitments		
Current location					
Details of current commitments					
Source	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;"> Indicate source of the equipment <input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured </td> </tr> </table>	Indicate source of the equipment <input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured			
Indicate source of the equipment <input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured					

Omit the following information for equipment owned by the Bidder.

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

Site Organization

1. The Bidder shall supply a table of personnel and a chart showing the proposed organization to be established for (i) carrying out the construction works during all phases of works like mobilization; DMA Establishment works, preparation of Service Improvement Plan; design & construction period (Implementation period) and operation and maintenance period separately.

Method Statement

1. The project is for Selection of Contractor for Implementation of Continuous (24 x7) Pressurised **Water Supply in 40% area of Pimpri-Chinchwad and operation and maintenance of the system for 5 years**. The Employer's indicative guidelines on Methodology is given in the Employer's Requirement which may be followed.
2. The bidder is required to submit Approach and Method Statement for carrying out work of **Pimpri-Chinchwad Continuous (24/7) Pressurised Water Supply Project (40% Area)** alongwith the technical bid. The bidder's approach and method statement shall be in line with the overall principle of the Employer. The Service Improvement Plan (SIP) for DNI shall be compatible with these concepts.. The instrumentation capable of transferring the real time data to the SCADA system shall include the parameters of performance evaluation of the contractor during the operation, maintenance and service delivery. The bidder's methodology shall also spell out how the NRW and real losses will be measured within service area which starts from Service Reservoir and ends at the consumers in all zones / DMAs.
3. **Not applicable**
4. The activities for methodology shall also include following:
 - (i) Surveys or confirmatory surveys (as applicable) including topographic, geotechnical, underground utility surveys etc
 - (ii) Door to door consumer surveys and mapping of all properties showing water consumers
 - (iii) Review, verifications and updation of designs;
 - (iv) Preparation of SIP, including phasing of works, cost effective value Engineering and drawings
 - (v) Approval of SIP (may be in phases)
 - (vi) Implementation schedule along with methodology as per scope of works:
 - (vii) Operation Services;
 - (viii) Customer services;
 - (ix) Safeguard activities;

Work plan:

1. The Contractors will submit detailed work plan as part of Technical proposal covering all sections of work to achieve sectional and full work key milestones as shown in Employer's Requirement

Mobilization Schedule

2. The Bidder shall submit mobilization and de-mobilization schedule of personnel and equipments in detail for all phases of works. The mobilization schedule should include mobilization of skilled and unskilled manpower, different machineries and equipment, materials, as required in each Phase.

Construction Schedule

3. The Bidder shall prepare and submit overall construction schedule. The construction schedule shall be designed and documented in a series of tasks and task assignments complete with projected completion target dates with the aid of computer operated management software like Microsoft project office, Primavera or latest by using Gantt charts and PERT diagrams to allow all actors to know their contribution towards fulfilling the Employer's Requirement.

Bidder's Qualification

To establish its qualifications to perform the contract in accordance with Section 3 (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder.

Form ELI - 1: Bidder's Information Sheet

Bidder's Information	
Bidder's legal name	
In case of JV, legal name of each partner	
Bidder's country of constitution	
Bidder's year of constitution	
Bidder's legal address in country of constitution	
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)	
<p>Attached are copies of the following original documents.</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1. In case of single entity, articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and 4.2. <input type="checkbox"/> 2. Authorization to represent the firm or JV named in above, in accordance with ITB 20.2. <input type="checkbox"/> 3. In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. <input type="checkbox"/> 4. In case of a government-owned entity, any additional documents not covered under 1 above required to comply with ITB 4.5. 	

Form ELI - 2: JV Information Sheet

Each member of a JV and Specialist Subcontractor must fill in this form

JV / Specialist Subcontractor Information	
Bidder's legal name	
JV Partner's or Specialist Subcontractor's legal name	
JV Partner's or Specialist Subcontractor's country of constitution	
JV Partner's or Specialist Subcontractor's year of constitution	
JV Partner's or Specialist Subcontractor's legal address in country of constitution	
JV Partner's or Specialist Subcontractor's authorized representative information (name, address, telephone numbers, fax numbers, e-mail address)	
<p>Attached are copies of the following original documents.</p> <p><input type="checkbox"/> 1. Articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and 4.2.</p> <p><input type="checkbox"/> 2. Authorization to represent the firm named above, in accordance with ITB 20.2.</p> <p><input type="checkbox"/> 3. In the case of government-owned entity, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB 4.5.</p>	

Specialist Subcontractor is a specialist enterprise engaged for highly specialized processes which cannot be provided by the main Contractor.

Form LIT –1: Pending Litigation and Arbitration

Each Bidder or member of a JV must fill in this form if so required under Criterion 2.2 of Section 3 (Evaluation and Qualification Criteria).

Pending Litigation and Arbitration			
<input type="checkbox"/> No pending litigation and arbitration.			
<input type="checkbox"/> Below is a description of all pending litigation and arbitration involving the Bidder (or each JV member if Bidder is a Joint Venture).			
Year	Matter in Dispute	Value of Pending Claim in US\$ Equivalent	Value of Pending Claim as a Percentage of Net Worth

Form FIN - 1: Historical Financial Performance

Each Bidder or member of a JV must fill in this form

Financial Data for Previous 6Years [INR Equivalent]		
Year 1: 2014-15	Year 2: 2013-14	Year3: 2012-13

Information from Balance Sheet

Total Assets			
Total Liabilities			
Net Worth			
Current Assets			
Current Liabilities			

Information from Income Statement

Total Revenues			
Profits Before Taxes			
Profits After Taxes			
Return on investment (ratio of annual profit before taxes and the net worth of previous year)			

Financial Data for Previous 6 Years [INR Equivalent]		
Year 4: 2011-12	Year 5: 2010-11	Year 6: 2009-10

Information from Balance Sheet

Total Assets			
Total Liabilities			
Net Worth			
Current Assets			
Current Liabilities			

Information from Income Statement

Total Revenues			
Profits Before Taxes			
Profits After Taxes			
Return on investment (ratio of annual profit before taxes and the net worth of previous year)			

- Attached are copies of financial statements (balance sheets including all related notes, and income statements) for the last 6 years, as indicated above, complying with the following conditions.
- all such documents reflect the financial situation of the legal entity or entities comprising the Bidder and not the Bidder's parent companies, subsidiaries or affiliates.
 - Historic financial statements must be audited by a certified accountant.
 - Historic financial statements must be complete, including all notes to the financial statements.
 - Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

Form FIN - 2: Average Annual Turnover

Each Bidder or member of a JV must fill in this form

The information supplied should be the Annual Turnover of the Bidder or each member of a JV in terms of the amounts billed to clients for each year for work in progress or completed, converted to INR at the rate of exchange at the end of the period reported.

Annual Turnover Data for the Last 3 Years			
Year	Amount Currency	Exchange Rate	INR Equivalent
Average Annual Turnover			

Form FIN – 3: Availability of Financial Resources

Specify proposed sources of financing, such as liquid assets,¹ lines of credit, and other financial resources (other than any contractual advance payments) available to meet the financial resources requirement indicated in Form Fin-4.

Financial Resources		
No.	Source of financing	Amount (US\$ equivalent)
1		
2		
3		

¹ *Liquid Assets mean cash and cash equivalents, short-term financial instruments, short term available-for-sale-securities, marketable securities, trade receivables, short-term financing receivables and other assets that can be converted into cash within one year.*

Note:

- *The bidder shall provide supporting documents like letter from the Banks for the revolving line of credit facility etc specific to the project(in format FIN 5) if applicable for its declared availability of financial resources.*
- *Bidder shall provide details on available credit facility from each source of financing after utilizing to the commitments*

Form FIN- 4: Financial Resources Requirement

Bidder (or each JV partner) should provide information indicated below in order to calculate the aggregated financial resources requirement, which equals the sum of: (i) the Bidder's (or each JV partner's) current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued and (ii) financial resources requirement for subject contract as determined by the Employer. Bidder must also disclose any other financial obligations that could materially affect the implementation of subject contract if such contract were to be awarded to the Bidder.

Financial Resources Requirement						
No	Name of Contract	Employer's Contact (Address, Tel, Fax)	Contract Completion Date	Remaining Contract Period in months (A)¹	Outstanding Contract Value (B)²	Monthly Financial Resources Requirement (B / A)
1						
2						
3						
4						
A. Cumulative Financial Resources Requirement for Current Contract Commitments ³						INR/US\$
B. Financial Resources Requirement for Subject Contract (Employer to specify)*						INR 2150 Lacs / US\$ 3.30 million
Financial Resources Requirement (Sum of A and B)						INR/ US\$

¹ Remaining contract period to be calculated from 28 days prior to bid submission deadline.

² Remaining Outstanding Contract Values to be calculated from 28 days prior to the bid submission deadline (US\$ equivalent based on the foreign exchange rate as of the same date).

³ Bidder should calculate this amount based on the sum of Monthly Financial Resources Requirements for Each Current Works Contract based on the following calculation:

$$\frac{\text{Estimated Contract Value (Inclusive of Taxes and Duties)}}{\text{Completion Period in Months}}$$

*Employer should specify financial resources requirement for the subject contract based on the following calculation: $3 \times \text{Estimated Contract Value (Inclusive of Taxes and Duties)} / \text{Completion Period in Months}$

Form FIN -5: Sample Form for assured Revolving line of credit facility

(To be submitted by a Reputed Bank on the Bank's Letterhead)

Date: *(Insert Date)*

To: **Joint City Engineer (Water Supply),**
Pimpri Chinchwad Municipal Corporation,
Pimpri
Maharashtra, India

Subject: Letter of Assurance for Revolving line of credit facility for INR ----

Dear Sir,

WHEREAS _____ [*name and address of Bidder*] (**hereinafter called the "Bidder"**) intends to submit a bid for----- (name of contract package) -----" under the Jawaharlal Nehru Urban Renewal Mission (JnNURM) of Pimpri Chinchwad Municipal Corporation (PCMC) (**hereinafter called the "Employer"**) in response to the Invitation for Bids issued by the PCMC through TENDER no. -----; and

WHEREAS the Bidder has requested that an assured revolving line of credit be provided to it for executing the ----- (name of contract package) -----
-----In the event that the Contract is awarded to it; then

KNOW ALL THESE PEOPLE by these presents that We _____ [*name of Bank*] of _____ [*name of Country*] having our registered office at _____ [*address of registered office*] are willing to provide to _____ (the Bidder) a sum of up to _____ [*amount of guarantee in figures and words*] as an assured revolving line of credit for executing the Works under ----- (name of contract package) -----should the Bidder be awarded the contract based on its tendered prices.

We understand that this assurance may be taken into consideration by the Employer during evaluation of the Bidder's financial capabilities, and further assure that we intend to maintain this revolving line of credit until such time as the Works are completed and taken over by the Employer.

SEALED with the Common Seal of the said Bank on the ____ day of _____, 2015.

Date: _____ Signature of the Bank: _____

Witness: _____ Seal: _____

[Signature, name and address]

Note: *This is a suggested format that can be used by the bidders and not a mandatory requirement to be used against the bidder during evaluation.*

Form FIN -6: Available bidding capacity Information and declaration

(To be submitted by bidder through affidavit as explained)

The bidder should have a minimum available bidding capacity of 100 % of the ECV

The available bidding capacity shall be worked out by the following formula

$$\text{Bidding Capacity} = (A*N^2) - B$$

where,

A= Maximum value of construction works executed in any one year during the last five financial years i.e. 20XX-XX, 20XX-XX, 20XX-XX, 20XX-XX and 20XX-XX taking into account the completed as well as works in progress (updated to the current price level), rate of inflation has been taken as 10% per year).

N = Number of years prescribed for completion of works for which bids has been invited).

B= Value at current price level of existing commitments and ongoing works to be completed during the next XX years (period of completion of work for which bids have been invited). Bidders will give a calculation for the same.

Bidders should also submit an affidavit on non judicial stamp paper of Rs. 100/- in original confirming that the details of all such works have been provided either being executed in their name or being executed as joint venture within India or abroad (bidder's share). In case of any concealment of information, the bidder's bid will be rejected. Please note that the affidavit as mentioned above should be duly notarized and submitted along with the bid.

(Note:- Specify the years for which the value of construction works is to be checked. For bids announced in Q1 or Q2 of a financial year, data for penultimate financial year and its 4 preceding financial years will be demanded. For bids announced in Q3 or Q4 of a financial year, data for 5 preceding financial years will be demanded. Example: if a bid is announced in Oct-2015, then data for FY 2014-15, 2013-14, 2012-13, 2011-12 and 2010-11 will be demanded. And, if a bid is announced in May 2011, then data for FY 2013-14, 2012-13, 2011-12, 2010-11 and 2009-10 will be demanded)

Example:

1. For calculating "A" – let's assume the maximum value of construction turnover in last 5 financial years is Rs. 100cr in FY 2009-10. Then taking 10% as given inflation rate, the present value of the maximum construction turnover in FY 2010-11 shall be Rs 110cr [=100*(1+10%)].
2. For "N", let's assume the current project duration to be 2 years.
3. For "B", let's assume that value for existing commitments and ongoing work in 2010-11 and 2011-12 be Rs. 100 cr and Rs. 200 cr. respectively. Then taking 10% as given discount rate, the current price level of existing commitments and ongoing works shall be Rs. 282 cr. [= {100/(1+10%)^0} + {200/(1+10%)^1}].

$$\begin{aligned}\text{Bidding Capacity} &= (A*N^2) - B \\ &= (110*2^2) - 282 = \text{Rs. } 158 \text{ cr.}\end{aligned}$$

Form EXP – 1: Contracts of Similar Size and Nature

Fill up one (1) form per contract.

Contract of Similar Size and Nature		
Contract No. of	Contract Identification	
Award Date	Completion Date	
Total Contract Amount	Equivalent INR -----	
If partner in a JV or subcontractor, specify participation of total contract amount	Percent of Total	Amount
Employer's Name Address Telephone/Fax Number E-mail		
Description of the similarity in accordance with Criteria 2.4.1 of Section 3		
Reference page No. of copy of work order completion certificate in support of above experience:		

Form EXP - 2: Construction Experience in Key Activities

Fill up one (1) form per contract

Contract with Similar Key Activities		
Contract No. of	Contract Identification	
Award Date	Completion Date	
Total Contract Amount	-----Equivalent INR -----	
If partner in a JV or subcontractor, specify participation of total contract amount	Percent of Total	Amount
Employer's Name Address Telephone Number Fax Number E-mail		
Description of the key activities in accordance with Criteria 2.4.2 of Section 3		
Reference page No. of copy of work order completion certificate in support of above experience:		

Bill of Quantities

A. Preamble to Bill of Quantities

1. The Bill of Quantities (BOQ) shall be read in conjunction with the section 6.23 for particular item description and section 6 for specific requirements, section 7 GCC & section 8 PCC for payments terms & conditions.
2. The quantities given in the BOQ are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Employer's Representative, and valued at the rates and prices bid in the priced BOQ, where applicable, and otherwise at such rates and prices as the Employer's Representative may fix within the terms of the Contract.
3. The rates for specific material and goods falling under Excise Exemption as per Central Excise Notification no. 12/2012-CE dated 17-03-2012 issued & updated by Government of India time to time shall be without any excise duty. Excise Exemption on the materials like pipes, valves, specials, flow meter, instrument, etc. shall be availed under this project. Contractor shall be responsible to get the Exemption and liaison with concerned department. However, PCMC shall assist Contractor to obtain certification towards Exemption of Excise Duties. The responsibility for obtaining any such exemptions from the Competent Authority will remain with the Contractor and the Employer shall not in any way be responsible for admissibility of the claims or eligibility of the Contractor.
4. The rates and prices bid in the priced Bill of Quantities shall, except as otherwise provided under the Contract, include all construction equipment, labor, supervision, materials, surveying, setting out, erection, maintenance, all lead and lift, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.
5. General directions and descriptions of work and Materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the priced Bill of Quantities.
6. The method of execution and measurement of completed work for payment shall be in accordance to the respective procedures provided in the Technical Specifications or Particular Specifications under this Contract and in the absence of which shall be in accordance to the relevant BIS Standard and Standard Specification published by MJP / the Public Works Department, Government of India as the case may be.
7. Rock is defined as all material that, in the opinion of the Employer's Representative, require blasting, or the use of metal wedges and sledgehammers, or the use of compressed air drilling for their removal, and that cannot be extracted by ripping with a tractor of at least 150 brake horse power (BHP) with a single, rear-mounted, heavy-duty ripper.
8. All defective works are liable to be demolished, rebuilt and defective materials replaced by the contractor at his own cost and time

-
9. In view of the site location and their prevailing condition, it is mandatory to the Contractor to visit the site and make himself thoroughly familiar with the site conditions, access and account for all possible difficulties and other requirements mentioned elsewhere in his bid prior to submission. When a contractor submits his bid for this work, it will be considered that he has quoted for this work with full and complete knowledge of the site and prevailing conditions, and no claim for additional compensation shall be entertained on this account.
 10. Description of items in this BOQ is by itself not complete, and for a full description the BOQ should be read together with the section 6.23 for respective items Technical Specifications. Rates quoted in the BOQ are deemed to have included all aspects covered in the Preamble and Technical Specifications.
 11. The Bidder shall, in the course of studying the bid document, point out all his/her remarks on the documents and make all his/her queries to the Employer at the time of pre-bid meeting who will study these remarks and clarify any discrepancy between the Bidding Documents.
 12. Submissions shall be strictly in accordance with the documents and shall not be qualified in any other way. The Bidder shall not alter the text of the BOQ.
 13. Extra and excess items of work shall not vitiate the Contract. The Contractor shall be bound to execute extra items of work as directed by the Engineer. The rates for extra items will be as per rates decided under Contract Conditions.
 14. For the evaluation process, if requested by the Evaluation Committee, the Bidder shall provide a sheet analysis for all priced items showing how the rate entered was derived. Successful bidder shall submit the same to the Employer.
 15. The rates shall be deemed to include all the cost of Works described in the Bidding Documents to operate, maintain and manage the water supply with in the project area as per the scope of work.
 16. The Bidder shall satisfy himself/herself as to the meaning of every item in the BOQ. The rates and prices inserted in the BOQ by the bidder shall be deemed to cover all costs, taxes, customs and import duties, levies, profits, risks, liabilities, insurance and obligations set forth or implied in the bid, as well as proper operation, maintenance and management of the Works including, but not limited to the following:
 - (i) All labor and Materials including consumables;
 - (ii) All temporary work of every description required including over ground pumping and other requirements to avoid disruption to the service whilst maintenance or repair work is carried out;
 - (iii) The provision and use of all equipment, tools and Plant of every kind, whether mechanical or non-mechanical, required for the expeditious carrying out of the Works in their proper sequence;
 - (iv) Provision for scaffolding, staging, guard rails, temporary stairs, temporary access during execution, approach roads up to the Site for the movement of vehicles, and heavy excavation machinery with supporting transport facility;
 - (v) Provision for excavation, back-filling, bringing to the Site extra fill for back-fill, making good and reinstating surfaces, disposing of surplus material, dealing with all ground water and wastewater flows, and for work in close proximity to other utility apparatus including protecting that apparatus;

-
- (vi) Provision for work on pipe line corridors such as traffic control measures, safety barriers, obtaining any approvals and permits from authorities, and reinstatement of surfaces;
 - (vii) Cooperation and coordination of the work with related authorities, other contractors and utilities, including obtaining their permission before starting the related Works if required; and
 - (viii) Providing security arrangements to guard the Site and premises at all times and to maintain strict control on the movement of Materials and labor until the completion of the work.
17. Electricity costs and initial connection charges associated with operations shall be paid by PCMC directly to the electricity service provider. The power connections shall be obtained in the name of PCMC, the charges of which will be paid by PCMC directly to electricity department or reimbursed under provisional sum if paid by the Contractor.
18. The serviceable materials, recovered while shifting of utilities as ascertained by the Engineer, shall be deposited at designated store yards or as directed by the Engineer. No payment shall be made to the Contractor in this regard.
19. Works itemized in the BOQ will be subject to measurement. Such measurement will be in the unit of measurement shown the BOQ and payment shall be made on the measured quantities.
20. Any item of work which is specified and required for the construction works, but not included or itemized in the BOQ, shall be treated as an extra item and will be paid separately.
21. All rules and regulations of the labor department, contract labor Laws, provident fund and employee state insurance and connected Laws, and all other Laws of the land are to be complied with by the Bidder within the quoted rates.
22. PCMC will provide required space for construction of service centers, and stores may be in PCMC campuses or at suitable locations. No land will be provided by the Employer to the Contractor for constructing any structure for his labor, workman and supervisory camps, un-authorized hutments, at the Site or within the premises. The Contractor shall make his/her own arrangements for the same outside the premises/boundary. These, if any, shall be with the knowledge of and prior approval of the Employer's Representative.
23. Bidders shall quote the fees / rates as per following;
- i) DMA Establishment Cost shall be minimum 10% of total Contract Price (Evaluated Bid Price)
 - ii) Operation & Maintenance service fees shall be minimum 25% of total Contract Price as per BoQ
 - iii) The ratio of DMA Establishment Fees, Construction Works cost & Operation and maintenance fees shall be in the ration of 1:6.5:2.5
- Any increase in Construction Works cost shall be subject to comparison to the ratio above. In that case, Construction works cost will be reduced and adjusted with DMA Establishment Fees and Operation and Maintenance Fees proportionately by keeping the total Bid Price unchanged.

24. Bill of quantity (BOQ) for House service connection (HSC):- There are two methods of HSC is considered in BOQ. Method-1 is open excavation & Method-2 is through Moling Method.

If work is executed through Method-1 payment shall be made as per item No. 36 & 37 as applicable and no additional payment for MDPE pipe will be made & item no-71, 72, 73 & 74 is not applicable.

If work is executed through Method-2 payment shall be made as per item No-71 (Moling) + item No-72 (MDPE pipe) + Item no 73 & 74 (HSC on C.I, D.I & HDPE pipe respectively for actual measurements Item no 36 & 37 is not applicable.

Kindly Note for any HSC the payment will be made for any one Method only.

25. Metric System and Abbreviations

Millilitre	ml
Million Litres per Day	mld
Million Litre	ML
Litre	ltr
Linear meter	m
Gram	gm
Square metre	m ²
Cubic metre	m ³
Number	No.
Kilogram	kg
Lump Sum	LS
Indian Rupees	Rs
Millimetre	mm
Square Centimetre	cm ²
Square Millimetre	mm ²

26. The abbreviations used in the Specification and BOQ shall be read as follows:

IS	Indian Standard
BHP	Brake Horsepower
BS	British Standard
Cm or CM or cm	Centimeter
Cum or CUM	Cubic Meter
MM or mm	Millimeter /s
Rm or RM or RMT	Running Meters
Sqm	Square Meters
SqKm	Square Kilometers
Qty.	Quantity
Drg.	Drawing
No. or Nos.	Number or Numbers
PCC	Plain Cement Concrete
RCC	Reinforced Cement Concrete
Rs.	Indian Rupees

Bill of Quantities
(Provided in Part 2)

Section 5 - Eligible Countries

Section 5 - Eligible Countries

Single Entity / Lead Partner Nationality – India

JV Partner - Eligible Countries includes all countries unless barred by Govt. Of India or Security Council of United Nations

Pimpri Chinchwad Municipal Corporation

Section 6: Employers Requirements

Vol-1 (Part - I) Technical Bid

BIDDING DOCUMENT

for the

**Selection of Contractor for Implementation of Continuous (24x7)
Pressurized Water Supply System in 40% Project Area of Pimpri
Chinchwad and Operation and Maintenance of the System for the
period of Five years**

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6.1 Introduction

6.1.1 Brief History of Water Supply of Pimpri Chinchwad

1. Pimpri Chinchwad is one of the most vibrant industrial and urban settlements in Maharashtra. Its developed industrial sector, proximity to Pune and the growing IT sector draws a large group of people and businesses to settle in the city, temporarily or permanently. This creates a growing demand for urban infrastructure, especially for water supply and sanitation.
2. Pimpri Chinchwad city is managed and governed by Pimpri Chinchwad Municipal Corporation (PCMC) and is responsible for providing infrastructure services to the citizens of the city. Pimpri Chinchwad Municipal Corporation has well planned infrastructure for Water supply system, which covers approximate area of 177 sq. km with a population of over 20 lakhs. For administrative purposes, the entire city is divided into six zones. The present source of water supply for the PCMC area is river Pawana.

6.1.2 Project Background & Objective

3. The overall objective of the PCMC Water Supply Project (40% Area) is to deliver a continuous, pressurized supply of safe water to the entire population of Pimpri Chinchwad city while improving infrastructure services to its citizens. In this context, the Authority proposes to convert intermittent water supply system to continuous (24 x 7) water supply system in the 40% area covering a population of about 8 lakhs. The improvement work will be executed under JnNURM sanctioned funding for indicative project cost of Rs. 143 Crore (Rupees one Hundred and forty three crore) for the selected 40% project area of PCMC. The area is so selected that there is enough storage and no new tanks are required to be constructed. The Authority intends to develop 24 x 7 water supply for 40% of the area with the assistance of the Contractor through Public Private Partnership (PPP). The project would aim at improving Technical & commercial efficiencies and upgrading existing intermittent supply for continuous pressurized water supply & reduction in non revenue & demand management to reduce the gross water consumption as per the norms.
4. The principal features of the project shall be as follows
 - i. Existing quantity of water supply: Existing total supply to PCMC is 428 MLD out of this water shall be directed for the project for the selected 40% Area.
 - ii. The project objectives to be achieved service level benchmark / performance targets as specified in section 8 of PCC for water supply services

5. The Scope of Services described hereunder is indicative and may not be exhaustive or complete. The Contractor shall undertake its own detailed investigation and verification of the Project Facilities and of the designs prepared by the Employer to ensure that specific objectives of the project can be achieved.
6. The Scope of Services shall include all technical, managerial, administrative, commercial, environmental, and social interventions as required in accordance with acceptable, prudent water utility construction and management practices, ensuring safe and sustainable drinking water supply services to the Consumers in the Service Area.

6.1.3 Existing Water Supply sources & Distribution

7. The source of water supply to the city of Pimpri Chinchwad is a dam located upstream 40 km. of river Pawana. Intake works are constructed in the riverbed 150 mt upstream of the existing “Punawale weir” near “Ravet” village, situated about 6 km. from the city. At present, the total quantum of water released at the source for the city is 428 MLD.
8. The service levels with regard to water supply are comparatively better than those obtaining in many other cities in the country. Pimpri Chinchwad has a gross supply of over 154 lpcd (accounting for about 15% of transmission losses) and a net supply of 138 lpcd (accounting for 10% of distribution losses).
9. The distribution network in the city covers a length of 1800 km., which is about 95 percent of the road length. The system presently covers almost 100 percent of the developed areas including the slums. The newly added areas are currently being catered to by tanker supply. The distribution system in the city is based on both gravity and pumping.
10. The distribution system in the city is based on the division of the entire city into two distinct parts on the basis of its topography, created by the ridge running in the east-west direction. Gravity Zone, comprising areas south of the ridge and sloping towards Pawana river. Pumping Zone, comprising areas north of the ridge and sloping towards the Indrayani river.
11. There are total 1,41,716 service connections in entire PCMC area as per details shown in Table below;

Table 1: Details of House Connections

Category	Number
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Total Connections	141716
Metered Connections	128290
Un-Metered Connections	2948
Slum Connections	6528
Non Domestic Connections	3950

Source: Cities Development Initiative for Asia (CDIA), Prefeasibility Study Report of the Pimpri-Chinchwad 24x7 Project, May, 2012

6.1.4 Definitions

12. The words, terms and expressions beginning with capital letters and defined under this Section 6, including those in Section 7 - General Conditions of Contract and those in Section 8 – Particular Conditions of Contract shall, unless the context otherwise requires, have the meanings ascribed thereto/herein;

“Boundary Limits” shall mean the boundary within which the Contractor has the responsibility of providing Services in accordance to the terms and conditions under this Contract;

“Bulk Water” means the treated bulk water supplied by the Employer to specific Supply Points of project area;

“Consumer” or “Customer” means all entities (including individuals) to which/whom PCMC provides water services through the existing water distribution system and will supply through the newly developed system and includes all existing consumers at the time of the Commencement Date and entities which become consumers after the Commencement Date;

“Contract Date” means the date on which the contract is signed.

“Contract completion date” means the final takeover date that includes operation services.

“Commencement Date” means the stipulated date of commencement of contract indicated in Work Order. Work order is issued after signing of the agreement or as decided by the Employer.

“Consumer Water Connection Points” means the water connection points from which Consumers take delivery of water.

“Construction Completion Date” is the date when all Design & Construction works have been completed and commissioned.

“Construction Plan” or “System Improvement Plan” means the Contractor’s Plan for implementation of Design & Construction works.

“CPHEEO” means the Central Public Health and Environmental Engineering Organization under the Ministry of Urban Development, Government of India;

“Customer Service Centers” or “CSC” means the special infrastructure provided by Employer and furnished & operated by the Contractor to provide public relations services to consumers under this Contract;

“Critical Measurement Points” shall mean the locations as agreed by the Employer in the Construction Plan and also as added during the term of the Contract for undertaking measurement of flow and pressure in the water supply system for facilitating the monitoring of Minimum Service Levels stipulated in Schedule 7: Performance Targets & Standards as per Employers Requirement;

“Design & Construction” means the period commencing from contract commencement date to completion of design and construction of the permanent works.

“DMA” or District Metered Area (DMA) means a discrete area of water distribution network, created by closing boundary valves so that it remains flexible to changing demands.

“DMA Start of Operations Date” is the first date when water supply services in the first DMA will be based on a 24/7 basis of water supply operations also means “Initial Take Over date”

“DPR” means the Detailed Project Report of PCMC Water Supply Project for 40% project Area prepared and approved by the Employer under JnNURM;

“Electricity Department” means the local service provider supplying electrical energy for Operation Service of the Facilities;

“Engineer” means the person named in this section 6 or Section 7 GCC or Section 8 PCC (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Engineer) who is responsible for supervising the execution of the Works and Services and administering the Contract.

“Existing Assets” means those infrastructure components, plant, machinery, equipment and any other units existing in the Service Area as on the Commencement Date;

“ESR” means Elevated Service Reservoir; GLSR (Ground Level service Reservoir), SR (Service Reservoirs), OHSR (Over Head Service Reservoir) has the same meaning as ESR;

“Final Take Over Date’ means the date on which the Contractor finally takes over the entire water supply distribution system including from all ESRs and distribution system from ESRs to consumer end laid under this contract including existing & new consumers.

“Initial Take Over Date” means the date on which the Contractor takes over the first zone / DMA for operation and maintenance, after completing works of water distribution network and making house connections.

“JnNURM” means Jawaharlal Neharu National Urban Renewal Mission;

“Mandatory Works” means those works which are listed in the Bill of Quantities and are required to be constructed, installed or erected as the case may be and commissioned in line with the provisions of this Contract unless such works may require change of scope or design as agreed by the Parties as part of the Construction Plan / SIP Plan;

“Mandatory key personnel” means expert services to be provided by Contractor during construction as well as Operation & Maintenance period under this contract;

“Minimum Service Levels: means the levels of service to be maintained in the operations, maintenance and management and service delivery to consumers more so described in Schedule 7– Performance Targets & Standards in PCC;

“Mobilization period” means the period in which activities defined in section 6: Employers Requirement would be completed. It is the period commencing from the date of commencement of contract and extends up to 30 days.

NRW in a DMA: A district metering area refers to a zone of a water supply network that can be isolated, and provided with input bulk meter, to measure input water quantity and consumer meters to measure consumption. The difference is used for assessing NRW in the district metering area.

“New Assets” means those infrastructure components, plant, machinery, equipment, instruments and any other units procured, supplied, installed, erected, programmed and commissioned by the Contractor during the Contract Period other than those existing on the Commencement Date;

“Operation and Maintenance Plan” means the plan for operating and maintaining the water supply system, submitted by the Contractor, and approved by the Engineer

“Contractor” or Operator is synonymous to the Contractor.

“PCMC” means Pimpri Chinchwad Municipal Corporation;

“Performance Related Payment” means payment to the Contractor based upon achievement of Performance Standards as per Schedule 5 & 7 of PCC

“Performance Standards” mean the Minimum Service Levels to be achieved and maintained by the Contractor during each period of the Contract set forth in Performance Targets & Standards in this Section 6;

“Potable Water Specification” means the water quality requirements of potable water to be supplied to the Consumers as stipulated under Recommended Guidelines for Physical and Chemical Parameters and Bacteriological Quality of Drinking Water, in the Manual on Water Supply and Treatment, CPHEEO, Government of India, Ministry of Urban Development, New Delhi;

“Preparatory Period / Phase or System Improvement Plan period” is the period commencing from the contract commencement date during which time the Contractor will prepare the Service Improvement Plan (SIP) for Selected Operational Zones within 90 days;

“Project Facilities” or “Facilities” means all existing and proposed infrastructure facilities including open lands, Pipelines, buildings, structures, Plant, machinery, softwares, and equipment under PCMC;

“Project Information Memorandum” or “PIM” shall mean the report prepared by the Employer detailing the Project as provided in Supplementary Information and available at the e-data room set up by the Employer;

“Project Management Consultant” or “PMC” means the agency appointed by the Employer to provide project management advisory services to the Employer;

“PRV” means Pressure Reducing Valve;

“Scope of Services” shall mean all those services to be provided by the Contractor in accordance to the obligations, activities, responsibilities and tasks in implementing the Project to achieve the Minimum Service Levels in accordance to the Employers Requirements and Contract Conditions;

“Sectional Completion period” means period between Initial takeover date and final Takeover date.

“Services” means all those activities, interventions, actions and tasks required as part of the implementation programme including all planning, verification & validation of detailed engineering design, procurement, construction, rehabilitation, operations, maintenance, and management in providing continuous pressurized water supply to the consumers of PCMC;

“Service Area” or “Project Area” means the area within PCMC administrative municipal boundaries which is approximately 40% of total project area where PCMC is responsible for provision of water supply services to consumers. The Service Area can be either within the administrative municipal boundary as extended from time to time and also include future

growth areas where PCMC decides to provide expansion of water services and undertake operation, maintenance and management services;

“Supply Points” or “Bulk water supply points” means the points where the PCMC will supply Bulk Water to the Contractor;

“Training Plan” means a report containing the detailed PCMC staff training program;

6.2 SCOPE OF SERVICES

13. The Scope of Services (SoS) described hereunder is neither exhaustive nor complete and is indicative only. The Contractor shall undertake detailed investigation of the Project Facilities, study, make assessments and ascertain all by itself the required tasks, interventions, inputs, and all other necessities to determine the complete Scope of Services for achieving the Minimum Service Levels as stipulated in Schedule –7 Performance Targets & Standards

The Services shall include all technical, managerial, administrative, commercial, social interventions as required in accordance to acceptable, prudent water utility management practices for ensuring safe and sustainable drinking water supply services to total number of 54000 Consumers in the selected operational zones within 40% project /Service Areas of PCMC.

The Scope of Services during the each Period of the Agreement is detailed hereunder;

6.2.1 Scope of Contract for Design & Construction period:

14. The Scope of contract for design & construction and Operating period is detailed out in Table below.

Table 2: Scope of Contract during Design & Construction Period

S.N.	Components	Indicative Quantities
1.	Preparation of System improvement Plan SIP within specified period and according to the contract conditions. SIP Preparation & Implementation shall include but not limited to the Survey & investigations of existing assets, distribution network, mapping, freezing selected DMA boundaries, Hydraulic Modelling, ascertain the necessity and the extent of rehabilitation required. SIP submission for priority zones shall be within 60 days and other zones submission within 180 days from the commencement date.	
2.	Survey and investigations of transmission and distribution network for levels (including primary Network main of 1000 mm as per DPR)	Estimated length 350 to 450 kms

S.N.	Components	Indicative Quantities													
3.	Supply, Laying, installation and commissioning of Clear Water Transmission Mains with diameter and length as indicated herein, from Clear water Pump house at Nigadi WTP to various OHSR's/ ESR's within the PCMC Command Area.	<table border="1"> <thead> <tr> <th>Diameter of DI-K7 (mm)</th> <th>Length (m)</th> </tr> </thead> <tbody> <tr> <td>300</td> <td>903</td> </tr> <tr> <td>450</td> <td>608</td> </tr> <tr> <td>500</td> <td>776</td> </tr> <tr> <td>1,000.00</td> <td>7,436</td> </tr> <tr> <td>Total</td> <td>9723</td> </tr> </tbody> </table>	Diameter of DI-K7 (mm)	Length (m)	300	903	450	608	500	776	1,000.00	7,436	Total	9723	
Diameter of DI-K7 (mm)	Length (m)														
300	903														
450	608														
500	776														
1,000.00	7,436														
Total	9723														
4.	Supply, Laying, installation and commissioning of distribution network with diameter and length as indicated herein within tentative 26 DMA's of selected operational zones within service Area. (54,000 Connections)	Distribution system of length 54.740 Km (Di 9.07 Km and HDPE 45.846 Km)													
5.	Distribution System- Replacement of pipes by DI pipes	22.5 km													
6.	Distribution System- Replacement of pipes by HDPE pipes	81 km													
7.	Providing House Service Connections MDPE pipe on D.I pipe	Maximum 54000 nos.													
8.	Providing House Service Connections MDPE pipe on HDPE pipe														
9.	Providing and Installing domestic customer meters without remote reading facility														
10.	providing and Installing domestic & commercial customer Fully AMR meters														
11.	<p>Estimate for the work of providing and Installing Bulk Flow Meter</p> <p>Estimate for the work of providing and Installing Electromagnetic Flow Meter</p>	32 nos.	180 Nos.												
12.	Providing & Fixing PRV Valves in PCMC	25 nos.													
13.	Designing, manufacturing, providing, erecting and fixing altitude control valve for maintaining water level in the service	27 nos.													

S.N.	Components	Indicative Quantities
	reservoir	
14.	Finding invisible leaks in pipeline network, carrying out repairs and allied works in 40% of Pimpri Chinchwad Municipal Corporation area	350kms
15	Central SCADA system including PLC's & interfacing with existing & new instrumentation for distribution system management and integration etc. with web enabled facility.	40% Area

- Note:-**
1. Quantities indicated in the Table above are indicative and need to be confirmed by Contractor through a SIP.
 2. All components of implementation of SIP are to be understood including commissioning and duly approved by Engineer / PMC.

6.2.2 Scope of Operation & Maintenance period

15. From the design, construction completion date (which shall also mean sectional/ priority works completion date of priority zone) the Contractor shall take over the Operation and maintenance services from PCMC for the 40% PCMC area having 54000 number connections within selected DMA's. Contractor shall be responsible for operation, maintenance and management of water supply in project / service area as detailed below. Contractor shall act as back office support to PCMC while managing the customer related services or complaints. The Scope of O&M shall include but not limited to the following:-

Table 3: Scope of Works under Operation Phase

No	Obligation	Period
1	Operation and Maintenance of infrastructure within the DMA's Established under this project including major and minor repairs.	from initial takeover date;
2	O & M of the distribution network for distributing water efficiently, equitably and minimizing water loss / non-revenue water (NRW), providing expert services for leak detection, reduction and maintaining the infrastructure on DMA basis	from initial takeover date

3	Providing continuous (24 x7) pressurized water supply to the connected consumers and maintaining the infrastructure	from initial takeover date
4	Collection, providing water Samples to PCMC lab of treated water collected from ESRs / consumer end to ensure that it meets the Potable Water Specification and monitor on regular basis;	from initial takeover date
6	Detecting and monitoring non-revenue connections and consumption and inform such connections to PCMC and install meters to measure consumption	from initial takeover date
7	Provide consumer service connections on approval or sanction by Employer (PCMC)	from initial takeover date
8	Operation and maintenance of SCADA, reporting and monitoring the computerised water supply management system with internet enabled facility and application software	from initial takeover date

16. The Scope of Services shall include all technical, managerial, administrative, commercial, environmental, and social interventions as required in accordance with acceptable, prudent water utility construction and management practices, ensuring safe and sustainable bulk drinking water supply services to total number of 54000 connections spread out in the 40% Service Areas. The Scope of contract mentioned in Tables above is indicative only and the Contractor is required to undertake his own detailed investigation of the Project Facilities to determine the complete Scope of Services for achieving the Minimum Service Levels.

6.3 Phasing of contract Works

17. The Contract is divided into two phases ;

i. Design & Construction phase

ii. Operation & Maintenance Phase spread over the contract period; from the stipulated date of Contract Commencement up to the Contract Completion Date.

Design & Construction phase includes;

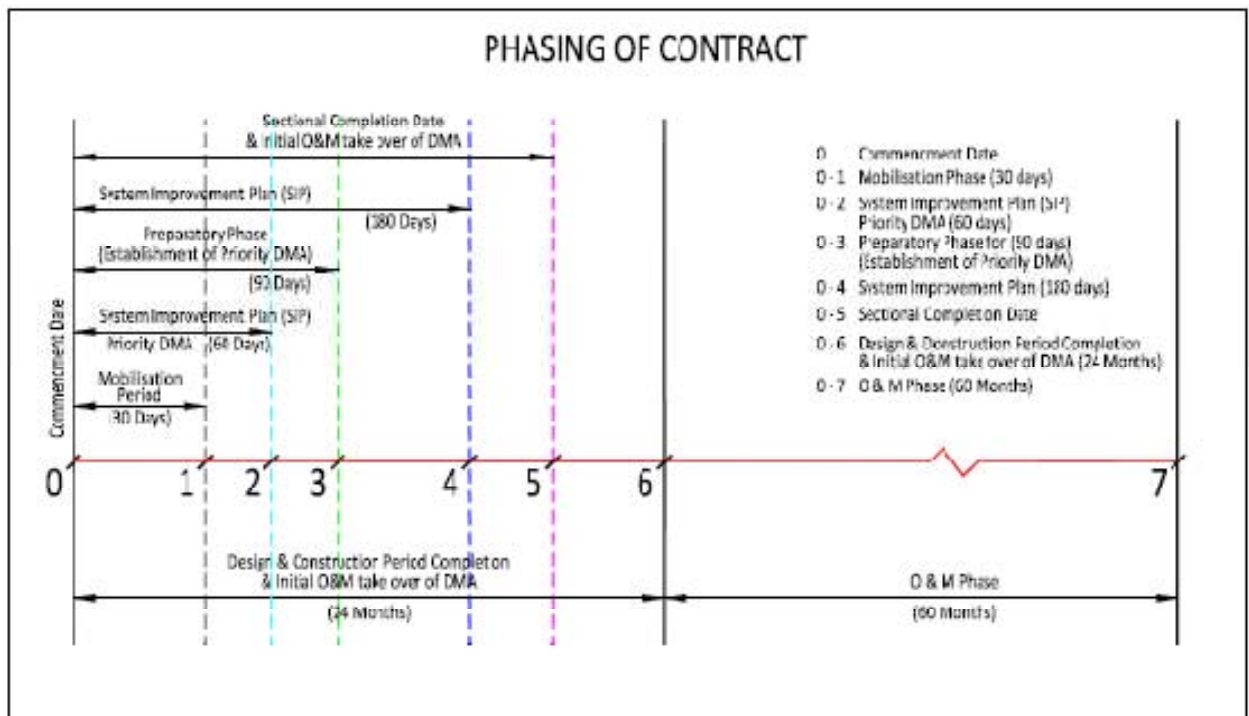
- I. mobilization, consumer survey, topographical surveys, investigations, mapping, preparatory works for DMA Establishment works and construction period as per approved service improvement plan (SIP) and

O & M Phase includes;

- II. Operation, Maintenance, Manage, Repairs , SCADA & Monitoring and Service Delivery Period during the contract period as per the sectional / priority completion of work from initial takeover date (in case of sectional completion for priority DMA's), till contract period.

Schematic Representations of the phasing of contract shall be as follows;

Figure 1 : Phasing of Contract



6.3.1 Mobilization Phase (30 days)

18. During mobilization period Contractor is required to:

- Arrange / rent for Office space within project area
- Establish a furnished project office in Pimpri Chinchwad city limit
- Employ the staff required for starting the preparatory work
- Mobilise the team for survey and investigations
- Mobilise the teams for baseline studies of selected priority DMAs
- Plan for Priority works of laying transmission main of 1000 mm
- Provide the computer hardware, software required for, mapping preparation, hydraulic modeling, project management etc. along with connectivity

- Provide vehicles to PCMC as per set up requirements
- Establish furnished Engineer's office
- Start of Baseline study works for priority DMA's

6.3.2 Baseline study and SIP phase for Priority DMA's (60 Days)

- Survey, investigations, mapping
- Door to door consumer survey
- Distribution network assessment
- Freezing of boundary of DMA
- Water inlet / outlet flow measurement
- Pressure measurement,
- Procurement of pipes for laying transmission main of 1000 mm
- Design, drawings, hydraulic modelling, System Improvement Plan

6.3.3 Preparatory Phase for DMA Establishment Phase (90 days)

During the Preparatory Period, the Contractors required to:

- Be Familiar with the project site condition after required consultation
- Collect data and maps, reports, freezing of boundary etc.
- Conform/ conduct survey to ascertain the data, information, designs, existing services etc.
- Network mapping surveys and investigations , isolation of areas
- Install boundary valves, flow meters, zero pressure test etc.
- Conduct door to door survey and prepare data base of the existing properties with service connections details, using base map image of the service area
- Review the detailed project report in water supply provided by PCMC and prepare a Distribution Network Improvement Plan for water supply
- Prepare System Improvement Plan in water supply
- Prepare an asset inventory report, baseline water balance and strategy for improving services with a focus on improving Consumer services.

- Submit revised SIP

6.3.4 Final System improvement Plan (180 days)

Deliverables of Final SIP phase are:

- Final out put for survey, design, drawings, mapping etc.
- Hydraulically District network and frozan boundaries for DMA
- Completion all baseline studies, demand assessment etc.
- Hydraulic Network model built on Digital Elevation model (DEM)
- The results of flow and pressure management, water balance
- Improved pressure management plan, SCADA plan
- Implementation plan, procurement plan, design drawings, as built etc.

6.3.5 Sectional Completion of DMA or Requirements for Initial Take Over of DMA's

Requirements of this phase are:

- Hydraulically district network establishment
- Completion of zero pressure test
- Completion of construction works
- Water balance
- Commissioning of selected DMA and etc.
- SCADA installed
- Achieving 24 x 7
- Commissioning of selected DMA Water loss detection & reduction.
- Taking over of O & M of DMA (initial take over date)

6.3.6 Design & construction Work Phase:

Requirements of this phase shall be completion of ;

- SIP should be approved& started for execution based on Employer's requirement including priority work completion requirement.

- Detailed design, survey & investigations, drawings and cost estimates of work and improvement as a part of Value Engineering should be completed to meet the Performance Standards.
- Door to door consumer survey for 54000 number connections shall be completed
- Work plan, Methodology and timelines for implementation should be in line with the employers' broad concept /requirement, GCC & PCC.
- Detailing of integrated Contract Management Information System by using latest software like Primavera, Microsoft office architecture, data capture, management and reporting structures, protocols including all related hardware, software, installation; .
- Contractor Personnel deployment plan;
- Construction Plant and equipment deployment plan;
- Cash-flow for both parts;
- Start of execution works of Transmission main of 1000 mm DI pipe as a priority works
- Detailed methodology for continuous monitoring of the performance of the Contractor in achieving and maintaining the Performance Standards for release of the eligible Operating Payments;
- Compliance matrix of contract and service requirement, O&M requirement and other requirement like social, environmental etc and;

6.3.7 Operating and Management Phase:

- i. Annual Operating Plan (AOP) covering all operations, maintenance and management requirements in the selected DMAs of operational zones within 40% area for 54000 number of connections;
- ii. Emergency Response Plan (ERP);
- iii. Consumer Management Plan;
- iv. Standard Operating Procedures (SOPs) for routine operations and emergency responses;
- v. Water Quality Surveillance Program;

- vi. Energy optimization program;
- vii. Connections policy for all types of connections including services to the urban poor and treatment of illegal connections;
- viii. Network expansion policy;
- ix. Detailing of an Integrated Management Information System (MIS) including computerised water distribution management software, its architecture, data capture, management and reporting structures, protocols including all related hardware, software, installation, and operation and maintenance requirements; and
- x. Periodic reporting plan including the formats for different performance reports.

The computer hardware and software improvement plan for continued operation of the MIS, instrumentation, SCADA& Web Server etc.

6.4 System Improvement Plan (SIPs) requirements

19. **Works of priority DMAs** on immediate basis- The Contractor is required to validate and finalise and execute the works in selected 5 DMAs on priority as specified by PCMC and shall be responsible to start baseline study of these selected DMA's and submit /prepare the SIP on immediate basis i.e. within 90 days from the commencement date. After approval of SIP all procurement and construction works of these priority DMA's shall be on top priority. The work of such DMAs should be completed within stipulated time as suggested in Contract Milestone.
20. In case of any interventions proposed in the SIP, which are not part of the DPR or those interventions which are part of the DPR but require improvement from conventional design practices, the Contractor shall provide sufficient explanation and justification as to how implementing such interventions would influence the achievement of the Performance Standards stipulated in the document.
21. In a situation where the Employer does not agree to the interventions proposed in SIP, there may be mutually agreed revision of the Performance Standards.
22. The Scope of Services during the implementation Period shall essentially comprise of implementing the approved SIP based on the hydraulic model prepared for water distribution based on DMA approach. SIP will be implemented in accordance to international best practice and industry standards and sufficient care shall be taken by the Contractor in minimizing

supply interruptions, traffic disruptions and ensuring good and timely communications with the Consumers in the Service Area. During work execution, Contractor would be required to inform the residents, say, of a particular street, well in advance about the type of work, inconvenience expected, timelines for various works, etc. Contractor to have a strong Public Relations and Community Outreach team. Contractor will plan sequencing of activities to synchronize water pipeline works with other related works to minimize the road excavation and restoration in the streets.

23. All the Works and interventions proposed as part of the SIP shall be in conformity with the Specifications set out in the Employer’s Requirements.
24. After implementation SIP plan and upon successful commissioning of DMA’s for continuous water supply within stipulated constructed period or actual commissioning period whichever is earlier shall be handed over to Contractors for further Operation and Maintenance per DMA wise.
25. The Contractor shall submit the draft SIP within 90 days for Priority DMA first from the Contract commencement date and within next 90 days for complete DMA’s / operational zones to allow the Employer to undertake a thorough review of the SIP and suggest amendments if any.

6.4.1 Performance and Condition Grades

26. Performance grades shall define whether the Facility including pipelines is meeting the required quality standards or levels of service standards or is suitable for its function. Condition grades shall define the structural condition of the Facility& pipes. This may be from an assessment of the structural condition or from recording of the frequency of failures of the Facility. Contractor shall provide the Condition Assessment Report for pipes and facilities covered under the scope of this contract.
27. Following Table describes the meaning of some of the Grades of the Facilities. Detailed definition of these Facilities shall be formed within six months of commencement date, for each Part, in consultation with the PCMC.

Table 4 : Definition and grades of facilities

Definition of Facilities		
Grade	Description	General Meaning
1	Good	Of sound structure with components that are operable and well maintained
2	Fair	As1, but showing some minor signs of deterioration Routine

		repair, refurbishment and maintenance required with review of condition in the medium term
3	Adequate	Functionally sound, but affected by minor cracking, staining or minor leakage. Some reduced efficiency and minor failures. Review of condition required in the medium term with action likely to be needed in the medium term to prevent deterioration to Grade 4
4	Poor	Condition has a significant effect on performance of the Facility with components requiring significant repair or maintenance to remain operational. Shall require major overhaul/replacement with in the medium term.
5	Bad	Condition of the Facility has a serious effect on its performance. Effective life of mechanical and electrical plant and other components is exceeded and incurring excessive repair and maintenance costs due to unreliability. Shall require major overhaul/replacement in the short term.

6.4.2 Timing Definitions and Differentiation between Facility Types

a) Performance Aspects

The Contractor shall develop a clear understanding of the exact meaning of the phrases 'Immediately', 'Short Term' and 'Medium Term' used in association with the performance Grades with the PCMC, within six months of appointed date of the Operating Period.

b) Condition Aspects

Different Facilities shall have different expected life span. Buildings or Civil (usually reinforced concrete structures) or pipes Facilities are expected to have a Facility life of 30 years. Electrical and Mechanical Facilities are expected to have a Facility life of 15 years. Bulk water mains would be expected to have Facility life in excess of 30 years, or may be taken as having an indefinite life.

The terms 'immediate', 'short term', 'medium term' need to describe approximately when major work shall be required related to the Facility's normal life.

Contractor shall provide the detailed justification for pipes replacement proposals with SIP. The pipe replacement proposal without sufficient investigation & justification shall be rejected. Contractor needs to prove by investigation report that pipe under proposed replacement schedule is beyond repair. The field investigation shall be witness by Engineer / PMC before approval of any replacement.

28. The Contractor shall review and validate the Detailed Project Report of the project area (40% area) prepared by Employer which will enable him to prepare SIP:

- (i) in line with the Detailed Project Report (DPR) approved for JnNURM funding of Rs. 143.7 Crores,

- (ii) in compliance with the Draft Master Plan PCMC Town, if any,
- (iii) in compliance to the terms and conditions of the Project and Loan Agreements among PCMC, Government of India and Government of Maharashtra and
- (iv) in coordination with the on-going and programmed activities of PCMC, and GoM as the case may be.
- (v) Any deviations to the document, data provided by PCMC and consultation shall be highlighted and got approved as part of the SIP.

6.5SIP Schedule & Key Milestones

29. Schedule of various activities including priority zones for survey, design& SIP submission is shown in Table below:

Table 5: SIP Schedule & key milestones and Penalties

S N	Activity	Target period for completion from contract commencement date	Amount of penalty to be recovered in case of delayed output
1	2	3	4
1	Mobilisation on site	30 days	
2	Verification & validation of base map (provided by PCMC), finalisation of DMA boundaries, procurement plan of priority DMA's	60 days	Rs. 10,000 per day
3	Topographical survey and ground profiling of the service area, plot surveys and any other surveys and investigations to ensure accurate design.	60 days	Rs. 25,000 per day
6	Complete system design and drawings, preparation of abstract of	90 days	Rs. 75,000 per day

S N	Activity	Target period for completion from contract commencement date	Amount of penalty to be recovered in case of delayed output
1	2	3	4
	final quantities and cost estimates for the designs		
7	Preparing PERT chart, manpower, equipment, mobilisation plan, cash flow plan, detailed methodology of continuous monitoring etc.	60 days	-
8	Detailed O&M plan, Standard Operating Procedures and policies plan, Performance measurement plan, Bulk Supply locational data base for water supply system.	60-90 days	Rs. 75,000 per day
9	Compilation and submission of designs, hydraulic modelling in complete with SIP and procurement plan for priority zones (tentative 5 nos.)	60-90 days	Rs. 75,000 per day
10	Complete designs, survey and all as built drawings for balance DMA's within 40% PCMC area	180 days	

30. Schedule of various activities of the Construction period (after Design) is shown in Table below:

Table 6 : Construction / DMA Schedule & key milestones and Penalties

S N	Target Period (end of quarter) for completion from contract commencement date	Target Activity: DMA establishment / No. of connection Completion (inclusive of all instrumentation & SCADA works)	Target Activity: Transmission Main /Pipe Laying Completion
1	2	3	4
1	1 st Quarter (Q1)	Door to door Consumer Survey, Network updation, hydraulic modelling, SIP, Procurement Plan, DMA Established (For Priority DMA's)	SIP & Procurement Plan
2	2 nd Quarter (Q2)	2000 number connections & Submission of SIP for balance DMA's	Pipe procurement
3	3 rd Quarter (Q3)	6000 number connections	Laying & testing
4	4 th Quarter (Q4)	14000 number connections	Laying & testing
5	5 th Quarter (Q5)	24000 number connections	Laying & testing
6	6 th Quarter (Q6)	34000 number connections	Commissioning
7	7 th Quarter (Q7)	44000 number connections	
8	8 th Quarter (Q8)	54000 number connections	

Note :- 1. Based on total 54000 number connections within 40% project area, the Contractor shall complete the DMA establishment works for minimum number of connections per quarter as shown in above. The figures per quarter (Q) indicate the cumulative number of connections that have to be operational (accepted by the Engineer) before the end of the respective quarter.

2. DMA's works or DMA Establishment work specified above inclusive all works required for Successful Establishment of DMA inclusive of all civil, electrical, instrumentation & SCADA works
 3. Transmission main pipe laying construction work shall be implemented simultaneous to DMA Establishment works on Top Priority.
31. Contractor shall submit the outcome of each activity for review of Employer's Engineer / Representative immediately after completion of the activity. Employer's Representative will review the outcomes on regular basis and will submit their review comments within 21 days of receipt of the document. Contractor will develop data bases for water supply hydraulic and water quality parameters and the daily Bulk inlet Supply at each ESr/GSr including hourly flows and total supply,
 32. Contractor shall also submit the activity wise Monthly Report for monitoring by the employer. Progress of all activities will be reviewed on weekly basis for design part. Monthly basis during construction part and daily basis during operations part.
 33. Contractor shall be responsible to submit Quality Assurance Plan (QAP) along with SIP Plan for approval of Engineer / PMC before procurement of any material at site.
 34. In case of delays in meeting timelines of design activities, penalty as per the sums indicated in column 4 and specified in Schedule 5 of PCC or specified elsewhere appropriate under this contract will be imposed and recovered from due payments. If the delays that occurred in activity milestones are covered by the Contractor within the stipulated or extended period for Compilation and submission of designs in complete, which is not attributable to Contractor, penalty imposed on account of such delays will be refunded.

6.6 Design Requirements

6.6.1 Survey, Mapping, investigations etc.

35. A detailed topographical survey, of the components involved as shown in the boundary limit, within the project area shall be carried out using Total Station equipment and the spot levels and the contours at 0.5 m interval shall be carried out & stored in editable digital format on the GIS base. Contractor will survey all underground utilities located within the Sub Project Area up to 1.5 m depth and mark on GIS based maps.

6.6.2 Recommended Design Norms

36. Water Supply components are to be designed as per design norms given in Manual on Water Supply and Treatment, Published by CPHEEO, Ministry of Urban Development, Government of India.

6.7 Commencement Date

37. The Contractor shall make a comprehensive assessment & due diligence of water supply distribution system in the 40% Service Area and prepare a holistic and comprehensive System Improvement Plan (SIP) for transforming all DMA's of selected Operational Zones into continuous (24x7) pressurized water supply for 40% area of PCMC. This will include baseline study of the water distribution system and network, updation / preparation of distribution network, condition assessment, consumer survey, validation of network data / details, finalizing the boundaries of operational zones, assessing operational feasibility of DMA's selected for converting into 24 x7 water supply, developing a working hydraulic network model, developing strategy for water loss reduction / leak detection, pipeline laying & replacement for improving services with a focus on optimization of performance of existing assets and improving Consumer services.

6.8 Bulk Supply point and Boundary Limits

38. Scope of Contractors obligations starts from the Bulk Water Supply point i.e. ESR/ GSR Inlet point onwards for total 54000 number of connections. Boundary Limits for undertaking planning, validation of baseline data, verification of designs, construction, rehabilitation, distribution, operations, maintenance and management by the Contractor, include the water supply operational zones as marked / mentioned in DPR for 40% area and extending up to the customer boundary limits including the customer meter if installed on the existing connections and up to the customer meter in all the new or rehabilitated connections of selected Operational zones.

Tentative Layout diagram of proposed Water supply of selected Operational Zones are as following;

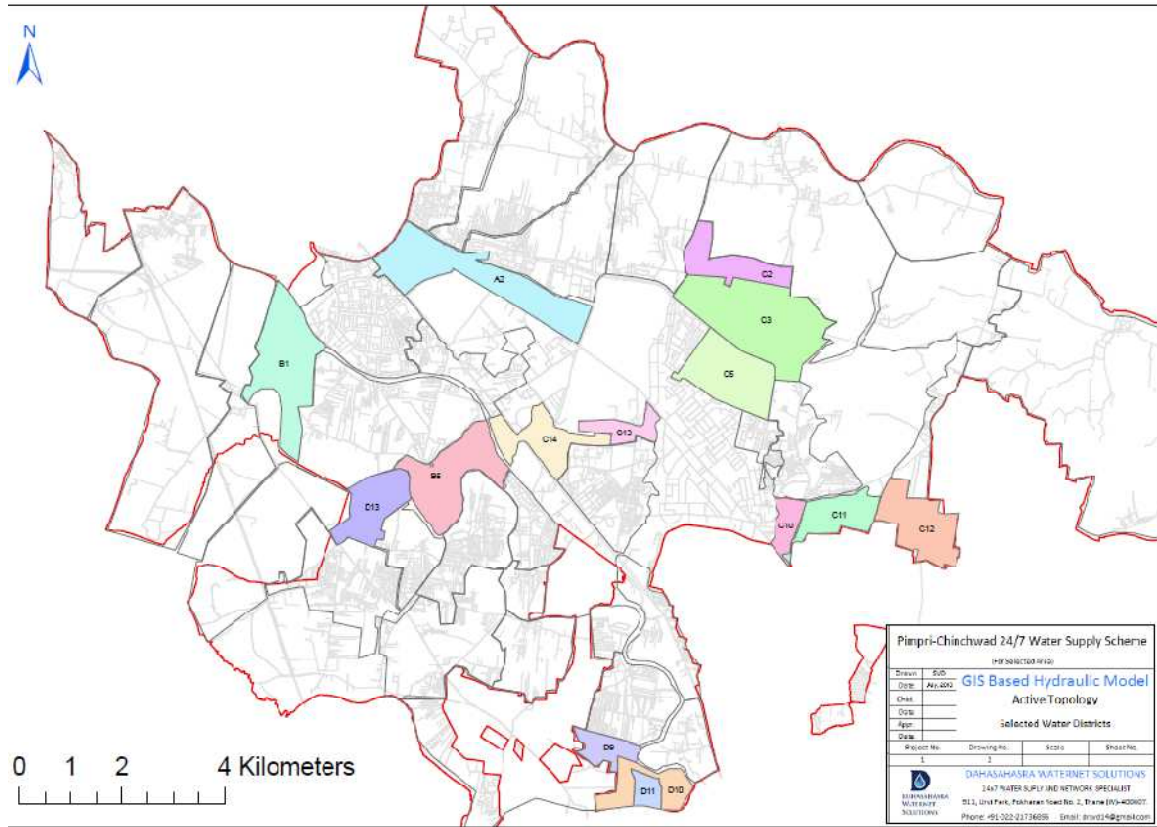


Figure 2: Tentative layout map for Selected Operational zones

Selected operational zones (Tentative) as indicated above and mentioned below are subject to change / modify within 54000 number connections as per requirements of PCMC.

Details of Selected Water districts / operational zones is as following;

Table 7 : Tentative Operational Zones / Water Districts Details

SN	Operational Zones	Name
1	A2	Triveninagar
2	B1	Sector 29
3	B5	Elpro
4	C2	Borhdewadi
5	C3	WD4
6	C5	Sector 7 & 10

7	C10	Bhosari Gawthan
8	C11	Sant Tukaram Nagar
9	C12	Dighi Gaothan
10	C13	Anna Saheb Magar Stadium
11	C14	Ajmera 1 & 2
12	D9	New Sangvi
13	D10	PWD Sector 85
14	D11	old Sangvi
15	D13	Laxshman Nagar

Note:- Above operational zones / water district areas are tentative and shall be subject to addition of additional zones depending upon technical feasibility for bulk water supply and hydraulic modeling for total 54000 number of connections.

39. Boundaries for selected operational zones shown above are tentative and indicative only. Finalization of boundaries of selected operational zone is responsibility of Contractor. Contractor while assessing the operational feasibility shall verify the boundaries of DMA's for hydraulically districts zones. In the process, if any adjoining area is being affected for water supply, it is in the scope of Contractors to make alternative arrangement of water supply for the area affected.

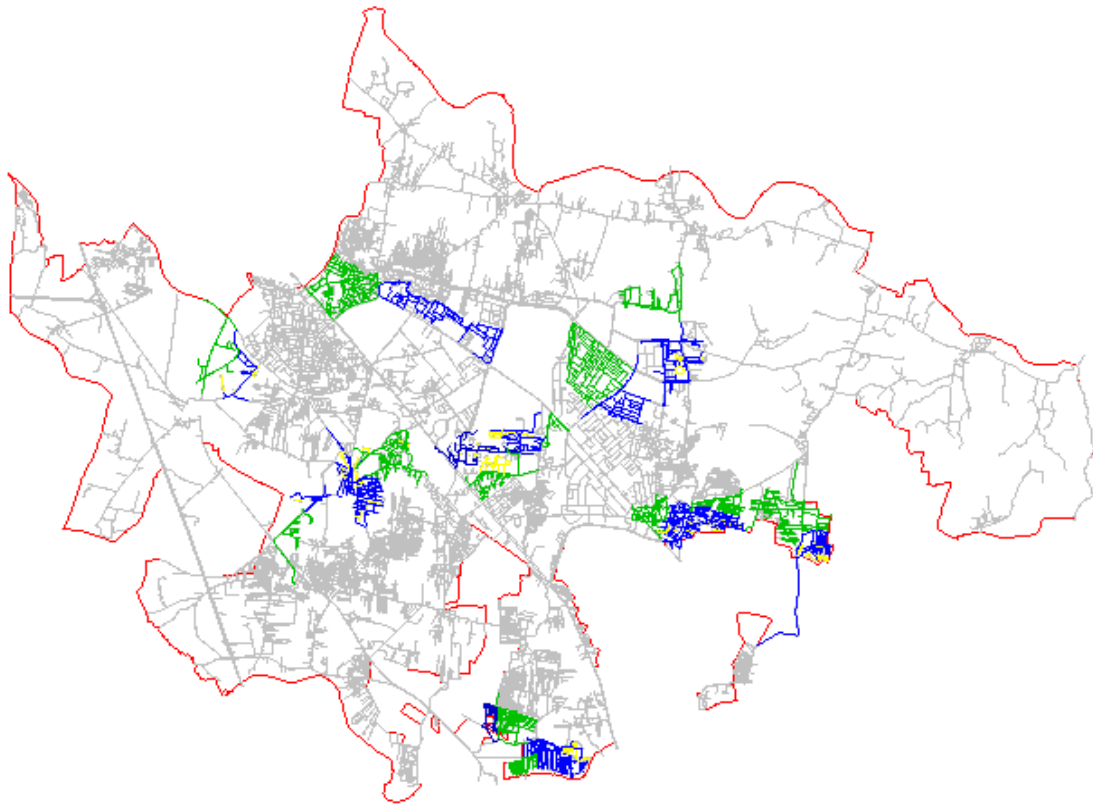


Figure 3 : Selected 26 DMA's within Operational Zones

The 40% project area under selected operational zones is within the existing jurisdiction of Pimpri Chinchwad Municipal Corporation which may decrease or increase at its sole discretion for total 54000 numbers of connections.

6.9 Preparative Activities

40. The Contractor shall establish contact with all relevant stakeholders and become familiar with the PCMC water supply system, and the applicable standards and guidelines for water supply design, and with past and current on-going works in the Service Area.

41. The Contractor shall satisfy itself to the nature and scope of work and the prevailing site conditions.

42. The contractor shall be deemed to have carefully examined the work & site conditions including labour, the general and the detailed specifications, schedules & drawings & shall be deemed to have visited the project area /site of the work & to have fully informed himself regarding the local conditions & carried out his own investigations to satisfy himself. In this regard, he will be

given necessary information to the best of knowledge of Employer/PCMC, but without any guarantee about it. If the Contractor have any doubts as to the meaning of any portion of the general conditions, the special conditions, the scope of work, the specifications and drawings, or any other matter concerning the contract he shall, in good time before submitting his tender, set forth, the particulars thereof and submit them to the Engineer in writing, in order that such doubts may be clarified authoritatively before or during prebid meeting. Once a tender is submitted the matter will be decided in accordance with the tender conditions.

43. The Contractor shall liaise with the PCMC , the local traffic police and other Government Agencies regarding governing laws and regulations in order to undertake studies and construction activities under the Contract such as:
 - 43.1. Environmental and social impact assessments and prevention, mitigation and monitoring of impacts during construction;
 - 43.2. Compensation for damages to property;
 - 43.3. Occupational health and safety including workers compensation;
 - 43.4. Consultation of beneficiary populations; and
 - 43.5. Signage for construction works.
44. There are several other water supply related works on-going or have been recently been completed by PCMC for the entire water supply system. The Contractor shall review all the reports and ensure that the Construction Plan, the Operation and Maintenance Plan and the Training Plan to be prepared by the Contractor do not duplicate any measure already financed and implemented. The Contractor shall also ensure that investments proposed as part of the Construction Plan are well coordinated and scheduled so that it can be adequately implemented, constructed, managed, supervised, monitored and finally be evaluated in terms of its impact.
45. The Contractor shall make a comprehensive assessment of baseline data & details, drawings, designs provided under the Detailed Project Report of 40% project area for capacity, performance and condition of existing water supply and distribution facilities. Contractors scope shall starts from Inlet supply point onward at service reservoirs (ESR's/GSRs). Bulk water upto service reservoirs shall be ensured by PCMC.
46. The Contractor shall acquaint himself the Detailed Project Report (DPR) and relevant sections of the Hydraulic Modelling and drawings that have been prepared for the project which is sanctioned under JnNURM and validate the improvement and construction plan mentioned in DPR.

47. The Contractor will prepare three Plans,
- 47.1. Construction Plan describing implementation of all System Improvement Plan with emphasis on the time sequence followed for the implementation and completion of Works in the different Sections, taking into account the conversion of priority DMA's in continuous (24x7) pressurized water supply and laying of pipelines (primary mains to Selected DMA's) .
 - 47.2. Operation and Maintenance Plan, after successful commissioning of DMA's in continuous (24x7) water supply for selected operational zones;
 - 47.3. Training Plan, describing all PCMC staff training activities to be conducted.
48. A preliminary draft of the Construction Plan or SIP Plan shall be submitted by the Contractor with the detailed time program as required under the Section 7 [*General Conditions of Contract*], in sufficient detail to support the detailed time programme.
49. A draft of the three Plans shall be submitted by the Contractor to the Engineer at least three (3) months from the Commencement Date for review and comments by the Employer. Any comments on the Plans will be furnished within one (1) month from receipt of the draft Plans and the final Plans shall be submitted by the Contractor at least five (5) months from the Commencement Date for approval.
50. Two types of office space shall be provided:
- 50.1. For all Works-related Services: The Contractor shall make its own arrangements for renting and acquiring sufficient land for erection of its own offices, facilities, as required, for carrying out test at site and of stores plus parking / maintenance area for vehicles and equipment to be used for the Works at its own expenses. It shall include provisions for the Engineer as further detailed in the Technical Specifications.
 - 50.2. For the Operation and Training Services: The Employer shall provide unfurnished office facilities to accommodate the Contractor's operation staff and of staff provided to the Contractor by PCMC. The cost of operations maintenance of the office shall be included in the Contractor's Operation fees.

The Contractor shall avail of existing facilities at the Nigadi waterworks compound for its stores, workshop, laboratory and water meter testing requirements during Operations.
51. The Contractor shall supply software for GIS, Hydraulic Modelling and maintenance management.

6.10DMA Establishment Requirements

6.10.1Assessment of Distribution System on DMA basis

52. The distribution network assessment and updation shall be based on DMA's selected under 40% area of PCMC (which includes 15 Operational zones). During this phase of the work the Contractor shall study the water transmission and distribution network within the Service Area i.e. selected operational zones to establish and improve network management and for ensuring the minimum Service Levels as specified under this contract to the Consumers within the Service Area.
53. The Contractor shall review previous studies and reports; interview the existing key staff in the Service Area; line staff, other consultants, companies, and Contractors currently working on the distribution system in order to prepare a baseline report describing the water transmission and distribution system including water sources, boundary limits, storage, and supply zones; and their condition to include pipe materials, dimensions, age, and condition; extent of Consumer water connections, meters and their operating condition; current estimates of illegal connections.
54. Contractor shall review the Detailed Project Report for 40% project area and shall immediately start working on priority DMA's which can be easily converted into continuous water supply and submit the procurement plan on immediate basis. It is assumed that the available information and drawings in DPR are indicative and Contractor shall validate such information on pipeline location, length, diameters and materials on his own during baseline study. Contractor shall submit the condition Assessment Report of such network information.
55. The Contractor shall review the present network management practice and develop an improved robust network management practice for improving the services.

6.10.2Distribution Network Improvement on DMA basis

56. The Distribution Network Improvement shall be executed based on priority DMA selected under operational zones. The Contractor shall finalise the boundaries of DMA while assessing the operational feasibility and proceed to isolate the same without affecting the adjoining areas for water supply. Contractor shall be responsible to provide alternative arrangement for such affected areas, if any, for water supply. The Contractor shall, set up hydraulically isolated District Metered Areas (DMAs) within the Service Area/ operational zone of each ESR. Each DMA comprising of about 500 -2000 consumer connections shall be considered as basic administrative

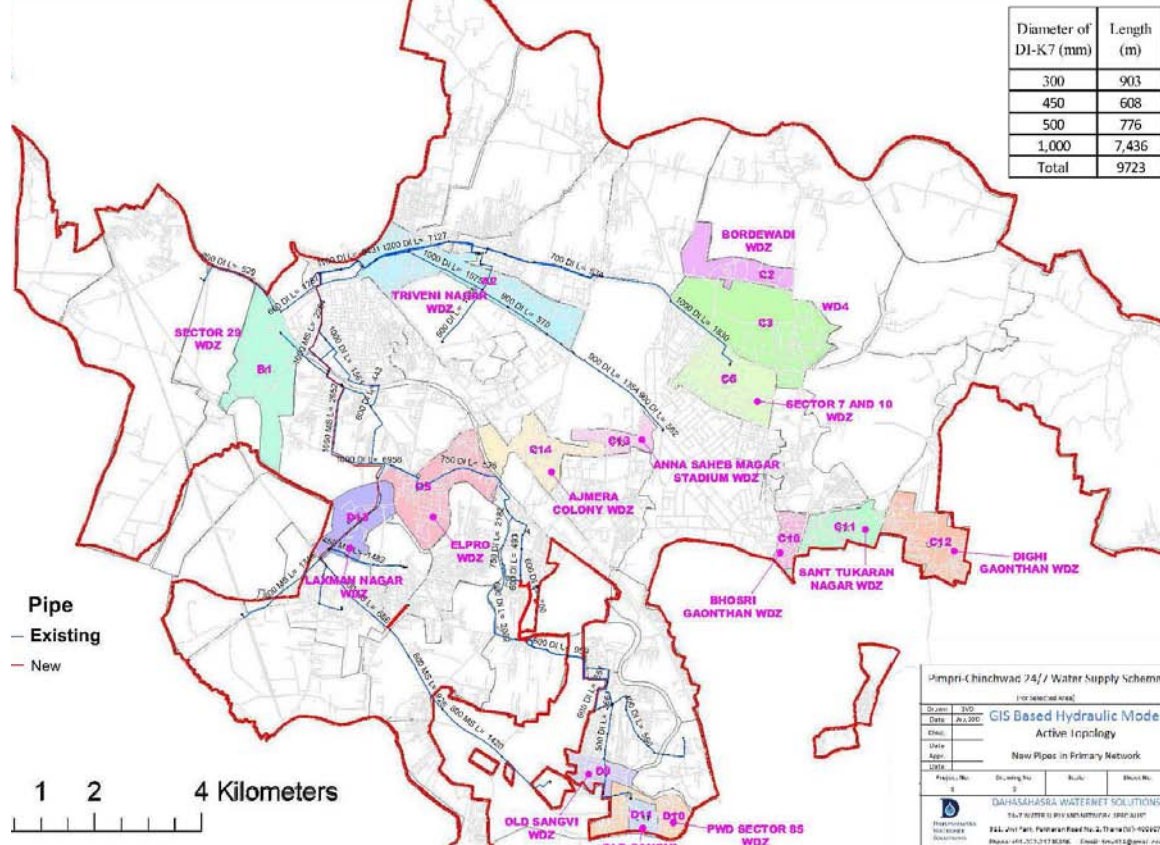
unit for the purpose of sectional commissioning and management services. The Contractor shall design water supply distribution network on DMA basis to ensure equitable, continuous, pressurized water supply to the Consumers by using the hydraulic model and simulating both present (2015) and future (Year 2041) conditions,. Each DMA preferably have one inflow point and be isolated by installing valves / end plugs. DMA at entry point will be provided with a bulk flow meter. Each DMA will have at least five Critical Measurement Points (CMPs) for continuous logging of pressure, and the CMPs shall be such that they should be at the highest and farthest points from the command reservoir. The performance parameters of the Contractor including O& M period shall be started after successful commissioning of DMA's for continuous water supply. DMA wise monthly reports will be generated to assess the DMA performance. Monthly meter readings will be taken and data shall be provided to PCMC billing department. Contractor, Consultant / thirty Party also may suggest good management practices. Lessons learnt from other utilities/agencies will also be incorporated for better management services.

6.10.3 Establishment of DMA's in Operational Zones

57. The Contractor shall prepare the designs submit to the Employer and rehabilitate and build the distribution network for the priority operational zones like B1, A2, C2, C3, C5 etc. while establishing DMA's in 40% project area .Contractor shall immediately submit the procurement plan for these priority zones and start executing the construction works. This activity will be simultaneous with baseline studies of other DMA's and shall be completed within three months from the commencement date.

58. The Works will be implemented DMA wise. The Contractor shall be allowed to do works for Selected DMA's of 40% Project area (tentative 15 operational zones) simultaneously and subsequently. Operational zones indicated below are tentative and are subject to add / modify depending upon feasibility of bulk water supply or as specified by PCMC within 54000 numbers of connections. Works in priority DMA shall completed and commissioned first in parallel to construction works in other DMA's. DMA's depending on laying of express feeder or transmission main, construction works in such DMA's shall be simultaneous to other works

Figure 4: Tentative locations of Operational zones / DMA's are shown in schematic map above.



59. As per DPR, the estimated length of existing distribution network is around 1352 km, and the length for selected DMA's is around 343.55 km. New pipelines to be laid in the selected DMA's is around 54.8 km and length of 103.1 km, shall be replaced by new pipes and decommissioned to the satisfaction of the Engineer and according to procedures approved by the Engineer. However, circumstances such as design requirements, site conditions and structural conditions of the existing pipes can be reason for deviation from this policy.
60. The Contractor shall make arrangements for maintaining the service of the presently connected consumers at the current level during the execution of the Works or arrange for alternative arrangement for water supply at his own cost.
61. The Contractor shall also lay pipelines for the extension of the distribution network to the areas presently populated but uncovered in terms of piped water supply services.
62. All non-metallic pipelines or underground components installed in the frame of the Contract shall be provided with metallic ribbon or other means enabling their detection by metal detectors.
63. All installed pipelines and appurtenances shall be disinfected to the satisfaction of the Engineer.
64. All Works involving excavation shall be finalized through reinstatement of the surface to the initial condition.

65. The Contractor shall make arrangements for maintaining the service of the presently connected consumers under selected operational zones though not covered under DMA's finalised at the current level during the execution of the Works.
66. All Works involving traffic blocking shall be coordinated timely with PCMC / traffic department and traffic diversion measures shall be implemented by the Contractor. The Contractor shall endeavour at any time to maintain the inconvenience caused by the construction works at the lowest possible level.

6.10.4DMA Creations

67. One of the main activities of this Contract is the Creation of District Metered Areas (DMAs) for 54,000 connections. The population projections and ward wise water demand as included in DPR will be applicable. The Contractor has to confirm the DPR and define DMA boundaries actually on ground, which have been selected in such a way that one DMA includes 500 to 2000 service connections. If needed the Contractor has to redefine the DMA boundaries. The total number of DMAs are tentative to 26 numbers & Contractor may revise as per site condition but total number of connections are limited to total 54,000 maximum. Total area can be increased or decreased within total number of 54000 connections at sole discretion of PCMC/ Employer.
68. The scope of work for each DMA established includes (but is not limited to):
- 68.1. detailed site investigations, updating of distribution network drawings, complete with all trial holes that might be required to verify pipe connections (and the consequent re-instatement of road, sidewalk or any other surface);
 - 68.2. Hydraulic modeling as basis for optimum DMA design and determination of feeder main diameter. The Contractor shall use either Water Gems or any equivalent software that has the same functionality or better.
 - 68.3. Verification and finalisation of suggested DMA boundaries; locating of existing boundary valves, functioning and tightness checks of existing boundary valves, identification of location for additional boundary valves to be installed, identification of locations where the pipes will be disconnected and capped.
 - 68.4. selection of location for DMA inflow chamber;
 - 68.5. identification of customer service connections that have to be re-located from a trunk or distribution main outside the DMA (or in a neighboring DMA) to a distribution main inside the DMA.

- 68.6. site survey for DMA inflow point and location of underground assets
- 68.7. detailed design of:
 - i. all pipelines that have to be laid
 - ii. location and installation details of new boundaries valves
 - iii. DMA inflow point arrangement design, pressure reducing valve chamber complete with all pipe work and structural design; inflow meter and PRV specifications; location and design of above ground instrumentation box
 - iv. standard design and map with location of all customer connections to be relocated
 - v. all other civil, mechanical, installation or plumbing works that might be required
 - vi. construction of PRV chamber, underground installation of electromagnetic flow meter, construction of above ground instrumentation box; including supply of all required pipes, materials, fittings and equipment, as per the specifications
- 68.8. construction of the critical point above ground instrumentation box; including supply of all required materials, fittings and equipment, as per the specifications
- 68.9. execution of all other civil, mechanical, installation or plumbing works, including supply of all required pipes, materials, fittings and equipment required for DMA establishment, as per the specifications;
- 68.10. for all works carried out: reinstatement of road and sidewalk surface
- 68.11. supply and installation of multiple channel data logger (two pressure and one flow channel) at the inflow point, setting up of data transfer to a central SCADA server (SMS, GPRS or similar data transfer); supply and installation of respective software
- 68.12. supply and installation of single channel data logger at the critical point (point with lowest pressure in the DMA), setting up of data transfer to a central server (SMS, GPRS or similar data transfer) with web enabled /cloud server facility alongwith application software.
- 68.13. execution of zero-pressure-test and execution of all subsequent investigations and works should the first zero pressure- test have failed until the test is successfully performed.
- 68.14. commissioning of PRV and controller
- 68.15. preparation of as-built drawings for all works executed.

69. Where hydraulically possible, DMAs shall be single feed as proposed in the DPR. In cases where it is advisable (for hydraulic or other reasons) to establish multiple feed DMAs, the same shall be subject to approval by the Engineer.
70. The Contractor shall verify the DMA boundaries specified in the DPR, on the pipelines to be kept in use: locating of existing boundary valves, functioning and tightness checks of existing boundary valves, identification of location for additional boundary valves to be installed, and identification of locations where the pipes will be decommissioned. No consumer connection pipe shall cross a district boundary. If a boundary is in the middle of the road, the main needs to be on the side of the road of the district to which it belongs, or the boundary should be behind the line of houses.
71. The Contractor shall identify customer service connections that have to be re-located from a trunk or distribution main outside the DMA (or in a neighbouring DMA) to a distribution main inside the DMA.
72. In preparation of Sections of DMA Works, the Contractor shall undertake a Consumer Water Connection survey in the concerned DMA. The parameters to be surveyed will at least include: type of Consumer (residential, commercial, governmental, etc.), geo-location, type of structure or dwelling, type of existing water connection. The Consumer Water Connection survey will determine the present status of water supply to each Consumer, whether they have an authorized water connection, illegal water connection or no water connection. The data so collected shall be shared / submitted to PCMC for transfer to GIS for web enabled application software and will be used at the time of rehabilitation of existing consumer connections and while releasing new consumer connections in future. The structure of data base and details of the Consumer Connection survey shall be finalized in consultation with the Engineer. PCMC shall provide the consumer connections list with unique ID of existing billing database for consumers of selected operational zones. Contractor shall maintain and update database of such consumers with same unique ID while pre-fixing any letter for further segregation /identification.
73. In preparation of Sections of DMA Works, the Contractor shall undertake a detailed site condition survey in each DMA. The survey data shall be sufficient to develop a comprehensive Geographical Information System (GIS) clearly showing the location of underground and over ground water supply assets and all physical features like roads, culverts, drains, nalas, electrical transformers and any other relevant features which would influence installation and

maintenance of existing and/or new pipelines. All key elevations with geo-reference shall be captured in the survey and the DMA service area maps are to be prepared in 1:2000 scale.

74. For each DMA, the Contractor shall apply hydraulic modelling as basis for verifying the optimum DMA design and determination of feeder main diameter. Flow velocities should be less than or equal to 1.5 m/s. Pressures shall not be less than 0.8 bar and should not exceed 2bar. The Contractor can use the hydraulic model used by the Employer or may use either Water Gems or any other software that has the same functionality or better and transfer the results to the GIS system. The data pertaining to reservoirs, pipes, valves and demand locations shall be included in the model. DMA specific hydraulic models shall be integrated into one Overall Hydraulic Network Model covering the entire Service Area.
75. A sufficient number of valves for future operation shall be provided for each DMA, in such a way to enable 4 or 5 steps for Step Test to be executed in leak detection campaigns.
76. The complete detailed design of the each DMA thus verified shall be submitted to the Engineer for approval.
77. Public awareness programs planned to achieve people's participation in managing demand by using the continuously available water to their absolute need only and not to waste, and to communicate importance of metered system and its benefit
78. The Contractor shall construct the 5 pressure monitoring stations including protection encasement and data logger facility.
79. The Contractor shall construct the above ground instrumentation box at strategic locations, including supply of all required materials, fittings and equipment, as specified. However, if suitable place is not available for locating the above ground instrument box, the same may be placed in the Monitoring station chamber.
80. Monitoring stations and meters shall be installed at safe locations onto the sidewalk where possible. Optionally provision for GPRS/GSM automatic reading can be made. The Contractor shall supply and install a multiple channel data loggers (three pressure and one flow channel), setting up of data transfer to a central server (SMS, GPRS or other remote data transfer); supply and installation of respective software. The Contractor shall ensure that the software is compatible with SCADA and life flow monitoring software and integrate/interface the entire system with Central SCADA Server / web enabled application software for easy assessing and

monitoring the information. Proposed SCADA system shall be compatible to integrate with existing SCADA of PCMC.

81. After the finalization of the construction, the DMA will be commissioned according to the requirements set out for Testing and commissioning of this Section.

6.10.5 Consumer Survey requirements

82. A complete consumer survey to ground truth the footprints and the properties in the project area shall be carried out. It may happen that the base map image (available with PCMC) may give one footprint but the footprint may be divided in several properties internally either horizontally or vertically. The foot print shall be divided to show clear distinction.
83. The Contractor shall undertake a door-to-door survey of all properties whether connected to the network or un-connected and obtain the details in regard to name, address, number of resident members, categories of general residential households (independent housing, group housing connections, societies and apartments), urban poor households, government housing, non-domestic, commercial, institutional, religious places, industrial and fire services and any other category of resident, consumers income status in the Service Area ,availability of water connection, metering status, estimated consumption levels, alternate water supply arrangements, willingness to pay, etc. The Contractor shall get the data from PCMC billing department about the authorised water connection and their location of properties. The data collected from household survey shall be geocoded to the satellite image / base map. This database will be used for the water demand of each property to be collected at the junction of distribution network pipe and the system shall be designed and modeled accordingly.

6.10.6 Hydraulic Modelling requirements

84. The Contractor shall develop a Hydraulic Network Model (HNM) for water supply system based on DMAs of Operational zones. The data related to water supply infrastructure like Reservoirs, Pumping Stations, rising mains and distribution system , valves and demand allocations shall be obtained through field baseline study and consumer survey captured on the network model.
85. The hydraulic network modelling by using latest soft-wares shall be carried out by collecting the actual property wise water demand allocated to the nearest junction. Following broad guidelines may be followed during hydraulic modeling:
 - 85.1. The junction shall be placed at the branching out/ at the crosses at the valves and where there is a large straight length at every 200 m. The model shall be

worked out by considering the domestic demand as 135 lpcd water supply and actual demand for commercial and industrial requirement.

- 85.2. The hydraulic water use pattern for the day spread over 24 hours shall be based on the survey data captured through consumer habits of water use in different hours at present and by following the standard pattern, after continuous water supply is successfully implemented.
- 85.3. The storage reservoir capacities shall be modelled to verify the water level in various hours. It shall neither be empty nor overflow. The incoming flow at constant rate shall be decided accordingly.
- 85.4. The DMAs which are still to develop where the present water requirement is quite less as compared to the design demand, the present scenario with existing water demand shall be run and the incoming flow shall be adjusted accordingly.
- 85.5. The minimum pressure in the distribution network when full demand in the zone cum DMA is developed shall not be less than 8 m of water column at consumer meter point. The excessive pressure in the typical areas shall be managed using the appropriate pressure management techniques at distribution system level and other at the individual connection level.
- 85.6. All new connections shall considered and captured as additional demand in the model and updated model.
- 85.7. The hydraulic model shall be calibrated using set of observed data of pressure from sensors placed in distribution network at critical points of high and low pressures and flow from the consumer and bulk flow meters. The calibrated model shall be further validated using other set of live data. This validated model shall be used for the operation and management and while making decision for giving new connections and branches.

6.10.7 Pipe laying requirements

86. After validation of DPR data and completion baseline study of distribution pipeline network, Contractor shall carry out the old pipeline replacement programme and laying of new pipelines. The discarded pipelines may remain in the ground. The old pipe line shall be left open at both ends (not plugged) to ensure that it is not brought back into service.
87. For successful transformation and operation of DMA's selected for 24 x 7 water supply, strengthening of primary network is suggested in the DPR. Construction of transmission mains /primary network shall be executed on top priority. Contractor shall be responsible to submit

the procurement and time schedule for works within 60 days from the commencement date. New transmission pipelines as shown shall be laid from the S1 sump at Nigadi WTP to the Dange Chowk (1000 mm) and at other locations as shown in tentative diagram below and with the details as mentioned in Table 8.

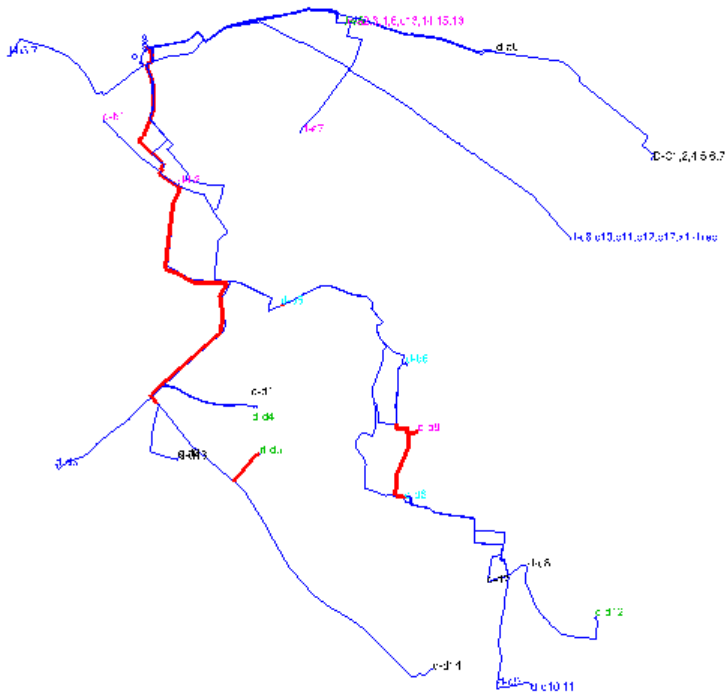


Figure 5 : New pipelines (red colour) to be laid for strengthening of the primary network

The transmission main of 1000 mm pipeline laying works to be executed from Contractor under SIP Plan / construction works programme shall not be covered in his O & M Plan.

Table 8 : Details of new DI-K7 transmission mains

Diameter of DI-K7 (mm)	Length (m)
300	903
450	608
500	776
1,000.00	7,436
Total	9723

(Source:DPR)

This work shall be started simultaneously and subsequently with all other works and executed /completed on priority.

88. The pipe network in the selected area is shown in Table 9 below.

Table 9 :Length of existing pipes in selected area of distribution system

Diameter (mm)	Length (m)					Grand Total
	AC	CI	DI	GI	MS	
50		3688		1111		4799
80		8506				8506
100		111763	3299		1463	116525
150		81571	10808		298	92677
175		990				990
200		25256	2349		1081	28686
250		14478	441		2898	17817
300	305	23278	6042		7419	37044
350		841				841
400		6413	1923		1756	10092
450		6847	2461		3561	12869
500		39	2033		286	2358
600		3314	2570		2745	8629
700			1723			1723
Grand Total	305	286984	33649	1111	21507	343556

The quantity shown above is indicative only (Source: DPR).

89. As per DPR, in order to improve the performance of the distribution system, pipe network rehabilitation proposed is as following:

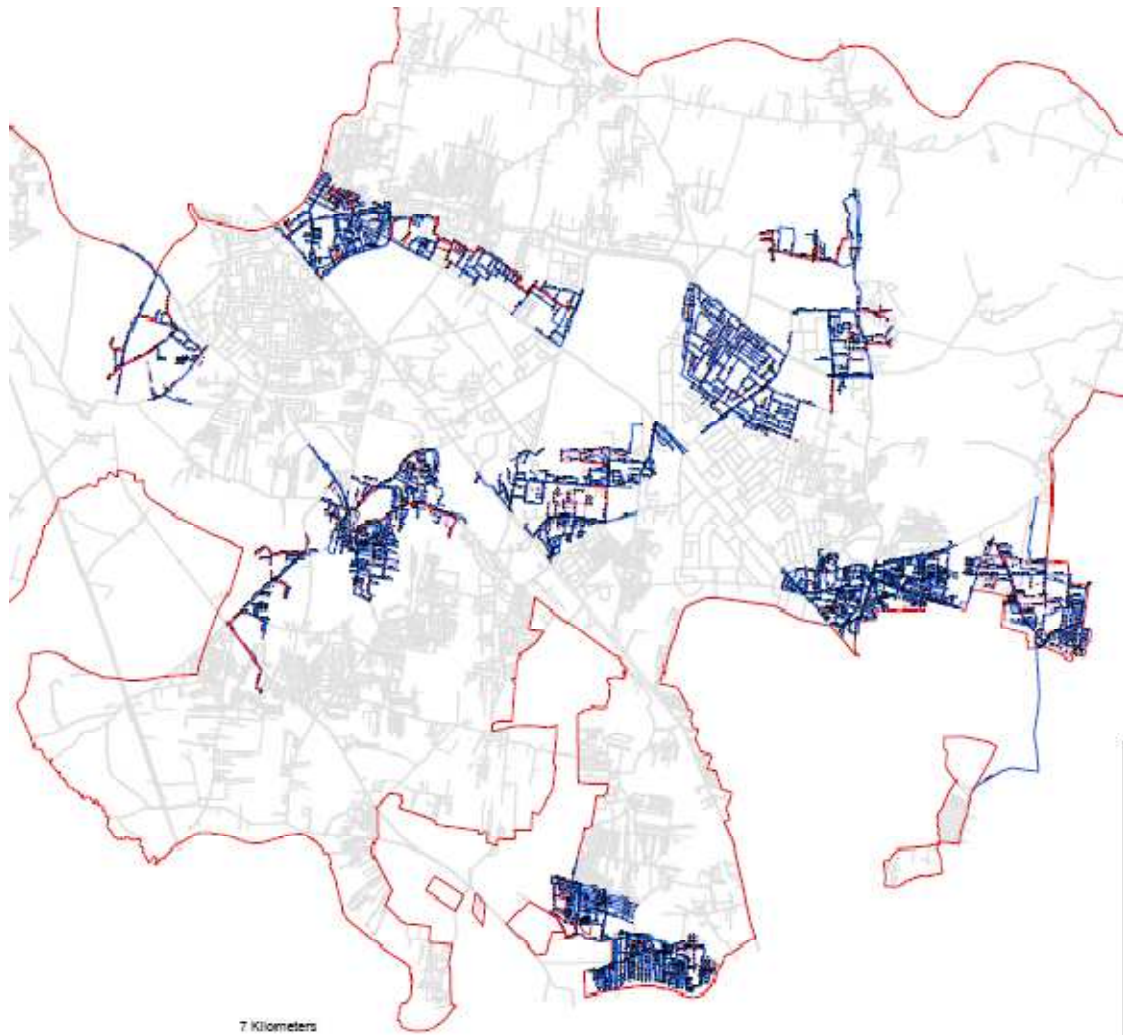


Figure 6 : Indicative layout diagram for New pipelines to be laid in selected areas

90. Length of proposed new pipes in selected area of distribution system is as below;

Table 10:- Tentative length of New Pipes

Diameter (mm)		Length (m)		
Outer	Inside	DI	HDPE	Grand Total
110	99.3		31251	31251
160	144.4		4177	4177
200	180.6		403	403
225	203.1		3050	3050
250	225.8		316	316
280	252.9		2782	2782
315	284.5		3867	3867
	300	710		771
	350	2566		2566
	400	4306		4306
	450	778		778
	500	131		131
	600	112		112

	700	291		291
	Grand Total	8894	45846	54801

(Source: DPR)

The quantity shown above is indicative only and contractor is expected to do his own assessment & validate through baseline study and confirm the same while submitting SIP to Engineer with condition assessment report for facilities covered under the scope of work.

Operation and Maintenance of above distribution network / pipeline laid / executed as per SIP shall be covered in Contractors O & M Plan.

91. Length of pipes to be replaced in selected area of distribution system is as following;

Table 11 : Tentative length of replacement pipes

Diameter (mm)	Length (m)		
	HDPE	DI	Total
110	38949		38949
160	27803		27803
180	297		297
225	8606		8606
280	5345		5345
300		11113	11113
350		252	252
400		3028	3028
450		3861	3861
500		707	707
600		2589	2589
700		517	517
Grand Total	81000	22067	103067

(Source: DPR)

The quantity shown above is indicative only and contractor is expected to do his own assessment & validate through baseline study and confirm the same while submitting SIP to Engineer with condition assessment report for facilities covered under the scope of work .

Operation and Maintenance of above distribution network / pipeline laid / executed as per SIP shall be covered in Contractors O & M Plan.

92. Ductile Iron class K7 pipes and HDPE pipes as per detailed specifications will be used for new distribution pipelines and MDPE pipe as per specifications will be used for consumer service pipe lines.
93. The Contractor has to plan and implement its pipe laying works in a detailed and strict manner as per approved SIP plan. The planning has to be coordinated with the Engineer and PCMC. The expected date of decommissioning of the existing pipeline and the commissioning of the new pipeline together with the exact location of the old and new pipeline have to be properly documented.
94. Pipe laying and decommissioning of old pipes should be done in the following way:
- 94.1. Preparation of skilled labor, tools, fittings, dewatering pump, chlorine water solution (10 ppm), hoses, electric source, grinder, welding machine (where required) etc.
 - 94.2. Excavation around the pipe at the pre-determined location of disconnection. It has to be ensured that there is enough working space according to the pipe diameter and the method of disconnection.
 - 94.3. Marking on the pipe, showing the length of the existing pipe to be cut out. The length to be removed piece shall generally be of at least 1.5 meters.
 - 94.4. Cutting the pipe perpendicular to the pipe centre line, using grinder, metal saw or cutter according to the pipe material. Extreme care is to be taken to avoid any dirt or foreign material entering the existing (and remaining) pipe.
 - 94.5. Installation of the required fittings to plug the existing (and remaining) pipe. All new parts are to be submerged completely in the chlorine solution (10 ppm) for at least 15 minutes directly before being installed.
 - 94.6. Installation of thrust block, where required.
 - 94.7. Repair of any possibly damaged protection layer.
 - 94.8. Greasing of bolts and washers and installing of the protective coat.
 - 94.9. After the one week period, described hereafter, all temporary parts are to be removed.
 - 94.10. The excavation shall be left open for about one week. During such time the pipe end has to be observed very frequently in order to ensure immediate recognition of a possible flow of water.
 - 94.11. After the one week period and with the consent of the Engineer and his approval on the appropriate form, the excavation shall be backfilled and the surface brought back to former condition.

94.12. If, at certain points or situations, public safety does not allow for leaving the pipe ends open for the mentioned time, other means shall be found to control the appearance of water at the pipe ends. Possible solutions, to be decided on from case to case could be the following:

- Plug the end where there are restrictions in a temporary form and leave only one end of the decommissioned pipe open.
- A pipe connection in a side street can be used for observation.
- A temporary pipe could be laid to the shoulder of the road to bring the possible water flow to the open.
- Former house-connections could be prepared for observation, after the pipe ends are plugged temporarily.

6.10.8 Consumer Service Connections requirements

95. The scope includes replacement of total number of 54,000 Connections in selected or more operational zones. The actual number of connections may vary which may include many unauthorized ones. All existing service connections shall be replaced and new connections made up to 54,000.
96. PCMC will provide information about the existing authorized consumers. Contractor will use this information for verification of the same during consumer survey and also for identifying unauthorized service connections in existence during the Consumer Connection surveys. The results of such verification of authorized connections and identified unauthorized connections will be submitted to the Engineer and PCMC for further needful action.
97. Existing authorized Connections: Contractor will replace the existing service pipe lines from distribution main pipe lines to the consumer premises with new saddles, ferrule, stop cock, MDPE pipe, GI pipe above ground etc. as per detailed specifications for the authorized consumers from the newly laid distribution pipe lines under a DMA. The work shall include excavation and cutting of road surface as required, making connection with distribution line under pressure, installation of service pipe and accessories including water meter and refilling the ground and bringing the road surface to original condition. This work will be done DMA wise on completion and commissioning of transmission main feeding the DMA. A water meter with a meter box will be provided at the end of the consumer service pipe line securely inside premises of the Consumer as per detailed specifications.

98. **New Service Connections:** Contractor will provide new service pipe lines from distribution lines to the consumer premises with new saddles, ferrule, MDPE pipe, stop cock etc. as per detailed specifications for the unauthorized consumers from the newly laid distribution pipe lines under a DMA on receiving approval from PCMC . This work will also be done DMA wise on completion and commissioning of transmission main feeding a particular DMA. A water meter with a meter box will be provided at the end of the consumer service pipe line securely inside the premises of the consumer as per detailed specifications. The work shall include excavation and cutting of road surface as required, making connection with distribution line under pressure, installation of service pipe and accessories including water meter and refilling the ground and bringing the road surface to original condition. Contractor will also be responsible for providing new consumer service connections from time to time on receiving approval from PCMC for the same. This will be an ongoing work during the entire contract period. The work of new service connections will be done as per detailed specifications within 3 days of receipt of approval from PCMC .
99. **Services to the Urban Poor:** In the case of urban poor areas in the Service Area, the Contractor, in accordance to the approved connections policy, shall undertake provision of individual. Such water connections shall also be provided with same specifications and procedures as mentioned above for regular consumer connections. However, the water meter and meter box shall be installed at a safe place as agreed with the Consumer and approved by PCMC .
100. **Public Stand Posts:** All public stand post shall be removed after providing individual connection or if PCMC instruct to install public stand post. All permitted public stand posts as per list to be provided by PCMC shall be rehabilitated and constructed with sturdy plumbing and good quality stopcocks and shall be provided with a Consumer meter for the purpose of accounting the consumption from the respective tap. The location and operation arrangement of each stand post will be determined in coordination with the future tap users. The Contractor is required to participate in the coordination process.
101. **Bulk Water Supply Connections:** In the case of bulk water supply connections of sizes equivalent or higher than 25mm dia. to bulk consumers such as apartments, housing societies or private layouts within the Service Area, the Contractor shall install a suitably sized, accurate consumption meter. The responsibility for providing saddles, service pipe, water meter and

stop cock as per specifications will be of the Consumer but installation of saddle to the distribution main pipe and making connection and installation of water meter will be done by the Contractor.

102. Illegal Connections: The Contractor based on the findings from the Consumer Connection survey, and in accordance to the approved connections policy, shall identify the illegal or unauthorized connections and inform PCMC for regularization / disconnections of the connections. On approval and after payment of prescribed charges by the Consumer, the Contractor shall then rehabilitate the connection with good plumbing material and a Consumer meter. Final decision on regularisation or disconnection of such Consumers shall solely be the responsibility of PCMC and Contractor shall be more particular in bringing to the notice of PCMC such connections.
103. The responsibility of the Contractor will be limited to providing service pipe line up to the water meter, water meter, stopcock and meter box in the consumer premises. All works beyond the water meter will be the responsibility of the Consumer, except for the public stand posts.
104. The Contractor shall set up and operate temporary Customer service points in those DMAs where Works are ongoing and Consumer Service Connections are being provided, to facilitate easy communication with Consumers.

6.10.9 Testing and commissioning

105. Testing of all materials, equipment and instrumentation shall be done as specified in the Technical Specifications. Installation of all electro-mechanical equipment shall be carried out strictly as per recommendations of the manufacturers. Pre-commissioning and trial run shall be undertaken as specified in Technical Specifications and detailed technical specifications covered under section 6.21, 6.22 & 6.23 of this document.
106. Supplying for the first time water to the DMA, the Contractor has to check that none of the replaced pipelines is still supplied with water via another pipeline inside or outside the DMA. In case of water flowing from the replaced pipeline, the Contractor has to take all necessary measures to stop the supply of water to the replaced pipeline. The measures at least include:
 - 106.1. Valves in the immediate vicinity of the decommissioned pipe shall be closed to assess the location of the connection.

- 106.2. Start digging out the decommissioned pipe from both ends until the unknown connection is found. The found pipe has to be followed until at least the border of the DMA, in order to isolate the DMA properly.
- 106.3. Gather latest information from PCMC on valve settings and pump operations. If it becomes evident that the water comes through a connection from outside the district, it will be necessary to examine jointly with the Engineer what changes in pump- or valve settings has been done recently.
107. Testing for commissioning of a completed DMA shall consist of flow measurements at DMA inlet and at all service connections to determine whether the target level of water loss, as specified in Schedule 7 of PCC [*Target Performance & Standards*], Parameter has been met.
- 107.1. Simultaneous flow measurements shall be undertaken during a 24-hour period.
- 107.2. In case the actual water loss thus measured is more than twice the target level, the Contractor shall propose a work method, to be approved by the Engineer, to determine the cause(s) of water loss.
- 107.3. The Contractor shall investigate the cause(s) of water loss accordingly and shall make the necessary rectifications.
- 107.4. The testing for commissioning shall then be repeated till the requirements are met & 24x7 water supply achieved in the project area.
- 107.5. Contractor shall be responsible to conduct the internal water audit / leak test at consumer premises. Contractor shall prepare and record the list of high water consumption consumers and perform the test.

6.10.10 Meter Reading and Management requirements

108. Meter reading of existing consumer is being carried out by PCMC under separate contract and hence meter reading of consumer meters is not covered under the scope of Contractor. However, Contractor shall be responsible to verify the volumetric consumption readings of DMA consumers during DMA / baseline study and also responsible for spot / random checking as when desired by Employer. If directed by PCMC Contractor shall engage the meter reader & meter reader supervisor and PCMC will make the payment as per day rate quoted by Contractor.
109. The Contractor shall:
- i. During DMA study, read all consumer water meters of selected DMA consumers in accordance with requirements laid down under this contract. ;

- ii. Develop a monitoring program of random spot-checks to ensure the accuracy of the meters and the meter reading process to be carried out by PCMC under separate contract and provide written reports to the Employer on the results;
- iii. Develop and implement a plan; the intent of which is to ensure that:
 - a. All consumer meters are in working condition
 - b. all consumer meters are accurate,
 - c. all consumer meters are read,
 - d. all consumer meters are in suitable and easily approachable locations,
 - e. problems related to unprotected and unsealed consumer meters are resolved,
 - f. develop and implement a program to estimate consumption in circumstances where metering problems exist, and
 - g. provide advice as to methods to improve the meter reading process to ensure greater accuracy;
- iv. Identify consumer meters which have not been read; and
- v. Respond to reports of malfunctioning consumer revenue meters from Consumers.

6.10.11 Water Loss reduction & management Services

110. The Contractor has to take all necessary action, provide all required services and materials and equipment and carry out all works required to achieve the main objective of the Contract and reduce water loss for total number of 54000 connections in selected DMA's of operational zones. The following (non-exhaustive) list summarizes the activities the Contractor is normally expected to carry out (without limiting the Contractor's obligations and the scope of work):

- a. no water loss reduction works shall be carried out prior to the 7-day inflow and pressure measurement baseline measurement to be carried out by the Contractor, jointly with and supervised by the Engineer;
- b. leak detection surveys (using all kind of equipment and technologies, from simple sounding with a listening stick to leak noise correlators and leak noise loggers as

appropriate, helium gas), note that all required leak detection equipment has to be provided by the Contractor (but will not revert to the Employer at the end of the Contract).

- c. pressure management: stabilizing, managing and reducing average DMA pressure using PRVs and controllers and various techniques as appropriate; when doing pressure reduction, the Contractor has to ensure that all the volume of water supplied to consumers in the DMA is the same or better than the baseline levels at the start of the project. Level of minimum pressure will depend on the type of housing and the general availability of tanks. Pressure management has to be done in close co-operation with the consumers in the DMA to reduce the risk of complaints. All required customer information and education is part of the Contractor's duties and cost for these activities covered under scope of services envisaged in this contract.
- d. service connection replacement: it is anticipated that most of the service connections are leaking or are in bad condition and must be replaced. Detailed design, supply and installation complete with all fittings and road and sidewalk reinstatement are included. The Contractor shall decide which connections shall be replaced but in any case, if a leak is found on any part of the service connection, the entire connection including the pipe saddle shall be replaced
- e. leak detection surveys, repairs and pressure fine-tuning shall be repeated and/or shall continue until an acceptable level of leakage is achieved. The acceptable level of leakage might vary from one DMA to the other, it is up to the Contractor to decide at which point the effort for further leakage reduction becomes prohibitively high;
- f. continuous flow and pressure data logging and data transfer to the central server establishment of the Target Night Flow Level (TNFL) in m³/h after completion of all water loss reduction activities in a DMA and continuous monitoring of inflow, pressure and minimum night flow to become aware of new leaks; and
- g. repeating of leak detection and repair should the minimum night flow exceed the tolerance limits .
- h. detecting illegal connections: Should the Contractor find illegal connections he shall report them to the Employer.

111. The fixed and performance fee together cover all fixed cost, overheads, profit and all manpower, machinery, equipment, transport as well as all materials and works required to carry out all activities that might become necessary to achieve the objective of the Contract.
112. Water Audit for Consumer Connections:- Contractor shall identify the consumers with very high consumption of water and prepare the list and maintain the record of such consumers. While Establishment of DMA's, the list of such consumers shall be submitted to Engineer for internal water audits within consumer premises. Contractor shall be responsible to carry out Internal water audit for such identified consumers and submit the Internal Water Audit Report to Engineer with the consent of Consumer. Payments for this activity shall be as per Schedule 5 of PCC.

6.11O&M Requirements

6.11.1Operations and Maintenance of Water Supply Services

113. After completion of Design Construction DMA Establishment works in a zone of selected service area, the Contractor shall take over the management responsibilities of the Operations and Maintenance (O&M) of the water supply facilities of that respective zone. The O&M tasks essentially comprise but not limited to the following.

- a. Providing & maintain water supply to the Consumers at the minimum service levels as per Schedule-7 without further deterioration
- b. Water Demand Management
- c. Emergency water supply
- d. Network Operations and Management
- e. Flow and pressure, SCADA monitoring
- f. Repair of leaks and bursts and valves
- g. New Connections as per directives and approval by PCMC
- h. Consumer Services including attending to complaints received through PCMC and their resolution
- i. SCADA Information management and reporting
- j. Valve Operations through actuator control

6.11.2O&M Period

114. During this period, the Contractor shall continue to provide water supply services to the legal Consumers in the Service Area at the prescribed Minimum Service Levels. This shall include

but not limited to all the tasks, operations, maintenance activities as listed above including attending to any new requirements for new connections, extended boundaries of Service Area etc complete.

115. The Contractor shall ensure continuous, pressurized water supply to all the Consumers and any interruptions shall be within the permissible limits as specified in the Schedule 7 Performance Standards.

116. The Contractor shall also implement all rehabilitation or service improvement works required in any extended area of the Service Area depending upon bulk water supply feasibility and hydraulic modeling or as necessary as mutually agreed between the Parties at same terms & conditions upto 25% of additional project area.

6.11.3 General requirements:-

Operating Functions

117. Basic Operating Functions shall be as following;

Area of Operations	Key Operating Functions
Storage and Distribution	<ul style="list-style-type: none"> ▪ Conduct routine O&M ▪ Valve inspection ▪ Compliance monitoring for pressure and quality ▪ Flow measurement & monitoring ▪ Leak detection and repair ▪ Storage tank inspection ▪ Repairs, rehabilitation, expansion of networks ▪ Replacement of assets as per maintenance schedule
Consumer services	<ul style="list-style-type: none"> ▪ Install new connections ▪ Conduct meter installations ▪ Checking of Meter reading carried out by PCMC ▪ Consumer complaints redressal, and monitor Consumer satisfaction as per instructions given by PCMC

Area of Operations	Key Operating Functions
Water Safety	<ul style="list-style-type: none"> ▪ Water safety plan ▪ Monitoring water quality
Administration	<ul style="list-style-type: none"> ▪ Planning and coordination with other authorities ▪ Procurement of materials, works and services ▪ Project Management and supervision ▪ Accounts and financial management, and training ▪ Information recording and management ▪ Regulatory reporting ▪ Stores and Inventory Management

In the above table, the key basic operating functions are only listed and there are many more routine O&M functions which the Contractor has to undertake at different time frequencies.

6.11.4 Preventive Maintenance

118. The preventive maintenance tasks generally required in O&M of distribution systems are given in the following Table.

Chart Indicating Preventive Maintenance Schedule

Component	Daily Maintenance Tasks
Pipelines	Routine Maintenance Check residual chlorine - weekly Surveillance for leakage – pipe breaks and leaks - Daily Pipe flushing once in 6 months Swabbing and scraping once in three years
Valves Actuators	Routine Maintenance (A) Sluice valve and Knife gate valve <ul style="list-style-type: none"> ▪ Check gland packing of the valve at least once in a month. ▪ Ensure that packings inside the stuffing box are in good trim and impregnated with grease. ▪ If necessary change the packing as often as necessary to ensure that the leakage is within limit.

Component	Daily Maintenance Tasks
	<ul style="list-style-type: none"> ▪ Grease should be applied to reduction gears and grease lubricated thrust bearing once in three months. ▪ Check tight closure of the valve once in 3 months. ▪ A valve normally kept open or closed should be operated once every three months to full travel of gate and any jamming developed due to long disuse shall be freed. ▪ Inspect the valve thoroughly for flaws in guide channel, guide lugs, spindle, spindle nut, stuffing box etc. once in a year. ▪ Do not operate with oversize hand wheel or cap or spanner. ▪ Do not operate under throttled i.e. partially open condition <p>(B) Reflux (non-return) valve</p> <ul style="list-style-type: none"> ▪ Check proper operation of hinged door and tight closure under no-flow condition once in 3 months. ▪ The valve shall be thoroughly inspected annually. ▪ Condition of dampening arrangement should be thoroughly examined once in year ▪ In case of dampening arrangement, check for oil leakage and replace oil once in a year. <p>(C) Butterfly Valve</p> <ul style="list-style-type: none"> ▪ Check seal ring and tight shut-off once in 3 months. ▪ Lubricate gearing arrangement and bearing once in 3 months. ▪ Inspect the valve thoroughly including complete operations once in a year. ▪ Change oil or grease in gearing arrangement once in a year.
Connections	Routine Maintenance
SCADA System	Routine tests , System PLC's , Calibration of instrumentation etc. complete
Water Meters	Routine Maintenance

Component	Daily Maintenance Tasks
	<ul style="list-style-type: none"> ▪ Check for bulk meter accuracy – once in 6 months or as per requirement ▪ Replace Consumer meters – once in 7 years ▪ Replace bulk meters – once in 10 years ▪ Calibration check from NABL labs once in 2 years

6.11.5 General Obligations

119. The Contractor shall have the following general obligations as they may be applicable during the term of the Contract .

- (a) The Contractor shall perform the Services in accordance with this Contract, and carry out its obligations with all due diligence, efficiency, and economy, in accordance with generally accepted professional techniques and international best practices, and shall observe sound management principles, and employ appropriate advanced technology and safe methods. The Contractor shall always act in good faith, in respect of any matter relating to this Contract or to the Services, to the PCMC and shall at all times support and safeguard the PCMC's legitimate interest in any dealings with the Customers, sub-contractors or third parties;
- (b) The Contractor shall ensure that all materials and workmanship used in the course of the Contract shall be in accordance with the standard specifications. In absence of and appropriate specification, in accordance with the Indian National Standards or the International Standards Organisation as the case may be.
- (c) The Contractor shall develop, install, commission and maintain efficient and effective Integrated Information Management System (IIMS) comprising of all management needs including customer contact management, new connections, disconnections, reconnections, consumption and flow monitoring, demand management, asset management, inventory management, human resources management, monitoring .of operating efficiency etc complete as' required for efficient and effective operations and management of the water supply services.
- (d) The Contractor shall establish and operate a 24-hour customer service centre to be managed by PCMC to carry out the functions of customer relations, support and complaints in terms of this Contract including but not limited to response and redressal of complaints concerning leakages in the distribution system, water reduction, water quality, low pressure, and provide assistance in imparting education concerning use of water supply, installation of new connection, water usage and plumbing. The customer service centre should be operational during all times of year round the clock with appropriate staff.

The support staff to manage the centre shall be provided by Contractor.

- (e) The Contractor shall install Customer metering on all points of Customer supply and randomly check the calibration of meters installed for accurate reading to establish accurate water balance and monitor water losses;

The Contractor shall supply water to PCMC properties with metered connection

- (f) The Contractor shall permit the persons appointed and / or authorised by the PCMC to conduct time to time audit of accounts and records of the Contractor relating to performance of the Contractor under the Contract after the Appointed Date subject to receipt of prior written intimation from the PCMC in this regard and shall fully cooperate with such auditors in the conduct of audit and review exercises and checks and shall provide all requested information to the auditors;

- (g) The Contractor shall on a periodical basis update the record of Facilities.

- (h) Neither the Contractor nor its employees shall indulge, either directly or indirectly, in any of the following activities:

- (i) during the term of this Contract, any business or professional which would conflict with the activities assigned to them under this Contract;
- (ii) NA

- (i) The Contractor shall undertake the measures as agreed under the Emergency Procedures as per para 6.11.9 herein in times of operational exigencies.

- (j) Any complaints received from the consumer through customer service centre shall be recorded and the appropriate remedial measures shall be effectively implemented to the satisfaction of the PCMC duly documented.

- (k) Any leakages observed in the distribution main shall be attended immediately and water supply restored within 12 Hours of the receipt of complaint for leakage.

- (l) The Contractor shall be responsible to maintain required quantities of spares for preventive maintenance, periodical maintenance and breakdown maintenance as enlisted hereafter in this document. The Contractor must also keep the minimum stock of spares for emergency repairs as required for prudent operational practices.

6.11.6 Specific Obligations of the Contractor for Operations & Maintenance

120. The Contractor shall have the following obligations:

- a) Prepare & implement operating and maintenance manuals, spare parts lists, recommended spares, warranty period from equipment suppliers and connected matters;
- b) identifying and procuring workshop equipment and capital spares for repairs as may be required, at his cost.
- c) select suitably qualified Suppliers of Spares, Consumables, and the external Contractors required during Operations.
- d) Set up a fully functional office with computers, personnel, equipment, furniture and communications and 24-hour customer service desk at locations / space provided or

suggested by PCMC/ engineer. Customer service front office shall be managed by PCMC, while support staff for resolving the complaints or repairs shall be provided by Contractor.

e) Contractor shall collect water sample for water quality check at ESR level, within distribution system as well as consumer end and submit it to PCMC laboratory for monitoring and reporting ,

f) The Contractor shall assist the PCMC in evaluating and verifying the reasonableness of the Operations and Maintenance Plan and answer all queries, explain the assumptions, projections, calculations etc. and shall make available all the concerned staff who had prepared the respective plans.

121. Notwithstanding the above obligations the Contractor shall have the following obligations during Operation & Maintenance

(a) Provide prudent management, operation and maintenance services as per the prescribed-standards of performance for existing as well as new assets created under this contract;

(b) Undertake efficient demand management and meet the entire demand for water as required during the time of operation;

(c) Co-ordinate with PCMC for ensured Bulk Supply volume at ESR inlet

(d) Contract management;

(e) connections, reporting defaulters, reconnecting as per the general conditions of contract.

(f) Manage and maintain the Integrated Management Information System (IMIS) to ensure efficient and transparent information, record keeping, and decision making. Under IMIS, set up a robust integrated information system comprising of the following areas:

(i) technical services such as service levels of NRW, water quality, consumption, pressure, losses, monthly real time water balance, SCADA etc.;

(ii) business services comprising, procurement, inventory management and human resource management;

(iii) Hydraulic network Modeling:- A hydraulic network model representing the water supply system for selected area of PCMC shall be developed using suitable software such as Water GEMS. The model shall be calibrated, reconciled and established and fully functional for continuous updating for management of the system;

(iv) Asset Management Program including covering each type and category of asset, its servicing schedule, replacement frequency, etc. for all assets in water system including but not limited to:-

(A) Valve inspections

(B) Tank inspections

(c) Pipeline inspections

(D) Leak detection process .

(E) Leak repairs

(E) SCADA & Preventive maintenance of all existing and new mechanical, electrical and instrumentation equipment

- (v) Set up operating and maintenance procedures for each of the unit operation including Standard Operating Procedures, Standard Maintenance Procedures, Emergency Procedures, Health and Safety Procedures etc incorporating Original Construction Contractor's Operating and Maintenance Manuals;
- (g) Maintain effective and efficient customer complaints redressal system, the prescribed performance standards including awareness program, campaigns, trainings etc.;
- (h) Undertake timely and cost effective asset management program;
- (i) Maintain the automated water quality surveillance system;
- (j) Operate and maintain all mechanical, electrical, instrumentation , SCADA Server & Monitoring and information technology installations, equipment, machinery etc as per the respective standard operating and maintenance procedures;
- (k) Undertake preventive and breakdown maintenance for all pipelines, valves, appurtenances, mechanical, electrical and instrumentation equipment in relation to the above referred Facilities, along with appropriate documentation to facilitate warranty and insurance claims, if required;
- (l) Ensure effective and efficient planning, procurement and inventory management for all spares, equipments, consumables, instrumentations and PLC/SCADA system etc;
- (m) Provide robust security arrangements for all the facilities within the scope of this project, including restriction of entry of unauthorised persons;
- (n) Manage and maintain the water distribution management system (WDMS) for the water supply in the project area, including all, water storage facilities, flow measurement, pressure measurement and quality surveillance systems etc. complete;
- (o) Comply with all relevant local laws including environmental, industrial and labour laws;
- (p) Maintain healthy working relations with all stakeholders including the Water resources department, PCMC, NHAI, PWD, MJP, State Pollution Control Board, and power utilities; etc.
- (q) Maintain detailed documentation and prepare periodical reports including monthly, quarterly and yearly reports for submission to PCMC including data on water balance, leakage levels, flow and pressure of water at designated check points, Import / Export point flow details, water loss / NRW level, service level, etc. complete as set out in.
- (r) Training of the operating personnel from PCMC or any other designated authority for taking over the system at the end of Contract Term;
- (s) To undertake emergency chlorination measures at times of outbreak of epidemics and any such emergency situations on behalf of PCMC;
- (t) Rectify all defects attributable to the Contractor and notify the PCMC of defects, developed within defect liability period of the commissioned components or equipments of Water supply system;

- (u) Follow all reporting requirements as specified by Engineer;
- (v) Maintain the Performance Indicators, Quality Assurance, Standard & Safe Operation Procedures (SOP_s);
- (w) To summarize, the services provided by the Contractor shall include the following:
 - Operation of Facilities from inlet of service reservoir upto consumer end;
 - Provision for 24 hours a day operation and emergency cover;
 - Maintenance of the Facilities from inlet of service reservoir upto consumer end;
 - Ground and buildings maintenance;
 - Unscheduled and emergency maintenance;
 - New service connection surveys and estimates as per instructions of PCMC;
 - Making new service connections as per instructions of PCMC;
 - Investigation of illegal connections, install meter & measure and necessary reporting as per instructions of PCMC;
 - Quality surveillance programme;
 - Data collection and reporting;
 - Holding emergency exercises;
 - Incident management;
 - Safety inspections;
 - Supervision of subcontractors, enforcement of specifications;
 - Operational liaison;
 - Updating of the IMIS/ Computerised water management software system;
 - SCADA system operations / cloud facility
 - Preparation of all plans, procedures and budgets relating to operational matters, as required within the Contract.
 - Consumer awareness program, campaign, training, meetings, media interaction etc.
 - Any other work necessary to ensure the continued operation and availability of the system.
- (x) All instruments shall be maintained, checked, calibrated and serviced periodically and will always be kept in operating condition. The calibration shall be checked whenever necessary and corrected. Calibration data shall be submitted to the PCMC for approval. As a minimum, all instruments shall be calibrated once per year.
- (y) For the purpose of complying with the requirements of this contract, the Contractor will need to provide.:
 - i) An adequate and skilled workforce, supervisors, managers and technical support staff;
 - ii) Administrative and financial support staff and computer and business support systems;
 - iii) All necessary mobile plant and equipment, vehicles and incidental equipment;
 - iv) Health and Safety equipment and staff protective clothing as well as traffic and footpath barriers and signs;
 - v) Necessary chemicals and fuel;
 - vi) Stores suitably stocked with adequate spare parts and replenished within a store policy that recognizes frequency of use and delivery periods;
 - vii) Suitable depot and office premises.
- (z) The Contractor shall carry out the complete cleaning & disinfection of service reservoirs, master balancing reservoirs etc. once in a year.

- (aa) All SCADA and monitoring data shall be maintained and available on internet through application software.

6.11.7 Standard Operating Procedures (SOP)

122. Operating Instructions and Standard & Safe Operating Procedures (SOP) shall be formulated for each Site comprising of process equipment schedules, operation & maintenance data, sampling and analysis with frequencies etc. The operating parameters shall be optimised based on the data collected on commissioning of the facilities. All the activities in the preventive maintenance schedule shall be followed without any lapse. Indicative functions that are expected to be performed at each site are given below:

Water Supply Network

- (a) Take all relevant meter, flow and pressure readings
- (b) Check operation of all equipment
- (c) Periodically check water meters and cross check readings
- (d) Check for Chlorine residual, flow and pressure at the Critical Measurement Points (CMPs)
- (e) Checking SCADA operations & monitoring

6.11.8 Maintenance and Repairs (Mechanical, Electrical and Instrumentation)

Management and Maintenance Plan

123. A properly designed water system shall be capable of delivering desired output at all times. Considering that every mechanical system shall have to be given a downtime for maintenance purposes, the Contractor shall schedule a downtime of one hundred twenty hours, on a cumulative basis in a year for the water components or project facilities in consultation with the PCMC so as to minimise disruption in services.

6.11.9 Emergency Action Plan

124. The Contractor shall provide Emergency Plan of Action, as per the following:
- (i) The PCMC may, at its election, intercede and take, or direct the Contractor to take, any and all actions reasonably necessary to respond to an Emergency.
 - (ii) The Contractor shall, upon learning of an Emergency or the probable occurrence of an Emergency, (1) immediately provide oral notice to the PCMC or its Authorized Representative of the same and (2) as soon as possible, but no later than twelve (12) hours, provide Notice to the PCMC or its Authorized Representative of such event or

probable event; provided however, if Applicable Law shall provide for a more expeditious oral or written notice of any Emergency to the PCMC, the Contractor shall so comply by providing such notice to the PCMC or its Authorized Representative.

- (iii) The PCMC and Contractor or their Authorized Representatives shall coordinate with each another prior to, during and after the occurrence of an Emergency including 1) the planning and implementation of actions designed to prevent or mitigate damage to the System and the environment and (2) the attendance of all meetings related to such planning and implementation.
- (iv) The Contractor shall **interact / liaison** and cooperate with appropriate departments of the public entities comprising the PCMC and other jurisdictions.
- (v) The Contractor shall supply standby employees from normal system staff ready to address an Emergency in an expeditious manner.
- (vi) Response Times and Emergencies:-

The Contractor commits itself to a high standard of effective response. To indicate commitment, the Contractor shall establish 'Standards of Service' which shall define the Contractor's response to any emergency with the intention of minimising the possible impact of an emergency or failure on the output of the Facilities. These standards shall be agreed with the PCMC and would typically include:

Situation	Response	Target Time
To any alarm or non-conformity during normal work time, or when the Facilities are being manned.	Any threat to public or personal health.	Immediate
	To attend to and assess the required action and the resources needed to effect remedial action. Effect first call repairs where possible	Immediate
	If the problem requires further resources, to have remedial work on site rectifying the problem	2 Hours
To any alarm Or non-conformity occurring outside normal Operating hours or when Facilities are unmanned	Any threat to public or personal health.	Immediate
	To attend to and assess the required action and the resources needed to effect remedial action. Effect first call repairs where possible	1 Hours
	If the problem requires further	2 Hours

	resources, to have remedial work on site rectifying the problem	
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125. A dedicated problem solving team shall be appointed by the Contractor and this team shall have the responsibility of tracking problems through to a satisfactory outcome.

Major events that threaten public, employee or process safety or security shall be managed directly by an Contractor's Representative, who shall have full authority to utilise whatever resources he considers fit to rectify any emergency situations. In performing these duties, this manager shall have full responsibility for ensuring proper and adequate communications with thePCMC and other relevant bodies.

6.11.10Permits

126. Both the PCMC and the Contractor will be responsible for obtaining various permits, authorizations and consents to enable them to carry out their duties. These will include, but not be limited to the following:

1. Permits to be obtained by PCMC
 - a) Abstraction licences from various departments
 - b) Planning permissions
 - c) Public way-leaves that may be required from time to time
 - d) Discharge consents
 - e) Disposal licenses
 - f) Permissions to enter public and industrial properties
2. Permits to be obtained by the Contractor
 - a) Vehicle and plant licenses
 - b) Licenses to store
 - c) Health and Safety certificates
 - d) Fire certificate
 - e) Approval from Labour Inspector
 - f) Approval from District Health Officer
 - g) Insurance as appropriate
 - h) Licenses to carry out water operations

6.11.11 The Contractor's and the PCMC Responsibilities.

127. Responsibilities are as following

- (a) The Contractor shall be establishing, keeping and maintaining the computerised water management system in consultation with the PCMC while integrating all water supply components under the scope of this contract. The Contractor shall

collect and keep up to date information on the facilities, both above and below ground.

- (b) All Facilities taken over by the Contractor shall be entered into the computerised water management system for integration to further set up IMIS and further monitoring.
- (c) The Contractor shall verify all information in accordance with procedures agreed with the PCMC.
- (d) The Facility Register based on condition grade system shall be supported by operational information on compliance with Performance Standards, part wise.
- (e) The Contractor shall be responsible for operating the Facilities and the Conveyance System in the correct manner and for maintaining them in a professional manner.
- (f) The Contractor shall use the data to plan the Annual O&M Plan in consultation with the PCMC.
- (h) PCMC may use the information to gain an overall view of the Facility's value, performance and condition grades.

6.11.12 Facility Register

128. The Facility Register shall be a schedule (a computerized database, but also available on paper for ease of inspection) of the Conveyance System to be maintained under the responsibility of the Contractor as agreed with the PCMC. The Facility Register shall be used to perform, or support, the Services carried out by the Contractor

The format of the Facility Register shall be designed in consultation with the PCMC.

The PCMC shall have the right to verify the Facility Register and Contractor's procedures for keeping it up to date.

6.11.13 Facility Numbering

129. Each above ground Facility shall be given a unique number within the Facility register. Numbering system shall be designed in consultation with the PCMC. The number shall refer to the site and the type of Facility.

Records to be Produced and Maintained

The scope of the Facilities to be included are summarised in following Table

Scope of the Facilities	
Type	Facilities
Management and General	Workshops Stocks Computers and associated equipment Land Vehicles Plant & machinery Service reservoir SCADA components Softwares

6.11.14 Operational Job Management

130. The Contractor shall establish and maintain a suitable job management system, in consultation with the PCMC. This job management system shall provide detailed information on Facilities such as the type and make of motors, maintenance schedules etc.

6.11.15 Record Drawings

Data on Facilities shall be mentioned on Record Drawings.

131. The PCMC shall ensure that the Contractor is given available Drawings of all Facilities. The Contractor shall accept the As-Built Drawings as per the scales and standards utilised by the Original Construction Contractor(s). The data can then be extracted and summarised on the IMIS. The Contractor shall establish and maintain up to date Record Drawings for both above ground and below ground Facilities.

132. The Contractor shall update the Record Drawings and Facility Register to include the Facilities taken over, together with any works that are subsequently undertaken. The Record Drawings shall be updated by the Contractor within 3 months of any modifications being carried out in the Facilities.

6.11.16 Accuracy of Data.

133. The Contractor shall assign 'Confidence Grades' to the data to validate its accuracy. The Contractor shall develop the definitions of these grades and how they are to be used in consultation with the PCMC.

6.11.17 Inventory Management

134. The Contractor shall operationalise a computer based inventory management system to enable effective control of spares and consumables on the commencement of the Operations Period. This system shall use standard proprietary software and shall be linked by the Contractor to computerised water supply management software integrated with SCADA server. The Contractor shall provide monthly reports from this system to the PCMC.

6.11.18 Water Quality

135. The PCMC shall supply treated water that complies with the CPHEEO norms, presented in Schedules of Section 8 [Particular Conditions of Contract].

136. The Contractor shall collect all water samples relative to the system within the selected DMA's required by Applicable Law for physical-chemical and bacteriological analysis at PCMC laboratory and provide and submit in a timely manner all such test results to the Engineer.

137. The Contractor shall propose its water sampling and analysis program as part of the Operations and Maintenance Plan. The program shall allow adequate monitoring of water quality and shall meet the minimum sampling and analysis frequencies as specified in CPHEEO manual or as per frequency interval below;

location	Physical&chemical parameters	bacteriological parameters	Heavy metals & pesticides	residual chlorine
at all Bulk Water supply points	monthly	weekly	annually	online
at all reservoirs	not applicable	weekly	-	online
at service delivery points, randomly taken from Service Area, two per DMA.	monthly	daily	-	online

138. During the Contract Period, i.e. upon completion and commissioning of selected DMA's for continuous (24 x7) pressurised water supply, PCMC will start supplying Bulk Water to specific Supply Points (ESR inlet) in the water supply system. If the quality of the supplied Bulk Water is not as per the CPHEEO norms, the Contractor shall immediately report to PCMC and the Engineer. The Contractor shall in this regard take two spot samples of the water supplied to it by PCMC . These samples are to be taken every day till such date that the Engineer issues a notice to discontinue the sampling. One of the samples should be analyzed on site for chlorine residual. The other sample, taken in accordance with the sterile requirements for bacterial analysis, shall be analyzed at a laboratory of PCMC or any other laboratory approved by PCMC for the test parameters as CPHEEO norms. A representative of PCMC and the Engineer shall be present, if they wish to, at the sampling and the sample for bacterial analysis should be divided in two for separate analysis at different approved laboratories, one portion for the Contractor and the other for PCMC .
139. Based on the results of the analyses, PCMC may advise the Engineer to instruct the Contractor to temporarily discontinue the supply of Bulk Water.
140. The Contractor shall assist and advise the PCMC in all matters related to water and quality including, but not limited to, providing advice and assistance during the PCMC 's discussions with the regulators and public health officials on water quality matters.

6.11.19 Customer Service Management System

141. Customer service encompasses a broad range of activities. The Customer Service Management System shall include redressal of complaints reported by PCMC and required performance parameters are met (e.g. water pressure and flow, NRW, SCADA) and proper response are given to customer enquiries. The following provisions shall be integrated into the customer service management system:

- i) At least 24 hours advance warning of planned supply shut off for repairs and renewals
- ii) Advice Customers during emergencies
- iii) Recording and Responding to Customer Complaints received from PCMC.
- (iv) The strategy prepared by the Contractor shall include, but not be limited to, a comprehensive strategy to establish a Customer Service Centre,
- (vi) The PCMC's personnel at front office at customer service centre shall receive and handle all customer queries and complaints, including, but not limited to, queries and complaints related to
 - water bills;
 - malfunctioning or inaccurate meters;
 - meter readings;
 - water quality;
 - water pressure;
 - leakage and damaged pipes;

- change in meter location;
- changes in customer names; .
- cancellation of connection by the customer

6.11.20 **Meters and Meter Reading**

142. The activity of meter reading and proper maintenance and use there of shall vest with the PCMC. The reading taken by PCMC for the consumers covered under 40% area shall be shared with Contractor for his information & further analysis, if any. Such reading are subject to random spot checking by the Contractor, for verification or as the case may be.

6.11.21 **Meter Replacements / Refurbishment / Calibration by Contractor**

143. Scope includes following

- i) Failed equipments / instruments / meters shall be replaced by Contractor under defect liability period.
- ii) Contractor shall be responsible for calibration testing of Flow meters after every 2 years from NABL accredited labs or CWPRS or as specified by Engineer
- ii) Complaints related to faulty water meters or inaccurate meter shall be notified to Contractor by PCMC. Contractor shall be responsible to un-install such meters and provide it to meters testing bench facility of PCMC as per the instruction of Engineer.

6.11.22 **Customer Service**

144. A 24 hour customer service desk shall be established by the Contractor and managed by PCMC. The customer service desk will be integrated with the computerised water supply management software. All enquiries and customer complaints shall be recorded into the system along with resolution mechanism, time of resolution, action taken and feedback procedures. Space for establishing the office shall be provided by PCMC for created DMA's under the scope of this contract within 40% project area.

6.11.23 **Environmental Management Plan**

145. It shall be as per following table

Environmental Management Plan
Environmental Management Plan for Selected Area of PCMC Project

Project Activity	Environmental Impacts	Mitigation Measures	Primary Responsibility
Bursts	Flooding and leakage of water in the influence Area during implementation	Appropriate shut off or bypass and leak control arrangements shall be ensured	Contractor
Replacing the valves	Temporary disruption of water supply to the consumer	Alternative supply arrangements such as supply through tankers shall be provided.	Contractor
Leak repair and replacement of mains	Disruption of water supply to the consumers during execution	-Alternative supply arrangements such as supply through tankers shall be provided.	Contractor
New pipelines or extensions	Disruption of traffic during execution	-Appropriate traffic diversion plans shall be prepared and implemented during construction	Contractor
Working in roads or restrictive places	Safety hazards to labour	-Adequate safety precautions such as helmets, safety shoes, gloves, etc. shall be provided to the labours	Contractor
Repair of pipelines	Disturbance to other utilities such as telephone cables and sewer lines etc.	-Scheduling activities in consultation with the other utility agencies and ensuring minimum disturbance to the utilities	Contractor
Construction or installation of new structures or equipments	Increased noise levels during construction	-Use of low noise generating equipment for all the activities, provision of personal protective equipment, ear muffs, etc. for the construction labour and avoiding construction activities during nights	Contractor
Replacement of service connection	Temporary disruption of water supply	Alternative supply arrangements such as supply through tankers shall be Provided.	Contractor
Provision of appropriate water meters & taps	Temporary disruption of water supply	Alternative supply arrangements such as supply through tankers shall be Provided.	Contractor

6.12Key -Personal requirements (Mandatory Provisions)

146. In general, staffing levels and qualifications are to be decided by the Contractor apart from minimum and mandatory personnel requirements specified in in this section. However, in order to make bids comparable, the following minimum number of experienced key-personnel has to be available for entire project period for the scope of services under this assignment. The number of man-months for each position is to be understood as the absolute minimum requirement. Evidence of the physical presence of these listed staff members have to be provided in the quarterly Progress Reports. Non availability of key persons shall result into imposition of penalty as per contract agreement.
147. It has to be understood that it might be necessary to bring significantly more specialists to the Site in order to achieve the objectives of the Contract. All costs of such additional personnel have to be included in the Contract Price.
148. Team Leader cum O & M specialist- having a minimum of 84 man-months of a person meeting the following minimum experience criteria shall be required during entire project duration:
- (a) 15 years experience with water distribution networks
 - (b) Technical University degree, for example Water and Sanitary Engineering, Civil Engineering or Mechanical Engineering
 - (c) Project Management & operation Experience
 - (d) 10 years of developing county experience
 - (e) 5 years experience with 24 x 7 water supply operations is mandatory
149. Water Loss / DMA and Pressure Management Specialist(s)- having a minimum of 84 man-months of one or more person(s) meeting the following minimum experience criteria shall be required during entire project duration:
- (a) 7 years experience with water loss / NRW leakage reduction projects, particularly with pressure reducing valves, Hydarulic Modelling, controllers, data loggers and similar
 - (b) 2 years developing country experience
150. Leak Detection Specialist(s)- having a minimum of 84 man-months of one or more person(s) meeting the following minimum experience criteria:
- (a) 7 years experience with leakage reduction projects, particularly with pressure reducing valves, controllers, data loggers and similar

(b) 2 years developing country experience

6.13 Consumer Awareness requirements

151. Contractor shall undertake at his own cost, all measures which shall promote the benefits of project and create public awareness about 24x 7 water supplies. Contractor shall also appoint a Public Relation team for such programmes. Contractor shall ensure cordial communication between Contractor, PCMC, public representatives, NGOs, consumer forum, Media, other Government Authorities etc.
152. The public campaign for the project & water conservation while conversing DMA's in to 24x7 Water Supply shall be responsibility of Contractor
153. Contractor shall conduct internal water audit or leak test for consumers those having history of high consumption. Contractor shall maintain the list of such consumers and identify them. Contractor shall identify all visible leakages while closing all known taps during supply hrs for period of 1 or 2 hrs. at consumer premises. Contractors shall submit report to Engineer after certification of same from consumer. Consumer shall be solely responsible for rectification of leakages within the premises of customer beyond consumer meter.
154. Contractor shall provide the checklist of probable leak points to consumers of DMA's as part of awareness programme.
155. Digging within the consumer premises shall be completed in a day time. Contractor shall provide advance notice & time table for his work within the premises / colony / societies.
156. Residents Welfare Association (RWA) / notified societies shall be informed about time table for digging & restoration work within the colony. The failure of Contractor to maintain the time table will attract penalty as decided by the Engineer. The penalty shall not exceed Rs. 5000 per day per RWA colony / Society.

6.14 Training Requirements

157. Contractor will provide on the job training during operation services to the staff of Employer. Such trainings will be commenced 30 days prior to commissioning the first DMA. Also that in the last year of O&M period and before 180days from the date of handing over the assets back to the Employer, the Contractor shall organize detailed training to the identified staff in technical, commercial and financial aspects of water services provision to enable the Employer to build sufficient capacity and skills to

manage the water services after the Contract Completion Date. Commencing from 120 days before the Contract Completion Date, the staff either from Employer or from a future Contractor will overlap and co-manage the operations to ensure continuity in service delivery.

6.15 Maintaining Performance Standards

158. The performance standards for the Design construction works during the SIP implementation shall consist of i) quality of work as per specifications and ii) The time line for completion as per the milestones defined in under this contract. The liquidated damages will be levied for non achievement of these milestones in time, as per the provisions in Section 8: Particular Conditions of Contract.
159. The measurement of the quality of work will be as per the tests laid down in the specifications of various items while the measurement of the achievement of milestones is based on the defined works and defined dates under this contract.
160. All works / services and materials, instrumentation to be provided/ required under this contract shall comply to 6.21 & 6.22 : Standard Technical Specifications and 6.23 :Detailed Technical Specifications specified under this contract. Contractor shall be responsible for replacement of equipments under defect liability period during the contract period.
161. Payment of operation services will be in accordance to the procedures in Schedule – 5 Contractor Payments attached to Section 8: Particular Conditions of Contract. Operation service contract will be governed by Performance Standards provided in Schedule 7– Performance Targets and Measurement attached to Section 8: Particular Conditions of Contract.

6.16 Customer Services Requirements

162. The Contractor shall start providing basic Customer services through Employer from the Operation Service Commencement Date. Contractor shall act as back office support to PCMC and shall provide services to consumers on behalf of PCMC. Contractor shall not exclusively interact with consumer or directly give any services to consumers. The Customer Service Management System shall have an interface with the Customer's premises to ensure required performance are met (e.g. water pressure and flow, NRW) and proper response are given to customer enquiries. The

following provisions shall be integrated into the customer service management system:

- Advance warning of planned supply shut off for repairs and renewals
- Advice Consumers during emergencies
- Meter reading queries of Consumers
- Recording and Responding to Customer Complaints through PCMC only.

163. The Contractor shall receive and handle all customer queries and complaints forwarded by PCMC, including, but not limited to, queries and complaints related to:

- i. Water meter queries;
- ii. Malfunctioning or inaccurate meters;
- iii. meter readings;
- iv. water quality;
- v. water pressure / availability of water;
- vi. leakage and damaged pipes;
- vii. change in meter location;
- viii. changes in customer names;
- ix. cancellation of connection by the customer

6.16.1 Customer Service Centers

164. The Contractor shall develop and set up Customer Service Centres (CSC) that will be used to manage consumers related services. The number of CSC's will increase with the number of DMAs completed and number of service connections provided. Ultimately there shall at least be one CSC for every 15000 to 20,000 connections to facilitate receiving and resolving consumer requests received through PCMC in the areas of new connections, service deficiencies, etc. Contractors scope shall be limited to development of customer service centre and deployment of staff for operating the same shall be responsibility of PCMC. Contractors shall provide the required O & M Staff to perform the duties and responsibilities specified under this contract. Contractors shall be responsible to provide manpower and resources in attending, resolving and closing the consumer complaints received and forwarded by PCMC to Contractor.

164.1. The CSCs shall function between 8am to 8pm during all working days and between 8am to 1pm during public holidays including Sundays.

- 164.2. The CSC shall be equipped hardware and software to facilitate continuous record of PCMCs forwarded complaints, monitoring the resolution, and reporting completion of necessary actions and tasks.
- 164.3. Cost of operation of the CSC shall be included in the Contractor's Operation fees.
165. The first CSC shall be operational from the Operation Service Commencement Date., adequate space will be provided by the Employer.
166. The design of the CSCs will be approved by the Employer.

6.17 SCADA System, Monitoring and Control System Design Requirements

6.17.1 Proposed System objective

167. Water distribution network management of DMA's & monitoring is possible using the subsystem referred as water distribution management system WDMS shall be implemented for the PCMC water supply system covered under 40% project area for 54000 connections (DMA wise) by providing a central monitoring station located at PCMC office or any other location specified by PCMC within the project area. The intention is to measure, record and monitor the parameters like flow, level, pressure, residual chlorine of Water distribution network at specific locations like distribution trunk mains, DMA Inlet and outlets points, ESR/UGR etc. along with valve actuator control facility for which necessary input & output signals, sensors and transmitters etc. Shall be provided along with wireless Telemetry system / GPRS system to communicate the data/information with Central Monitoring System. The proposed system shall have real time data retrieving, monitoring, recording and web enabled facility through application software.
168. All the relevant data, graphs, trends shall be made available online to PCMC executives and field personnel using cloud services and apps developed for Android and IOS devices. Relevant Data to be made available to the citizens at large using website and apps. Dashboards to be developed along with minimum service standard for monitoring and information and variance, if any these parameters parameters shall be notified to PCMC personnel automatically by SMS, email alerts.
169. The proposed system is broadly divided into following sub-works;
- i) Instrumentation for parameters like Pressure, Flow, Level, Residual Chlorine
 - ii) Control Elements like Electrical Actuators
 - iii) Data loggers at key locations or remote locations

- iv) New PLC Based control Panels
- v) Integration with existing PLC based Panels
- vi) New SCADA Server Software
- vii) Integration with existing SCADA
- viii) Report Generation and Alert Notifications
- ix) User Interface like Dashboards, Cloud Application, Apps

170. The scope of the works includes design, manufacture, testing at works (FAT), supply at site, storage at site, installation / erection, testing, commissioning, programming, integrating with existing systems, providing, field testing (SAT) and development of integrated SCADA server and Monitoring system consisting of Central SCADA with cloud server facility, PLCs at various locations with HMIs, flow meters, pressure transmitters, chlorine analysers, dataloggers and automation of valves through actuator control within 40% water supply distribution network of PCMC

171. The locations covered under the scope of proposed system for Integration and monitoring at Central Server locations are as following

- At feeder mains:
 - Flow at delivery pipe
- At storage reservoirs (tentative 23 nos.) (both ground level reservoirs and overhead tanks):
 - Flow, pressure, residual chlorine in incoming mains;
 - Flow, Pressure, residual chlorine in outgoing mains;
 - Water level.
 - Residual Chlorine level
- At DMAs (Tentative 26 Nos.):
 - Flow at the inlet point(s) (i.e. IMPORT) of each DMA;
 - Flow at the Outlet point(s) (I.e. EXPORT) of each DMA;
 - Flow meters within DMA
 - Pressure at 5 Critical Measuring Points in each DMA.
- At remote valve locations
 - Valve actuators within all DMA's
 - Data loggers at remote locations
- At Central Server Monitoring System

Note:- 1. Pumping station or BPS locations SCADA is not covered in present scope of works

2. Above locations may include many instrumentations, PLC's etc. which are being

operated under separate SCADA service contract. Contractor shall be responsible to interface & integrate above instruments with the Proposed SCADA system for further monitoring and proper functioning of the system. Contractor is expected to visit the locations covered in the scope of work shall do his own assessment before tendering.

6.17.2 Functional requirements of Instrumentation interfacing and Integration

172. All existing and new instrumentation like flow meter, pressure sensor, residual chlorine, etc. (installed at various ESR locations) or existing PLC panels will be integrated and interfaced with proposed SCADA system through GPRS communication. These instruments can be monitored/operated either from the SCADA in the central control room or from local control panel.
173. Instrumentation Interfacing and integration includes commissioning, required development & programming for PLC or SCADA software as per the requirement of PCMC with actuator control facility and level, flow, pressure, residual chlorine for integration with central monitoring system.

6.17.3 Functional Requirements of Monitoring System

174. Contractor shall responsible to fulfill following minimum functional requirements of proposed monitoring system
 1. The proposed system includes the central monitoring station, the local PLC panels for the valve actuator operation and/or data acquisition from existing/new instrumentation.
 2. To provide continuous real time data monitoring of water inventory & inflows/ outflow at each ESR&DMA.
 3. To create mathematical model for each ESR/DMA& use the same along with past data to derive demand curve for each ESR/DMA.
 4. To provide levels data of each ESR / DMA continuously for 24Hrs.
 5. Daily flow, Pressure data for all ESR/DMA with flow meter location by graphics display.
 6. Residual chlorine at the outlet of ESR
 7. Graphical trending diagrams of water balance (Pie Chart) of all ESR /DMA's within project area.
 8. Water Audit charts & LPCD for each zone/DMA-Bar chart
 9. To provide alerts, in case of emergency, to the appropriate authorities to quickly initiate actions for disaster management.
 10. Sending alarm SMS messages to PCMC engineers and authorities to connect them with the system on 24x7 basis.

11. To generate, store historical data and print valuable data regarding water distribution network in, easy to analyze, digital form which can be used for distribution chain optimization.
 12. Generation of bulk water audit report or any other as specified by PCMC(hourly/dailybasis)
 13. Water management system shall be web enabled with application software including all internet facility.
 14. All the relevant data to be linked online on the cloud, link to which should then be made available on the PCMC website.
 15. The relevant data on the cloud server shall also be accessible to users and citizens using Android and IOS apps.
175. The functions and features specified here with are the minimum acceptable requirements for the successful implementation of proposed Monitoring System. The provided system shall equal or exceed each requirement as specified by Engineer or mentioned elsewhere in the contract. Contractor shall refer to Section 6.23 ; Detailed Technical Specifications of the instrumentation and specifications mentioned for proposed SCADA system

6.17.4 Functional Requirements of SCADA/PLC Operation and control

Local : PLC Control

176. All the logic for automatic operation of the valves using data from local instrumentation shall be programmed in the local PLC based panel and shall work irrespective of the connectivity with the central monitoring station. The status of each actuator and instrumentation shall be communicated online to the SCADA using GPRS. If there is a break in the GPRS/Broadband connectivity at the ESR side or SCADA side the working of the system should not get hampered in any way.

Local Modes of operation

Auto Control

It shall be executed as per the logic in the local PLC based on timings and or pressure, level and flow, residual chlorine settings

Manual Control

Manual control shall be executed using control elements like push buttons and selector switched to be provided on the control panel.

Remote :SCADA Control

177. The SCADA software shall have the facility to remotely carry out manual operation and control of Valve Actuators for changing/ controlling the delivery pressure at the inlet and outlet of ESR.

The ESR / GSR inlet / outlet Valve actuator operation will be integrated with SCADA System and timing / level based automatic filling system can be developed as per the requirements of PCMC. Valve Actuator operations within distribution system of DMA's shall also be integrated with SCADA system.

6.17.5 Proposed System Architecture

178. The system shall be implemented using following Four levels of information system. First level shall consist of primary sensors such as pressure, flow, level sensors, residual chlorine etc. Field instruments which are located at various local stations within DMA's and ESRS/GSR will acquire each ESR & DMA information and will communicate the information to the next level of information processing system using standard 4-20 mA current signal.

179. Second level shall consist of Analog/ Discrete Input Module which will communicate with the PLC located at local stations / remote locations within the DMA.

180. Third level shall consist of SCADA monitoring software running on PC located at central office within project area. The system will communicate with all the existing ESRS/ UGRs & MBRs and vice versa. During each communication Telemetry system will get status of different parameters from the above Input modules. The telemetry/ GPRS system will transfer information with main central SCADA system server. Whenever required it should be possible to start communication with specific above Input modules. The whole system can be monitored and controlled from single location. The operator can give the instructions to the local site through voice or SMS for taking corrective action from other end. In addition to that any alarming condition at local station is generated, is also displayed / informed immediately at Central station without through GPRS/telemetry system.

181. Fourth level shall consist of WDM software system which will run in typical client-server mode. Data acquired from ESR / GSR / Valve locations using level one hardware as well as data acquired by operator data entry shall be used as centralized water distribution system information data. MSSQL database or any other equivalent or higher technology data base server shall be used for information storage. It will consist of one server PC & one client PC, which includes PC used by GPRS. It is under the scope of this contract to provide all required latest software, configurations all other peripherals and licenses (unlimited) & the same shall be registered in the name of PCMC.

Important Note:-

- 1) For detailed specification of the instrumentation refer Section 6.23 : Detailed Technical specifications for the instrumentation.
- 2) The functions and features specified herewith are the minimum acceptable requirements for the instrumentation & proposed Monitoring System. The provided system shall equal or exceed each requirement. Contractor shall visit to all locations covered in scope of work before and do his own assessment before tendering.
- 3) The extent of the instrumentation is indicated but not limited to that specified instruments and in the subsequent clauses mentioned elsewhere in the contract. Additional instrumentation as appropriate to the requirements of specification shall be included. Consent letter from PCMC is necessary before the actual supply of instruments.

6.17.6 PLC System

182. PLC shall be provided as a Hot-Standby configuration to perform combinational and sequential logic functions, status monitoring and reporting functions with counter and timer facilities.

PLC Panel interrogation power supply should be fully redundant.

PLC shall comprise of necessary processors, input/output (I/O) modules, communication interface modules and man-machine interface (MMI) or HMI required to perform the desired functions with .

Adequate PLC handling capacity is need to be envisaged by Contractor considering the need to support Communication ports like serial RS 485, RS 232, Ethernet port and GSM cards and Ethernet connectivity, must be able to reprogram the external device connected to it and also support future add-ons cards, the memory (USB) and speed requirement.

PLC should be capable of the following

- Integrated Colour Graphic display with Touch/viewer screen and all specified

memory units Built-in.

- Complete automation of valve operations.
- Accurate recording of all events
- Effective alarm management for the personnel concerned
- Complete remote surveillance.

The data generated at the PLC shall be transmitted on continuous basis to the Master PLC. The data from the PLC shall be transmitted over wireless network using GPRS communication technology from the ESR / GSR locations within DMA.

183. Each PLC shall have memory protected built in historical archiving/data logging of system alarms & events and process variables. Data logger shall be able to log data based on time or an event PLC shall have enough memory allocated to allow 200,000 time and data stamped discrete and /or analog values to be archived. The historical archive shall allow the oldest data to roll off the system as memory is used keeping the 200,000 most current data points available. Process point time stamping frequency shall be selectable within the configuration software. It shall be possible for the archived data to be exported in CSV format allowing use with standard spreadsheet and data software applications

PLC shall have the following attributes as a Hot-Standby configuration.

- carry out sequential logic implementation for operations of plant;
- carry out computation and interfacing for data acquisition, data storage and retrieval;
- it shall accept downloaded program from a programmer;
- it shall have different functional modules to perform the desired functions;
- it shall scan the inputs in time cycles and update the status of its outputs.

Every PLC at ESR / GSR to be connected via an intelligent switch to GPRS/ wireless telemetry (from any service provider available locally) to be connected to the communication Modem.

The wireless communication shall enable seamless data transfer from each PLC to a centralized reception at the Central Control Room, wherein the data are stored in a suitable high-density storage data server.

The communication technology services require a service provider who shall set up and maintain necessary transmission devices at each location within DMA. The transmission set up at each station shall include necessary equipments like firewall, routers, etc. for network

security. The data transmission over the entire wireless network shall be secured and same shall be envisaged by setting up required equipments at each transmission/reception points.

The communication network requires statutory requirements like licensing, structural design, lightening arrestor, aviation lamp etc. shall be considered. The communication network should be sufficient enough to handle the required traffic.

6.17.7 SCADA System

184. The SCADA shall be a fully dual redundant server integrated microprocessor based control and data acquisition system which will monitor, control, display, record and trend all assigned plant and water supply network inputs and outputs. The main process monitoring and control shall be by means of Visual Display Unit (min. 50 inch. LED monitor) based process operator workstations that shall be located in the central control room.

185. SCADA/HMI system shall be designed and implemented such that the failure of a central processor or HMI console does not inhibit continuous automatic control of the system. In the event of such a failure, historical data shall be recoverable to a condition where a worst-case maximum of 15 minutes of historical data is lost.

Integration with the existing System

PLC Panel Integration

186. The existing PLC based panels have to be used to import data of the existing instrumentation into the new PLC based panel. This can be done by installing additional hardware like communication modules with required wiring modification in the existing panel and collect data over a standard protocol like MODBUS. All the additional hardware/software/interfacing devices/cabling/licenses required to achieve this connectivity shall be in the scope of the contractor.

187. The contractor shall ensure that while carrying out the integration part the existing system should not get damaged or hampered in any way.

188. All the logic shall be in the new PLC based panel and the existing system shall be used only to retrieve data of the existing sensors/instrumentation.

SCADA Integration

189. The new SCADA software shall be required to connect to the existing SCADA system to retrieve relevant data of the existing system. The required hardware/software/interfacing devices/cabling/licenses required for establishing a seamless channel for communication shall be provided by Contractor.

190. Any requirement related to the above including database integration and utilities/query functions to be developed for the same shall be in the scope of the Contractor.

End User Interface

191. There shall be three levels of End user Interface

i) Central Monitoring Station

The Central Monitoring Station shall have the following main components

1. Screens to display the layout schematic of the system as per actual configuration on the field
2. Online and historical trends plotted with respect to benchmark graphs. The benchmarks are to be arrived at using practical data over a reasonable period of time
3. Settings screen for important parameters like timing, pressure and flow, residual chlorine
4. User login and authentication screens
5. Dashboards of important KPIs as specified by the Engineer in Charge
6. Bar graphs as per Engineer-in-charge to be plotted against Benchmark levels

ii) Cloud based web Pages

1. Important Data to be uploaded to the cloud using state of the art protocols like IOT drivers etc. and viewed using Http protocol. Any software/hardware/drivers required for the same shall be provided by Contractor
2. This shall be only in view mode and no changes shall be possible in this method
3. It should be possible to add a link to these webpages on the PCMC website. The link to be added by the customer using the services of the service provider/agency maintaining the website of PCMC

iii) Apps

1. Apps for IOS and android devices to be developed by the contractor
2. Apps to be downloadable by users/citizens if required
3. Screens of the apps to be developed as per Engineer in Charge
4. No Changes to be possible using the apps.

6.17.8 Instruments and general requirements

192. Under the Works component of the Contract, EMF Flow meters, bulk flow and pressure measurement devices, level measurement devices, chlorine analysers, data loggers etc. shall be installed to monitor water distribution. In addition, temporary pressure loggers shall be installed at 30 locations in the existing system. These pressure loggers can subsequently be used as permanent pressure loggers in the DMAs.
193. Most DMAs will have one single inlet point. In case of multiple inlet points, each point shall have a flow meter.
194. The Contractor shall design and install a Supervisory Control and Data Acquisition (SCADA) system that shall meet the following objectives:
 - 194.1. Data acquisition at all bulk flow meters installed storage reservoirs and DMAs, at all water level indicators installed at storage reservoirs and at all pressure loggers installed in all completed DMAs.
 - 194.2. Data acquisition at pressure loggers, temporarily installed in the existing distribution system, is recommended.
 - 194.3. Data acquisition at customer service connections shall not be included
 - 194.4. A telemetry / GPRS system to send the acquiring data to a centrally located supervisory system, including adequate security systems.
 - 194.5. A supervisory (computer) system with adequate back-up facilities to gather the acquiring data, and to feed a Historian (Database Management System).
 - 194.6. The SCADA system shall be expandable to include the bulk flow meters to be installed in future, if any.
 - 194.7. SCADA system shall be web enabled with application software so that other users can view, print and monitor.
 - 194.8. The SCADA system shall allow for upgrading to include remote control in the future.
195. The Contractor shall provide computer hardware and develop software for SCADA data analysis and reporting that shall meet the following objectives:
 - 195.1. Daily and monthly water balance for each water production, transmission and storage sub-system. Each sub-system typically consists of one storage reservoir

- 195.2. Hourly and daily water balance of each storage reservoir, presenting inflow, water level fluctuations and outflow at each reservoir.
 - 195.3. Daily and monthly water delivery at each DMA, at clusters of DMAs served from a single reservoir, and total water delivery to all selected DMAs.
 - 195.4. Daily and monthly water delivery to the existing distribution network.
 - 195.5. Hourly pressure logs at Critical Measuring Points in the DMAs.
 - 195.6. Water Balance of DMA with water audit report of each DMA
 - 195.7. Graphic presentation of all the above.
196. Further requirements and detailed technical specifications are provided in Vol-2of this document. The Contractor shall submit its proposed SCADA system as part of its Operations and Maintenance Plan for approval by the Engineer.
197. The SCADA system shall be implemented step-wise following the completion of the relevant components of the Works. The SCADA system shall be fully operational at the completion of the entire Works.
198. The Contractor shall train PCMC staff in operating the SCADA system and related software.

6.17.9GPRS enabled data loggers for remote locations

199. The Datalogger shall be a dual channel device capable of taking inputs for pressure as well as flow. It shall be a battery based instrument with a minimum battery life of 3 years with data transfer frequency of every 30 mins. The minimum frequency of data logging shall be atleast 5 mins. To achieve a data transfer frequency of every 30 mins, an external battery pack of suitable size shall be used with the data logger. All the logged data should be transferred over GPRS using the data sim card to be provided by the contractor. It shall include all other charges to be paid to the manufacturer like cloud subscription charges, data usage charges to be paid to the service provider etc to ensure the working of the data loggers.
200. Channel1 – Pressure :The pressure input shall be a direct input from a tapping point on the pipe line. It shall not need any additional pressure transducer to be mounted on the pipeline. The transducer shall be built in the logger and only a capillary to be connected form the tapping point to the datalogger.

201. Channel 2 4-20mA/pulse input: The second channel may be used to connect to a flow/level sensor with 4-20mA output. This can be used as instantaneous flow rate/level of water. Alternatively it may be used to connect to the pulse output of a flowmeter to totalize the flow of water.

6.17.10 Instrumentation System

202. Instrumentation system shall fulfill to following requirements
- a. Electronic instruments shall utilize solid state electronic components, integrated circuits, microprocessors, etc., and shall be of proven design.
 - b. all instruments shall be suitable for continuous operation;
 - c. all digital outputs shall be volt free;
 - d. all instrumentation systems for use out of doors shall be protected to IP 65 for sensors and transmitters, while enclosures under submersible conditions shall be protected to IP68;
 - e. all analogue displays shall be of the digital type with no moving parts utilizing back lit liquid crystal diode technology;
 - f. For transmitting instruments, output signal shall be 4-20 mA DC linear having two wire system.
 - g. Unless otherwise stated, overall accuracy of all measurement systems shall be $\pm 0.5\%$ of measured value, and repeatability shall be $\pm 0.5\%$.
 - h. After a power failure, when power supply resumes, the instruments and associated equipment shall start working automatically.
 - i. The instruments shall be designed to permit maximum interchangeability of parts and ease of access during inspection and maintenance.
 - j. The instruments shall be designed to work at extremes of the ambient conditions of temperature, humidity, and chlorine contamination that may prevail. The instruments shall be given enough protection against corrosion.
 - k. Lockable enclosure shall be provided for the field mounted instruments wherever required.
 - l. All field instruments, and cabinets / panel-mounted instruments shall have tag plates / name plates permanently attached to them.
 - m. The performance of all instruments shall be unaffected for the $\pm 10\%$ variation in power supply voltage and $\pm 5\%$ variation in frequency simultaneously.

- n. All wetted parts of sensors shall be made out of non-corrosive material capable of working with chlorine content of 5 ppm.
- o. For all instruments (transmitting analogue signals) installed in the field, surge protection devices (SPDs) shall be provided at both ends of the connecting cable for the protection against static discharges / lightning and electromagnetic interference.
- p. Pressure transmitters shall be provided with two valve manifold and a test port, so that in situ calibration can be carried out.
- q. Two wire transmitters shall be provided with on-line test terminals.
- r. The ranges of all instruments shall be suitable for the application in the process.
- s. Instruments of similar type shall be of same make for appropriate inventory of spares, ease of maintenance and training.
- t. The Indian agents of imported equipment shall have establishment to provide after sales maintenance facilities.

6.18 Reporting Requirements

203. The Contractor shall prepare and submit for approval, plans and periodic reports on those plans, progress of Works and Services, performance standards etc., including exceptional reports on emergencies if any. The reporting requirements shall be as instructed by Engineer time to time . The Contractor shall as part of the Baseline System Improvement / Construction Plan, the Operations and Maintenance Plan and the Training Plan, develop the required formats for the periodic reports and also identify any critical reporting requirements in order to enable timely decision making by the Employer.
204. The Contractor shall prepare and submit for approval a System Improvement plan, Construction Plan defining and scheduling all Improvement Works. The Construction Plan shall be finalized and approved within 6 months from the Commencement Date. The Construction Plan shall include:
- 204.1. The results of the review and verification of the proposed water supply system of 40% service area and transmission mains works & establishment works for DMAs covered under scope of work;
 - 204.2. Condition Assessment, Survey & Investigation Report, Consumer Survey report, Hydraulic Modeling (all DMA's), frozen boundary map and proposed SCADA & web enabled system facility

- 204.3. The results of the review and verification of the designs for DPR prepared by the Employer;
- 204.4. The results of the review and verification of DMA boundaries including priority DMAs;
- 204.5. Proposed construction schedule alongwith resource planning & SCADA Report/ Architecture;
 - 204.5.1. Cash flow requirements;
 - 204.5.2. Format for periodic construction reporting;

- 205. The Contractor shall prepare and submit for approval an Operations and Maintenance Plan, defining all operational services to be provided under the Contract. The Operations and Maintenance Plan shall be finalized and approved within 6 months from the Commencement Date. The Operations and Maintenance Plan shall include:
 - 205.1. The Hydraulic Network Model developed by the Contractor
 - 205.2. The results of water quality survey sampling
 - 205.3. Results of Assets of water supply
 - 205.4. The results of consumer connection surveys
 - 205.5. Emergency Response Plan
 - 205.6. Energy Optimization Program
 - 205.7. Standard Operating Procedures for routine operations and emergency responses
 - 205.8. Format for periodic operation and maintenance reporting.
 - 205.9. First year plan Annual Operating Plan, covering specific water supply operations requirements and scheduled maintenance activities.

- 206. The Contractor shall prepare and submit for approval a Training Plan, defining all on-the job and class room training of PCMC staff to be conducted during the Project. The Training Plan shall be finalized and approved within 6 months from the Commencement Date.

- 207. Operation and Maintenance Manuals shall provide the details of the regular and periodic maintenance of Works, and shall ensure that at all times during the Operation Service Period, the Project Facilities are maintained in a manner that it

complies with the Performance Standards. Such Operation and Maintenance Manuals shall include but not be limited to the following:

- 207.1. Intervals and procedures for the carrying out of inspection of all elements of the Section;
 - 207.2. Criteria to be adopted for deciding maintenance needs;
 - 207.3. Preventive maintenance schedule;
 - 207.4. Intervals at which the Contractor shall carry out periodic maintenance;
 - 207.5. Intervals for major maintenance and the scope thereof;
 - 207.6. Leakage management system;
208. Monthly Operating Performance Report (MOPR); Performance targets and standards report as per Schedule 7 of PCC. The MOPR shall also include: a detailed progress report on the implementation of the Operation and Maintenance Plan; monthly water account with details of water measured at bulk supply points, distribution and Performance Standards achieved or maintained during the month; exceptional reports on emergencies; financial information on project cash flows, etc.
209. Quarterly Operating Performance Report (QOPR). Performance report as per schedule 7 of PCC. The QOPR shall also include a brief summary of the relevant issues detailed in the Monthly Performance Reports including a summary analysis of the quality of water supplied, the number of Consumer connections, the performance of water meters, consumer complaint recording and handling on behalf of PCMC.

6.19 Performance Standards & Measuring Framework

210. The Contract distinguishes two sets of Performance Standards:
- 210.1. Target Performance Standards are performance standards that the Contractor shall aim to achieve in order to provide improved levels of water supply services.
 - 210.2. Minimum Service Levels are the performance standards the Contractor is required to maintain at all times;

The performance standards and measuring framework shall be applicable as per Schedule 7 of PCC

6.20 QUALITY ASSURANCE & CONTROL

211. Contractor shall prepare detailed plan for this Contract for Quality Assurance and Quality Control and get it approved from the Employer's Representative or Engineer. The Contractor shall deploy adequate number of suitable experts whose sole responsibility shall be to strictly implement the QA/QC plan and conduct necessary tests to ensure highest quality standard. All other measures that the Contractor may feel necessary or as may be directed by the Employer's Representative or Engineer or his representative shall be followed.

6.20.1 Shop Drawings for equipment's / works

212. The Contractor shall prepare shop drawings before manufacturing, ordering, installing any equipment, materials etc. The shop drawings shall follow the design and detailed requirements as indicated by the Engineer's specifications and shall incorporate the fabrication details. Six copies of these shop drawings shall be submitted by the Contractor i.e. two copies to the Engineer and Four copies to Consultants/ PMC. After due checking, the consultant will forward three copies to PCMC with his comments within seven days. The Engineer shall, at his earliest convenience scrutinize these comments from consultant and return one copy to the Contractor with his comments/approval. Only on receipt of the approval of the shop drawings, further work shall be proceeded with by the Contractor. The Contractor shall submit these shop drawings to the Engineer at the earliest, but within 30 days from the award of work considering the overall time schedule, to allow the Engineer reasonable time to scrutinize. Any plea of delay on this aspect, shall not be entertained, as per the Contractor's request.

6.20.2 Drawings, Maintenance Manual etc. for works

213. All the drawings, documents and data sheets as detailed below shall be delivered after checking & verifications from the consultants to the Engineer for his approval. The approval of the drawings/data sheets/documents/ QAP by the engineer shall in no way relieve the Contractor from his obligations to get the drawings approved from the statutory bodies before execution of the work and provide a complete and satisfactory plant and installation as per intent and purpose as laid down in the specifications. Any omission and/or errors shall be made good or rectified whether or not the drawings were approved or not, at no extra cost to PCMC.

6.20.3PRE-DISPATCH INSPECTIONS OUTSIDE THE EMPLOYER'S CITY

214. In the event the Contractor proposes to procure material which requires pre-dispatch inspection of the Employer's Representative from outside of the Employer's city, the Contractor will have to arrange and provide for the cost the travel to the Manufacturer's place, accommodation, local transport and food for the representatives of the Employer. Such costs will be incorporated in the tendered cost of such items and no separate payment will be made for the same.

6.20.4Material

215. All material used shall be new and conform to the relevant specifications or standards or as per approved Quality Assurance Plan. Reconditioned parts/Equipments shall not be accepted.

6.20.5Working Conditions

216. It will be the Contractor's responsibility to acquaint himself with the local prevailing conditions of temperature, humidity, rainfall, dust and other conditions. All the equipments supplied shall be suitable for satisfactory operation under such abnormal conditions as prevalent.

6.20.6Conformity to Specification

217. The work is to be executed in accordance to the specifications (mentioned under this contract) and the relevant I.S. Codes.

6.20.7Approval of Materials

218. All materials used on the work shall be new and of the best quality available, conforming to the relevant specifications specified under this contract and as per the good Engineering practices. Prior approval should be obtained in writing from the Engineer or Employer's representative while approving the Quality Assurance Plan (QAP) for all materials proposed to be used.

6.20.8Shop Inspection and Testing

219. Contractor shall depute the Third Party Inspecting Agency (TPIA) for the shop Inspection & Testing at his own cost for the items specified under this contract. TPIA shall be as per approved list of PCMC or as Specified in PCC.

220. The Engineer or his appointed inspecting agent shall be entitled at all reasonable times during manufacture to inspect, examine and test in the Contractor's premises, the materials and workmanship, of all plant to be supplied under the contract and if part of the said plant is being manufactured on other premises, the Contractor shall

obtain permission to inspect, examine and test the same at such premises for the Engineer. Such inspection, examination and testing or waiving of the same shall not relieve the Contractor from any obligation under the contract. The Contractor shall give the Engineer minimum 30 days' notice in writing of the date and the place at which any Plant will be ready for testing.

221. All instruments used for such tests shall be calibrated and certified by an approved testing authority and the calibration certificate shall be valid at the time of tests. The calibration certificate shall be produced by the Contractor, at the time of carrying out every test, showing the readings obtained, all calculations and full details of the calibration.
222. The expenses for shop inspection of finished equipment and witnessing of performance tests at manufacture's work as specified shall be borne by the Contractor. The charges towards to & fro travel, boarding, lodging etc for third party agency including their inspection fee shall be borne by Contractor. The expenses incurred for above shall be deemed to be included in the prices quoted for the equipment. The above arrangements shall be made in advance and intimated to the department before any inspection has to be carried out at the manufacture's works. The delay in the inspection due to any reasons whatsoever shall be attributable to the Contractor.

6.20.9 Test Certificate

223. All manufacturer's certificates of test proof sheets, etc. showing that the equipment, material also have been tested in accordance with the requirements of the PCMC, appropriate Indian Standard, Statutory requirement, other relevant standard specification or this specification are to be supplied free of charge on request. In case of dispute, PCMC or Employer shall have the right to get the material tested at the cost of the Contractor as per the specification. Materials, which are not supported by the test certificates or for which test results do not tally with relevant standard specifications, shall not be used.

6.20.10 Quality Certificate of Equipment/ Material

224. The Contractor shall be required to produce a manufacturer's quality certificates for the equipment and materials supplied by the Contractor. Notwithstanding the manufacturer's certificates, the engineer may ask for testing of materials in

approved test houses. The test result shall satisfy the requirements of the relevant Indian Standards/ PCMC.

6.20.11 Records & Usage of Equipment/ Material

225. The Contractor shall maintain a detailed report of all equipment/materials received at the site in his stores or storage and working areas in the vicinity of the site and shall make such records available to the Engineer at such times as the latter may reasonably require.

6.20.12 FAILURE TO PASS TESTS AFTER COMPLETION

226. The performance criteria, as specified in the tender are the minimum acceptable criteria, below which the works failing to pass tests after completion shall be rejected.

6.20.13 SAFETY ASSURANCE

227. The Contractor will take all measures required to maintain highest safety standards on the site. The measures taken will include all but will not be limited to the relevant provisions of the Indian Standards. The Contractor will prepare a safety plan for the project and have it approved from the Employer's Representative. The Contractor shall deploy a safety officer on each important site to ensure compliance.

6.20.14 OPERATION AND MAINTENANCE MANUAL

228. The Contractor, before commencement of the Tests on Completion, shall submit 6 (six) copies of the operation and maintenance manuals for the pipe line, Water Supply System (continuous), overhead service reservoirs, SCADA, Instrumentation, Consumer Services etc. covering all the project components in English language, containing descriptions, illustrations, sketches, drawings, sectional drawings, sectional arrangement view and manufacturer's parts numbers to enable the connections, functions, operation and maintenance of all components of the complete System to be easily followed and for all parts to be easily identified to facilitate ordering of the replacement parts.

The Contractor shall also submit the following information while handing over water supply system / Equipments / SCADA / softwares:

- a) A write up about the system, sufficient in detail to enable the staff of PCMC to operate the water supply in smooth & trouble free manner and to maintain, and continue the services.
- b) Six sets of detailed drawings and specifications in respect of wearing parts and parts likely to be damaged. For parts where submission of detailed drawings & specifications will be possible, parts catalogue of equipments will be acceptable.
- c) Six sets of List of control components giving their type, designation.
- d) Six sets of manufacture's catalogues of the main equipment and accessories.
- e) Schedule in quadruplicate, of the items of which the Contractor is not manufacturer or manufacturer's authorized dealer. This should contain the specifications of each item and the agency from which these items are purchased.
- f) Maintenance/instruction manual furnished by the manufacturer.

6.21 Construction Requirements: Technical Specifications for Material & Equipments

6.21.1 General

229. The Contractor shall carry out the Works based on the Technical Specifications included in this section. If the specifications for a particular item are not given by the Employer, the Standard Specifications of PCMC/ PWD or Maharashtra Jeevan Pradhikaran (MJP) shall be followed.
230. All the Materials incorporated in the Works shall be the most suitable for the duty concerned and shall be new and of first class commercial quality, free from imperfections and selected for long life and minimum maintenance. These may be tested according to relevant Indian Standards (IS) or International Standards Organization (ISO) standards in qualified labs and certificates produced to the satisfaction of the Engineer.
231. The objectives of the specifications given are to specify the details pertaining to the designs, drawings, and selection of equipment or product. The equipment or product supplied shall be of high standard of quality and best engineering practices and shall comply with all currently applicable standards, regulations and codes.
232. Except as otherwise specified in these technical specifications, the Indian/International Standards and codes of practice in their latest version shall be adhered to for the design, manufacturing, inspection, calibration, installation, field testing, packing, handling and transportation of products. Should any product be offered conforming to other standards, the equipment or products shall be equal to or superior to those specified and the documentary confirmation shall be submitted for the prior approval of the Employer.

6.21.2 Pipes

6.21.2.1 Main Pipes

233. Ductile Iron Pipes in accordance with ISO 2531-1988-K9 PN10
- Sulphate resistant blast furnace cement lining as per ISO 4179-2005
 - Outside corrosion protection: zinc layer and bituminous
 - coating, as per ISO 8179-2004
 - Rubber joints in accordance with ISO 4633-2002
 - Automatic flexible push in joints TYTON or STANDARD

6.21.2.2MS PIPE AND SPECIALS

234. Providing, fabricating, testing, painting, supplying and installation of M.S. Pipes & Specials of specified ID / OD & specified wall thickness conforming to IS 3589-2001

- Pipes shall be made from steel plates conforming to relevant IS 2062 grade Fe410 or strips by butt welding longitudinally or spirally.
- The tolerance on the pipe body shall be + 0.75 % for all sizes of pipes
- The tolerance on specified wall thickness shall be - 2% / + 10%

6.21.2.3HDPE Pipes

235. High Density Polyethylene Pipes in accordance with IS: 4984 used for water supply

- The length of straight pipe used shall be 5 m to 20 m as agreed by Project Manager
- The minimum & maximum wall thickness of pipe for the three grades of materials, namely PE63, PE80, and PE100.
- Injection moulded HDPE fittings shall be as per IS: 8008 (Part I to IX). All fittings/specials shall be manufactured by injection moulding at factory only.

6.21.2.4Service Connections

236. Medium-Density Polyethylene (MDPE) Pipes shall be according to ISO 4427-1996 and shall be suitable and approved for use with potable water at a working pressure of min. PN 10. The color of the pipes shall be blue and the dimensions in accordance with ISO 4427-1996.

6.21.3Pipe Fittings and Appurtenances

6.21.3.1General

237. Flanges of all valves and other appurtenances supplied under this project shall be drilled according to ISO 7005-2- 1988 PN 10. All bolts, nuts and washers used under this project shall be stainless steel 304.

6.21.4Sluice Valves

238. Resilient seated gate valves shall in general be in accordance with ISO 7259-1988, double flanged if not otherwise required; with face to face dimensions to EN 558-1 GR 14-short (DIN 3202-F4) and flange dimensions and drilling to ISO 7005-2-1988 PN 10 and shall be suitable for a nominal working pressure of 10 bar.

239. Body and bonnet shall be of ductile iron EN-GJS-400-18 acc. to EN 1563 (GGG 400 - DIN 1693) and shall be epoxy powder coated with a minimum coating thickness (DFT) of 250 µm in accordance to DIN 30677-2 and DIN 3476, inside and outside.

240. The wedge shall be of ductile iron EN-GJS-400-18 acc. to EN 1563 (GGG 400 - DIN 1693), fully vulcanized with EPDM or NBR (suitable and approved for potable water).

241. All resilient seated gate valves that shall be used for underground installation shall be supplied with extension spindle consisting of galvanized steel rod, spindle adaptor and operating cap and protecting tube of plastic material.

6.21.5 Pipe Saddles

A Pipe Saddles for metallic pipes

242. Pipe saddles shall be of the universal type with flexible strap for DI, steel and AC pipes and shall be suitable and approved for use with potable water at a nominal working pressure of 10 bar.
243. The body of the pipe saddle shall be of ductile iron EN-GJS- 400-18 acc. to EN 1563 (GGG 400 DIN 1693), and shall be epoxy powder coated with a minimum coating thickness (DFT) of 250 µm in accordance to DIN 30677-2 and DIN 3476, inside and outside.
244. Saddle strap and bolts/nuts/washers shall be made of stainless steel 304. Strap shall be rubber lined to avoid direct contact between the stainless steel strap and the pipe. Gaskets shall be of EPDM or NBR (suitable and approved for potable water).

B Pipe saddles for plastic pipes

245. Pipe saddles for use on plastic pipes shall be of the full collar type with a minimum length of 120 mm to support the plastic pipe and with a fully rubber lined sealing area around the full circle with multiple O-rings or multiple lip seals around the outlet.
246. The body of the pipe saddle shall be made from ductile iron EN-GJS-400-15 acc. to EN 1563 (GGG 400 DIN 1693) for a nominal working pressure of 10 bar and shall be epoxy powder coated with a minimum coating thickness (DFT) of 250 µm in accordance to DIN 30677-2 and DIN 3476, inside and outside.
247. Stud bolts with nuts and washers and shall be made of stainless steel 304, gaskets shall be of EPDM or NBR (suitable and approved for potable water).

D Ductile Iron Fittings

248. Ductile Iron fittings shall be in accordance with ISO 2531-1998, and shall be epoxy powder coated with a minimum coating thickness (DFT) of 250 µm in accordance with DIN 30677-2 and DIN 3476, inside and outside.

E Universal Joints

249. Flanges shall be to ISO 7005-2-1988 PN 10. Gaskets shall be of EPDM or NBR (suitable and approved for potable water).

250. Pressure ring and body shall be of ductile iron EN-GJS-400-18 acc. To EN 1563 (GGG 400 DIN 1693) or forged steel, and shall be epoxy powder coated with a minimum coating thickness (DFT) of 250 µm in accordance to DIN 30677-2 and DIN 3476, inside and outside.

F Repair Clamps

251. Pipe repair clamps shall be of the full circle universal type, suitable for CI, DI, steel, AC and PVC pipes.
252. All metallic parts like band, lugs, bolts, nuts and amour shall be of stainless steel 304, specially treated (passivated) after welding to avoid corrosion. The gasket shall be of EPDM or NBR (suitable and approved for potable water).

6.21.6 Pipe Laying

- a) Each pipe shall be thoroughly checked for any damages before laying and only the pipes which are approved by the Project Manager shall be laid.
- b) While installing the pipes in trenches, the bed of the trench should be level and free from sharp edged stones.
- c) PE pipe is lighter than water. Hence care should be taken for normal installations where there could be a possibility of flooding of the trench thus the trench shall be kept free of water till the jointing has been properly done
- d) When flooded, some soils may lose cohesiveness, which may allow the PE pipe to float out of the ground. Several design checks are necessary to see if groundwater flotation may be a concern. Obviously, if the pipeline typically runs full or nearly full of liquid, or if groundwater is always below the pipe, flotation may not be a significant concern.
- e) However, weights by way of concrete blocks (anchors) are to be provided so that the PE pipe does not float when suddenly the trench is flooded and the soil surrounding the pipe is washed away. Thus site conditions study is necessary to ensure the avoidance of flotation.
- f) Pipe embedment backfill shall be stone-free excavated material placed and compacted to the 95% maximum dry density.

6.21.7 Customer Meters

6.21.7.1 Large Meters

253. The meters shall conform to ISO 4064 standards for Class "B" horizontal Woltmann meter. Meters must be designed with an accuracy limit of $\pm 2\%$ for the maximum, minimum and transitional flow and $\pm 5\%$ for minimum flow. The meter manufacturer

must warrant that the new meter will meet this accuracy standard. The main body of the meter shall be made of cast iron. The meter must be capable of installation in any allowable position with no change in accuracy of measurement. The meter must have the capability for both optical and reed switch pulse outputs ranging shall be from 10 liters/pulse up to 1,000 liters/pulse. The water meter shall capable to operate in an ambient temperature of up to 50°C. Pressure loss through the inlet and outlet of the water meter shall not be greater than 0.1 bar at nominal flow. The water meter marking must be well defined with the following identifications such as metrological class, flow direction indicator, rated nominal flow rate in m³ per hour, working pressure, serial number, manufacturer's trademark and approval marking and certificate numbers.

6.21.7.2 Small Meters

254. The meters shall conform to ISO 4064 standards for Class "B" velocity, super-dry, magnetic driven multiple jets meters. Meters must be designed with an accuracy limit of $\pm 2\%$ for the maximum, minimum and transitional flow and $\pm 5\%$ for minimum flow. The meter manufacturer must warrant that the new meter will meet this accuracy standard. The main case of the meter and other exposed parts shall be made of brass or bronze alloy. The flow display unit must be IP 68 rating and must be resistant to corrosion, moisture and fogging. The totalizer protecting glass must be made of sturdy glass and must have the ability to withstand damage. The water shall capable to operate in an ambient temperature of up to 50°C. Pressure loss through the inlet and outlet of the water meter shall be not be greater than 0.1 bar at nominal flow and 0.2 bar at maximum flow. The water meter marking must be well defined with the following identifications such as metrological class, flow direction indicator, rated nominal flow rate in m³ per hour, working pressure, serial number, manufacturer's trademark and approval marking and certificate numbers.

6.21.8 DMA Inflow Meters

255. Full-bore electromagnetic flow meter for potable water with accuracy margin of $\pm 0.5\%$ of measured value and built-in data logger that sends pressure and flow data on desired sending intervals via GPRS or SMS communications. Built-in data logger can be set into minimum of one (1) minute sampling interval for data analysis purposes. The battery life should be not less than 10 years under normal operating conditions. Transmitter/converter cable length must be not less than 10 m. Ingress protection rating of IP68 for both converter and sensors. Built in data logger to have at least two

(2) pressure channels for pressure monitoring upstream and downstream of a pressure reducing valve.

256. Specific requirements:

- (i) Minimum conductivity: 5 μ S/cm
- (ii) Nominal Pressure: PN 6 to PN 250
- (iii) Liquid Temperature: -5°C to 80°C
- (iv) Electrodes: Stainless steel AISI 316
- (v) Repeatability: \pm 0.5%

6.21.9 Above Ground Instrumentation Box

257. Fiber-reinforced plastic (FRP) cabinet spacious enough to enclose the electromagnetic flow meter converter, PRV controllers, data logger and accessories. It must be pad mounted in concrete pedestal for ease access and protected inside a > 4 mm ϕ wire mesh cage and secured by weather proof durable padlock.

6.21.10 Data loggers

258. Pressure data logger capable of transferring data via GPRS/SMS communication. Input pressure range of 0 - 20 bars, accuracy \pm 0.5%, and repeatability \pm 0.1%, with re-zero function for offsetting. Memory must be not less than 50,000 readings, and can be set in cyclic or start-stop (block). Logging interval can be set 1 second, 1 min, 15 mins, 30 mins, hourly etc. Capable to export data to comma-separated values (csv) file format or Excel spreadsheets. Software Supports statistical data (average, maximum, mean and standard deviations). Ingress Protection rating of IP68, with minimum battery life of 5 years. Data loggers must be compatible with the Employer's telemetry / GPRS software.

6.21.11 Pressure reducing valves (PRV)

259. The extremely low water pressure in the Site require careful PRV and PRV controller selection. The valve shall be a full bore Globe type diaphragm actuated (no piston) hydraulically controlled by a 3-way pilot valve (allowing full opening when upstream pressure drops below the required downstream set pressure).

Specific requirements:

- (a) The valve body and bonnet made of Ductile Iron GGG50 or higher grade and shall be epoxy powder coated with a minimum coating thickness (DFT) of 250 μ m in accordance to DIN 30677-2 and DIN 3476, inside and outside.

- (b) Each PRV should be hydrostatically tested at 160% of the rated pressure. A test report should be supplied with each valve.
- (c) Main Valve shall have Stainless Steel Seat Ring and stainless steel stems.
- (d) The valve's pilot control loop shall include a low maintenance, "self-cleaning", inline filter.
- (e) All external fasteners and washers shall be stainless steel 18/8 or better
- (f) Pilot circuit isolation valves for inlet, outlet and valve head isolation
- (g) All pilot loop fittings, ball valves and connectors to be made of stainless steel. Pilot valve, strainer and needle valve optionally made of brass or bronze.
- (h) Pilot system shall have be designed for stable regulation in wide range of flow speed, from near-zero to maximal designed flow.
- (i) Each valve shall be supplied with a variety of springs, taking the extremely low pressure situation into account
- (j) PRVs must have either NSF (American, <http://www.nsf.org/>) or WRAS (UK, <http://www.wras.co.uk/>) or other substantially equivalent internationally accepted certificate (such as Japan, Europe, etc.). All supporting documents must be included in the bid.
- (k) Manufacturer must be able to provide support and maintenance services in Kolkata. In case a manufacturer is not doing business within India, the Contractor should ensure that the concerned manufacturer, before contract signing or an appropriate timing as agreed with the Employer, shall arrange a representative Agent in the country equipped and able to carry out the maintenance, support, repair and stocking obligations prescribed in the Conditions of Contract and/or Technical Specifications.
- (l) Contractor to supply a reasonable number (to be agreed with the Engineer) of valve repair kits containing all internal valve and pilot parts for the various valve types and diameters at the end of the Maintenance Period.

6.21.12PRV controllers

- 260. Although the DMAs are relatively small in size and fixed outlet PRVs might be sufficient in many cases, the Contractor is encouraged to experiment with various controllers to get optimum results and also cater for fire-fighting requirements.
- 261. Since it shall be in the interest of the Contractor to use only best quality industry standard controllers, the specifications hereunder are kept at a minimum:

- (a) Controller to be easily retro fitted to any pressure reducing valve to convert the valve from a fixed regime to advance control.
- (b) Units to be fully sealed to IP68 standards, the pressure connections to be of quick-fit type.
- (c) Controller to be powered by a fully-sealed internal battery, with an expected operational life of 5 years and with low power indicator.

6.22 Construction Requirements: Technical Specifications for Installation and Repair Works

6.22.1 General

262. The Clauses in Part G of the ERQ are non-exhaustive given the diversity and complexity of the project. Wherever no specific works and installation specifications available, the Employer's internal specifications shall be followed.

The Contractor is furthermore expected to execute all works in accordance with international best practice and with all relevant regulations and norms of India.

The Contractor is required to take digital photos at all stages of the work progress. Detailed instructions will be given by the Engineer.

All old pipes, valves and other appurtenances shall be returned to the Employer unless otherwise instructed by the Engineer.

6.22.2 Pipeline Trenches

6.22.2.1 Trench Width

263. Trench dimensions and width shall be sufficient to install the various pipes, specials, closures, fittings, valve chambers, and anchorages, as shown on the Drawings and specified herein.

264. The width at the top of the trench shall be not more than the outside diameter of the pipe plus 300mm, or 400mm in total, whichever is the larger.

6.22.2.2 Start of Excavation

265. Where a trench is excavated in a paved surface, whether of asphalt, concrete, or other material, the Contractor shall start by carefully cutting through the paved surface and foundation along the lines of the trench, without loosening or damaging the adjacent parts.

6.22.2.3 Trench Cross Section

266. The trench sides shall be excavated as follows unless specifically varied by the Project Manager:

- (a) With stable soil conditions: vertical sides.
- (b) With soil of low stability: the excavation faces shall be supported by shoring or sheet piling. Additional trench width shall be included to allow proper tamping of backfill and the placing or removal of piles or shoring.
- (c) Trench depth shall permit the pipe to be laid to the gradients and elevations shown on the Drawings.
- (d) At pipe joints, additional excavation shall be made for the pipe joints.
- (e) Pipeline depth shall be in accordance with the Employer's standard Technical specifications.

6.22.2.4 Length of Trench Left Open

267. The trench open ahead of pipe laying operations shall be limited to the length of pipe which can be laid in one day except as otherwise authorized by the Engineer.

If natural or artificial conditions create hazardous operations in the performance of excavation, the Engineer may specify further limitation in the length of open trench permitted. The Contractor shall ensure that safety measures with respect to open trenches will be provided to the satisfaction of the Engineer.

6.22.2.5 Temporary Reinstatement

268. After backfilling the pipeline trench up to the level shown on the Drawings or as directed by the Engineer, the Contractor shall install and compact temporary road surface reinstatement.

To accommodate settlement, temporary surface materials shall be to the same standard as the road.

The Contractor shall maintain the reinstatement and top restore additional material as necessary, to accommodate settlement for a period of not less than two months

6.22.2.6 Permanent Reinstatement

269. Permanent reinstatement of roads and pavements shall restore them to their original condition.

The permanent reinstatement shall be carried out in accordance with the specifications and requirements of the Employer.

6.22.3 Pipeline Installation

6.22.3.1 General

270. The Contractor shall provide labor, materials, tools, equipment, and plant for the installation and handing, laying and installation of the pipes and fittings to the lines, grades and elevations shown on the Drawings.

6.22.3.2 Pipes to be Clean

271. Pipes and fittings shall be carefully cleaned of foreign substances which may have been collected therein before installation and kept clean at all times thereafter, to ensure that there is no difficulty later with flushing and sterilization of the pipe lines on completion.

Before leaving the work for the night or for holidays or at other times when pipe installation is to stop, all pipeline ends shall be closed with suitable wood or metal bulkheads to prevent ingress of animals or persons. The Contractor shall make all necessary arrangements to maintain dewatering pumps in operation so that the pipeline do not fill with dirty water.

The Contractor shall be deemed responsible for any delays caused to its installation program arising from its failure to keep the interior of the pipes clean.

6.22.3.3 Inspection of Pipe at Trench Site

272. Each length of pipe shall be carefully examined before it is lowered into its laying position to ensure that only new undamaged pipe shall be installed following the approval of the Engineer.

Any pipes found damaged shall be rejected and removed from the Site for repair, cutting off the damaged portion if short, or disposal, subject to the opinion of the Engineer.

6.22.3.4 Pipe Cutting

273. Cutting of pipes shall be carried out in accordance with the pipe manufacture's recommendations, without damage to the pipe or the protective coating, and so as to leave a smooth face normal to the pipe axis, chamfered as necessary for subsequent jointing.

274. All cutting shall be done with proper cutting tools and apparatus, and the Contractor shall always be responsible for the accuracy of the measurement of the cut pipe required.

With ductile iron pipes, the cut ends shall be coated with quick drying epoxy paint to the approval of the Engineer which shall be dry before the joint is made.

The Contractor shall remove all unused offcuts from the site on completion, and return them to the Employer's stores. Such offcuts shall be set against the Contractor losses, provided the offcuts did not arise from the repair of damaged pipes.

6.22.3.5 Pipe Bedding

275. Bedding shall form a continuous, sound and uniform bearing for the full length of the pipe except for small grooves for removal of sling, and at the ends of joint.

All such grooves shall be filled and thoroughly compacted with bedding material after removal of the sling and completion of jointing.

6.22.3.6 Pipe Installation

276. Pipes shall be carefully lowered into the trench.

The bedding shall have been prepared and compacted to the required line and level, so that the pipe will be lowered directly onto the bedding. Temporary supports on blocks will not be permitted.

Larger pipes should be supported by the crane during jointing to reduce the jointing effort.

6.22.3.7 Flotation

277. The Contractor shall take all precautions necessary to prevent pipes from floating due to accidental flooding or from any other cause, and shall be responsible for the consequential cost of remedial work delays.

The Contractor shall include details of precautionary methods proposed for pipe restraint with his method statements for the execution of the work.

6.22.3.8 Jointing

A Spigot and Socket Type

278. The spigot and socket to be joined shall be thoroughly cleaned just before joining and the joint rubber gasket and lubricant supplied by the manufacturer shall be installed and applied in accordance with the manufacturers' recommendations. The joint lubricant to be used must be suitable for potable water.

When a joint deflection is needed to accommodate a grade or an alignment adjustment, the deflection should be made only when the joint has been made as described above.

The amount of the joint deflection must not exceed the limits imposed by the design or recommended by the manufacturer.

B Mechanical Couplings

279. In the case of mechanical couplings the bolts shall be tighten gradually so that the components of the coupling are drawn together uniformly.

The manufacturer's recommendation shall be followed.

C Flanged joints

280. Flanged joints shall be completed in like manner, and in accordance with the manufacturer's recommendations as regards maximum torque applied to bolts.

6.22.3.9 Valves

A Valves in the Ground

281. Generally, DN 350mm and smaller valves shall be placed directly in the ground when not installed in chambers with larger valves.

The valves are provided with surface boxes and protection tubes, and shall be installed, and supported on a concrete block as shown on the drawings.

B Valves in chambers

282. Valves for installation in chambers shall be hand-wheel operated and installed as shown on the drawings.

C Thrust Blocks and Restraints

283. Bends, plugged ends, tees and tapers shall be well braced against undisturbed earth by the use of concrete thrust blocks.

D External protection of joints

284. Mechanical couplings, flanged joints and saddle straps shall protected on site by the cold application of Densyl tape or similar approved material supplied by the Contractor.

Application of Densyl tape with Denso Primer, Densyl Mastic and Outerwraps shall be strictly in accordance with the manufacturer's recommendations.

6.22.4 Connections to Existing Water Mains

285. The level of an existing line shall be accurately ascertained by the Contractor and the exact details of all the materials and other requirements determined and listed in a detailed method statement to be submitted for the approval of Engineer.

286. The Contractor must have the approval of the Engineer and the Employer before any work is started and the Employer shall have made arrangements for the closing off of supplies as well as proposing the most appropriate time for the shut-down.

The Contractor must consider execution of such connections as early in the program as practicable, because the Employer will need to select a time when there will be least interference to the network and will not accept any requests for extensions of the Contractor period arising from delays in finding a suitable time for the connections.

6.22.5 Service Connection Installation

6.22.5.1 General

287. The installation of service connections shall be in accordance with a standard design to be prepared by the Contractor and approved by the Engineer. The diameter of the replaced service connection must not be less than the diameter of the existing service connection.

288. The Contractor shall prepare trenches for the service connections generally in accordance with the pipeline trenching requirements, and the reinstatement and compaction of the backfill follow the same procedure.

6.22.5.2 Interruption of supplies to consumers

289. The supply to any consumer's premises shall not be interrupted for more than one working day while the new service connection is made.

290. The Contractor shall be responsible for ensuring that the individual consumers are informed in advance of the timing and duration of any shutdown and for ensuring the access is available to the premises for the execution of the work necessary.

6.22.5.3 Pipe Saddles

291. Under pressure drilling should be carried out when installing pipe saddles on new or existing pipes.

292. The Contractor shall follow the detailed procedures of the manufacturer and supplier of the under-pressure pipe equipment to install and secure the pipe saddles and to connect the corporation stops to them.
293. The pipe saddles shall generally be installed horizontally, unless otherwise instructed by the Engineer.

6.22.6 Customer Meter Installation

6.22.6.1 General

294. The Contractor shall submit standard design drawings for large and small meter installation for the approval of the Engineer.

6.22.6.2 Large Meters

295. Large Meters, predominately for Industrial, Commercial and Institutional customers shall be installed in a suitable location taking the manufacturers recommendation for straight pipe length upstream and downstream of the meter into account.

6.22.6.3 Small meters

296. Small meters, predominately for domestic customers, shall be installed in underground boxes. Location of the boxes shall be in easily accessible locations outside of private premises. All meters shall be installed in a strictly horizontal position.

6.22.7 Leak Repair

6.22.7.1 Leaks on Service Connections

297. Leaking service connections shall be completely replaced from and including the tapping point to the customer.

6.22.7.2 Leaks on Main Pipes

298. Leaks on main pipelines shall be repaired by using stainless steel repair clamps. In case the damage is too large (e.g. longitudinal split) the damaged pipe shall be replaced by a new section of pipe, connected to the old pipe with flexible joints or flange adaptors. Intrusion of ground water into the main pipe has to be avoided as far as possible.

6.22.8 Repair/ Replacement of Leaking

6.22.8.1 Sluice valves

299. Leaking sluice valves shall be replaced with new valves, even if only the stuffing box (gland) is leaking. Valves shall be installed complete with extension spindle, protecting tube and surface box or with had wheel if the valve is located in a chamber.

6.22.8.2 Fire Hydrants

300. Leaking fire hydrants shall be replaced with new hydrants. Fire hydrants found with other operational deficiencies shall be reported to the Engineer and will be dealt with by the Employer unless otherwise instructed by the Engineer.

6.22.9DMA Inflow Meter Installation

301. The electromagnetic DMA flow meters shall be buried without chamber. Straight pipe length before and after the meter shall be according to the manufacturers specifications. The meter shall be properly grounded in according with the specifications of the manufacturer. Meter battery back and converter/transmitter unit shall be placed in the above ground instrumentation box. Cables from the meter to instrumentation box shall be well protected in a plastic conduit.

6.22.10PRV Chamber Installation

302. Pressure reducing valve and strainer shall be installed in a chamber large enough to PRV maintenance, PRV dismantling and PRV removal/replacement. Standard PRV chamber design shall be submitted to the Engineer for approval. Chamber covers shall be lockable and might be either heavy duty cast iron covers or steel covers – depending on the location of the chamber in respect to heavy traffic. Chamber covers have to be approved by the Engineer.
- PRV controller and pressure logger as well as and any other electronic or electrical parts shall be placed in the above ground instrumentation box of the DMA inflow meter. Cables from the meter to instrumentation box shall be well protected in a plastic conduit. Pressure shall be measured upstream and downstream of the PRV.

6.22.11Above Ground Instrumentation Box Installation

303. The Above Ground Instrumentation Boxes shall be located in appropriate locations on the sidewalk or in similar places. Detailed design for every location shall be submitted to the Engineer for approval.

6.23 Construction Requirements: Detailed Technical Specifications

Provided in Volume 2

Note:- The Detailed Technical Specifications provided in Volume 2 under Section 6.23 separately shall supplement the Standard Technical Specifications provided in Section 6.21 & 6.22 above. Whenever there is a conflict, the provisions Detailed Technical Specifications under Section 6.23 shall prevail over those in Section 6.21 & 6.22.

6.24 Supplementary Information

The following list is not exhaustive but shows some of the main reports that are available as part of the electronic data room (EDR) set up in Nigadi WTP of PCMC. Participating Bidders can obtain the information by seeking the necessary permission from the Employers representative.

- a) Detailed Project report on Pimpri chinchwad Continuous (24 x7) Pressurised water Supply Project _ Main report (Volume-I) (40% Project Area)
- b) Detailed Project report on Pimpri chinchwad Continuous (24 x7) Pressurised water Supply Project _ Pipe report (Volume-II)
- c) Detailed Project report on Pimpri chinchwad Continuous (24 x7) Pressurised water Supply Project _ Drawings report (Volume-III)
- d) Detailed Project report on Pimpri chinchwad Continuous (24 x7) Pressurised water Supply Project _ Main report (Volume-III) for 60% Project Area
- e) Project Area Bas Map (2006)
- f) PCMC water tariff notifications

6.25 Drawings

304. Employer's Drawings. The List of drawings is provided as a guideline of the specifications and work of the Bidding Document. All data and information furnished in the drawings by the Employer is given in good faith as a part of approved Detailed Project Report for the service area, but the Employer does not guarantee their completeness and accuracy. The drawings shall be verified and corrected by the Contractor before submitting the System Improvement Plan the Engineer / PCMC.

Below is the list of Drawings available with PCMC and shall be open for assess to participating bidders at PCMC Nigadi WTP office;

SN	Drawing	Drawing Number
1	Pimpri-Chinchwad - Water Districts	1
2	Pimpri-Chinchwad - Selected Water Districts	2
3	Pimpri-Chinchwad Zone population density	3
4	Existing Primary Network	4
5	New Primary Network	5
6	PCMC – Existing Distribution Pipe Network	6
7	Selected Area in Distribution System	7
8	New Pipes in Selected Area Distribution System	8
9	PCMC – DMA wise pipes	9

305. Contractor's Drawings. All completion drawings provided by the Contractor shall be on standard size sheets, prepared on computer with Auto CAD or equivalent and shall show particulars in a title block located in the lower right hand corner, in addition to the name of the Contractor and equipment manufacturer, date, scale, drawing, revision number (RO for drawings submitted initially, R1, R2 etc., for drawings submitted subsequently). A blank space shall be provided for the Engineer's approval stamp and provision shall be made for details of revisions to be recorded. All drawings submitted by the supplier shall use the English language. All drawings shall be clearly and fully cross-referenced to the other drawings as relevant.

6.26 Personnel Requirements

6.26.1 During Construction Period

306. The table below presents the Contractor's key personnel required during design & construction period, minimum numbers of staff required for each key position, educational and working experience requirements.

Using specified forms in Section 4 [*Bidding Forms*], the Bidder must demonstrate it has key personnel that meet the specified requirements.

Table 12 : Personnel Requirements – construction period

Sr. No	Position	Minimum Number Required	Professional requirements		
			Education level	Total Working Experience	Working Experience in similar assignments
General Management and Construction Staff					
1	Project Manager	1	Graduate Engineer with specific experience in implementation of water supply improvements in urban areas.	15 years	10 years
2	Planning and Material Engineer	1	Graduate Engineer	10 years	5 years
3	Procurement cum Quality Assurance Engineer	1	Graduate Engineer	10 years	3 years
4	Construction Supervisors	3	Graduate Engineers in civil/ electrical/ mechanical/ instrumentation engineering	7 years	3 years
5	Water supply network design / hydraulic Engineer	1	post Graduate Engineer in civil/ hydraulic engineering	7 years	5 years
6	Customer Administration	1	Graduate with post graduate diploma in social or environmental science	7 years	3 years

Note:- List above is minimum and Contractor shall deploy the staff over and above to perform his obligations as specified under this contract

6.26.2 Mandatory Requirements

307. The Table below presents the Key-personnel mentioned Section 6 of Employers requirements are mandatory requirements of Employer during design and Construction as well as Operations period i.e. for entire 84 months of contract. Price Bid shall be

inclusive Cost of expert services desired under this contract. Non availability of mandatory key personnel shall be result into deduction of penalty amount and recovery of such cost as specified in Section 8 of Particular Conditions of Contract.

Mandatory Key Experts during Design and Construction and O & M period

Table 13 : Mandatory Key Experts

Sr. No	Position	Minimum Number Required	Professional requirements Working Experience
1	NRW cum DMA Management Specialist	1	As specified employers Requirement
2	Operation and Maintenance Specialist	1	As specified in employers Requirement
3	Leak Detection Specialist	1	As specified in employers Requirement

The table below presents the Contractor’s personnel and services, if required during design & construction period or provisional O & M take over period(arises due sectional / priority DMA completion prior to completion of 24 months of design and construction period from commencement date) and shall be paid per day basis as the need be;

Sr. No	Position	Minimum Number Required	Professional requirements
Personnel during construction period			
1	Meter Reader	15	As per employers Requirement
2	Meter Reader Supervisor	3	As per employers Requirement

(Note : It is understood that one meter reader shall read and submit consumer meter readings of minimum 72 nos. connections per day)

Payments for such services are specified in Schedule 5 : Contractors Payments of Section 8 of Particular Conditions of Contract(PCC).

6.26.3During O & M Period

308. The table below presents the Contractor’s key personnel (minimum) required during Operation and maintenance period, minimum numbers of staff required for each key position, educational and working experience requirements.

Table 14 : Personnel Requirements during O & M Period

Sr. No	Position	Minimum Number Required	Professional requirements		
			Education level	Total Working Experience	Working Experience in similar assignment

					s
Centralized Operational Staff					
1	Operational Manager	2	Graduate Engineer with experience in water distribution management system with 5 years O & M experience	10 years	5 years
2	Network Engineer	1	Graduate Engineer with experience in water distribution system / modeling	5 years	3 years
3	Asst. Network engineer	2	Graduate Engineer with experience in water distribution system	3 years	2 years
Leak Detection Team & O & M					
4	Leak Detection Engineer	26	Graduate engineer	3 years	1 years
5	Maintenance Team	20 to 25	Pipe repairs expe	-----	-----
6	Valve Operators	78	Water distribution experience	----	-----
7	Fitter	13	Experience of similar works		
8	Instrumentation Engineer	01	Experience of similar works	3 years	2 years
9	Instrumentation Asst. engineer	02	Experience of similar works	1 years	1 years
10	Operators for SCADA & monitoring	03	Experience of operating SCADA	1 years	1 years
Customer Complaints Supervisor					
11	Supervisors	50	Similar Work Experience		
Each DMA wise					
12	Meter Reader	6	Similar Work Experience		
13	Meter Reader Supervisor	1	Similar Work Inspecting and managing Experience	1 years	1 years

Note:- List above is minimum and Contractor shall deploy the staff over and above to perform his obligations as specified under this contract

6.27 Minimum Set up Requirements

309. During DMA establishment, the Contractor is expected to provide the expert management support services while completing the engineering study, survey & investigations, fixing boundary valves & isolating the area, capacity building & trainings to PCMC staff, computers peripherals, transport, necessary tools equipment's etc. The list of minimum set, tools & equipment etc. required for the project is indicated below;

	Qty.
Furnitures	Lump sum
Interiors	3 Offices
PC's	10
Printers Small Color	3
Bulk Printing machine	1
Communications	5
Networking Costs	3
Sign Boards, Leaflets	3
Software	
Water Gems software	1
GIS software	1
Auto CAD and other accessory softwares	3
Equipments	
Leak Noise Correlator	1
Leak detection ground phones	6
Pipe locaters	2
Air Compressor + Jack hammer	2
Pipe Welding Sets	3
Mobile Generator	1
Portable dewatering pumps	2
Portable Flow meter	2
Vehicles (SUV) - Equipped with all tools & tackle for routine maintenance	3
Inventory for Connections	100

Note:- List above is indicative for management support services expected from Contractor during contract period. Contractor shall procure equipment's / softwares, expert services over and above required for successful completion of his obligations specified under this contract.

310. Apart from above, during the entire contract period till taking over of the works by PCMC, the contractor shall provide two new brand AC vehicles of TATA Safari/Scorpio/XYLO/Innova or equivalent make Vehicles, for the PCMC. The vehicle shall be provided with fuel, driver & maintenance for a running of at least 3000 Kms per month within a fortnight from the date of commencement of the work. The cost of this facility is incidental to the work and deemed to be included in the offer given by contractor.

Section-7
General Conditions of Contract

Section 7 - General Conditions of Contract

The GCC in this Section, read in conjunction with the Particular Conditions of Contract in Section 8 and other documents listed therein should be a complete document expressing all the rights and obligations of the contracting parties.

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General Conditions

A. Contract and Interpretation

1. Definitions

1.1 The following words and expressions shall have the meanings hereby assigned them:

“Bill of Quantities” means the priced and completed Bill of Quantities forming part of the Bid and to be executed with in Construction Period.

“Completion Date” is the date of completion of the Works and Services as certified by the Engineer in accordance with GCC Sub-Clause 32.

“Construction Period” or “Design & Construction phase” means the initial period of contract where Construction Works to be completed with in the period as per PCC

“Construction Works” means activities including the replacement of main pipelines and the installation of customer meters, Bulk meters, SCADA and other works that are covered under Bills of Quantity including works for DMA Establishment and Water Loss Management.

“Contract” is the Contract between the Employer and the Contractor to execute, complete and maintain the Works and Services. It consists of the documents listed in GCC Clause 3.

“Contract Commencement Date” means date as per PCC

“Contractor” is the party whose Bid to carry out the Works and Services has been accepted by the Employer.

“Contractor’s Bid” is the completed bidding document submitted by the Contractor to the Employer

“Contract Price” is the price stated in the Letter of Acceptance and subject to such additions and adjustments thereto or deductions there from, as may be made pursuant to the Contract.

“days” are calendar days; “months” are calendar months.

“defect” is any part of the Works and Services not completed in accordance with the Contract.

“Defects Liability Certificate” is the certificate issued by the Engineer upon correction of defects by the Contractor.

“Defect Liability Period” means the period calculated from the Completion Date where the Contractor remains responsible for remedying defects.

“Design & Construction Period” means same as Construction

Period or 'Design & Construction Phase'

"District Meter Area (DMA)" is a small hydraulically discreet part of the water distribution network, usually comprising less than 3,000 service connections may be higher in exceptional cases, generally with one but sometimes with two or more inflow points equipped with bulk water meters.

"DMA Establishment Works" are specific and clearly defined civil works the Contractor is required to carry out during the initial Construction Period of the Contract, as defined in Section 6, Employer's Requirements.

"DMA inflow chamber" is the chamber with all pipework, bypass, valves and other fittings, pressure-reducing valve, magnetic flow meter, data logger and above-ground box.

"Drawings" include calculations and other information provided or approved by the Engineer for the execution of the Contract.

"Dispute Board" (DB) means the person or persons named as such in the PCC appointed by agreement between the Employer and the Contractor to make a decision on or to settle any dispute or difference between the Employer and the Contractor referred to him or her by the parties pursuant to GCC Clause 53 hereof.

"Employer" means the person named as such in the PCC and includes the legal successors or permitted assigns of the Employer.

"Employer's Requirements" means entire Section 6 of RFP document and is a part of Contract

"Engineer" means the person named in the PCC (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Engineer) who is responsible for supervising the execution of the Works and Services and administering the Contract.

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

" Final take Over Date" as defined in GCC Clause 32 hereof

"GCC" means the General Conditions of Contract.

" Initial take Over Date" as defined in GCC Clause 32 hereof

"Letter of Acceptance" means the formal acceptance by the Employer of the Bid and denotes the formation of the Contract at the date of acceptance.

"Materials" are all supplies, including consumables, used by the Contractor for incorporation in the Works and the provision of Services.

“Maintenance Phase” is a period of time after the Establishment of DMAs with in the Construction Period during which the water loss levels have to be maintained and the Contractor has to prepare for the final take-over of the works and system to O&M Phase.

“Mobilization Phase” is a period of time from the signing of the Contract to allow the Contractor to mobilize his team for the execution of the Works and Services.

“O&M Phase” is a period immediately after Construction Period and till contract completion date as per PCC. The contractor Obligations with in this Phase are as per contract.

“PCC” means the Particular Conditions of Contract as per Section 8 & schedules attached to it.

“Pipe Replacement, Meter Installation and Unforeseen Works” also called as “Construction Works” are activities including the replacement of main pipelines and the installation of customer meters and other works that are not covered under DMA Establishment and Water Loss Management.

“Project Manager” means any person nominated by the Contractor and approved by the Employer in the manner provided in GCC Sub-Clause 25.2 hereof to perform the duties delegated by the Contractor.

“Service Level” means Contractors obligations as per Employers Requirements related to water supply service obligations including Water loss Reduction targets, achieving & maintaining Continuous pressurized water supply and resolve non commercial customer complaints with in a specified time period .

“SIP” means Service Improvement Plan to improve Service Level as per scope of contract

“Start Date” is given in the PCC. It is the latest date when the Contractor shall commence execution of the Works.

“Site” is the area defined as such in the PCC.

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

“Water Loss Reduction and Management Services” means all interventions under the Contract which shall be carried out by the Contractor in order to achieve the annual minimum water loss levels& other Service Levels as defined in the Contract and receive the respective payments therefore.

“Water Loss Reduction Phase” is the period of time after the Mobilization Phase during which the Contractor has to complete

	<p>SIP, DMA Establishment Works & Construction Works of individual DMA or Sub DMA& Maintenance Phase and Up to final take over date .</p> <p>“Work Order” is an order issued by the Engineer to the Contractor authorizing the execution of Construction Works & Services as per contract.</p> <p>“Variation” is the instruction given by the Engineer which varies the Work.</p> <p>The “Works& Services” are what the Contract requires the Contractor to construct, install, operate and turn over to the Employer, as defined in the PCC.</p> <p>“year” means 365 days</p>
<p>2. Interpretation</p>	<p>2.1 In the Contract, except where the context requires otherwise:</p> <ul style="list-style-type: none"> (a) words indicating one gender include all genders; (b) words indicating the singular also include the plural and words indicating the plural also include the singular; (c) provisions including the word “agree”, “agreed” or “agreement” require the agreement to be record in writing; (d) the word “tender” is synonymous with “bid”, “tenderer” with “bidder” and “tender documents” with “bidding documents”; and (e) “written” or “in writing” means hand-written, type-written, printed or electronically made, and resulting in a permanent record. <p>The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.</p> <p>2.2 Entire Agreement</p> <p>Subject to GCC Sub-Clause 24.4 hereof, the Contract constitutes the entire agreement between the Employer and Contractor with respect to the subject matter of Contract and supersedes all communications, negotiations and agreements (whether written or oral) of parties with respect thereto made prior to the date of Contract.</p> <p>2.3 Amendment</p> <p>No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party hereto.</p> <p>2.4 Independent Contractor</p>

	<p>The Contractor shall be an independent contractor performing the Contract. The Contract does not create any agency, partnership, joint venture or other joint relationship between the parties hereto. Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed. All employees, representatives or Subcontractors engaged by the Contractor in connection with the performance of the Contract shall be under the complete control of the Contractor and shall not be deemed to be employees of the Employer, and nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives or Subcontractors and the Employer.</p> <p>2.5 Non-Waiver</p> <p>2.5.1 Subject to GCC Sub-Clause 2.5.2 below, no relaxation, forbearance, delay or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect or restrict the rights of that party under the Contract, nor shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.</p> <p>2.5.2 Any waiver of a party’s rights, powers or remedies under the Contract must be in writing, must be dated and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.</p> <p>2.6 Severability</p> <p>If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.</p>
<p>3. Documents Forming the Contract</p>	<p>3.1 The documents forming the contract shall be interpreted in the following order of priority:</p> <ul style="list-style-type: none"> (a) Agreement (b) Letter of Acceptance (c) Contractor’s Bid (d) General Conditions of Contract (GCC) (e) Particular Conditions of Contract (PCC) (f) Employer’s Requirements

	<p>(g) Drawings</p> <p>(h) Bill of Quantities</p> <p>(i) Any other document listed in the PCC as forming part of the Contract</p> <p>3.2Acceptance of conditions compulsorybefore tendering the work</p> <p>Any contractor who does not accept these conditions shall not be allowed to submit the tender for works. The submission of tender means acceptance of all conditions of contract.</p>
<p>4. Communications</p>	<p>4.1 Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices, requests and discharges, these communications shall be:</p> <p>(a) in writing and delivered against receipt; and</p> <p>(b) delivered, sent or transmitted to the address for the recipient’s communications as stated in the Contract Agreement.</p> <p>When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Engineer, a copy shall be sent to the Engineer or the other Party, as the case may be.</p>
<p>5. Law and Language & Other Provisions</p>	<p>5.1The Contract shall be governed by and interpreted in accordance with laws of the country specified in the PCC.</p> <p>5.2 The ruling language of the Contract shall be that stated in the PCC. 5.3 The language for communications shall be the ruling language unless otherwise stated in the PCC.</p> <p>5.3Measurements and Arithmetic Conventions: All measurements and calculations shall be in metric system and calculations done to 2 decimal places, with the third digit of 5 or above being rounded up and below 5 being rounded down.</p> <p>5.4 Ambiguities and Discrepancies: In case of ambiguities or discrepancies within this Agreement, the following shall apply:</p> <p>a. between two Articles of this Agreement, the provisions of specific Articles relevant to the issue under consideration shall prevail over those in other Articles;</p> <p>b. between the written description on the drawings and the specifications and standards, the latter shall prevail;</p> <p>c. between the dimension scaled from the drawing and its specific written dimension, the latter shall prevail; and</p> <p>d. between any value written in numerals and that in words, the latter shall prevail.</p> <p>5.5 Operating Licence :</p> <p>Together with the Letter of Acceptance, the Employer shall issue</p>

to the Contractor the Operating Licence or equivalent legal authorization to enable the Contractor to operate and maintain the Works during the Operation Service Period.

The Operating License shall automatically come into full force and effect upon the issue of the Readiness Certificate upon completion of the Design & Construction works under Sub-Clause 32.2 [Initial take over date] and shall remain in force until the issue of the Contract Completion.

The Operating Licence shall only extend to those parts of the Site which it is required to occupy for the purposes of carrying out the Works and Operation Service as set out in the Contract. The Operating Licence granted pursuant to this Sub-Clause shall not operate nor be deemed to operate as a tenement or a demise of the Site or any part thereof. The Contractor shall not have or be entitled to any estate right, title, or interest in the Site. The licence shall immediately terminate upon the termination of this Contract for whatever reason.

5.6 Assignment: Neither Party shall assign the whole or any part of the Contract or any benefit or interest in or under the Contract.

5.7 Care and Supply of Documents: Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over by the Employer. Unless otherwise stated in the Contract, the Contractor shall supply to the Employer's Representative six copies of each of the Contractor's Documents.

The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Employer's Requirements, the Contractor's Documents, and Variations and other communications given under the Contract. The Employer's Personnel shall have the right of access to all these documents at all reasonable times.

If a Party becomes aware of an error or defect of a technical nature in a document, which was prepared for use in executing the Works, the Party shall promptly give Notice to the other Party of such error or defect.

5.7 Compliance with Laws: The Contractor shall, in performing the Contract, comply with applicable Laws. Unless otherwise stated in the Employer's Requirements:

- a. the Employer shall have obtained (or shall obtain) the planning, zoning, building permit, or similar permission for the Permanent Works and for the Operation Service, and any other permissions described in the Employer's

	<p>Requirements as having been (or being) obtained by the Employer; and the Employer shall indemnify and hold the Contractor harmless against and from the consequences of any failure to do so;</p> <ul style="list-style-type: none"> b. the Contractor shall give all notices, pay all taxes, duties and fees, and obtain all further permits, licenses and approvals, as required by the Laws, in relation to the design, execution and completion of the Works and Operation Service and the remedying of any defects; and the Contractor shall indemnify and hold the Employer harmless against and from the consequences of any failure to do so; and c. the Contractor shall at all times and in all respects comply with, give all notices under, and pay all fees required by any licence obtained by the Employer in respect of the Site or the Works or Operation Service, whether relating to the Works or Operation Service on or off the Site. <p>5.8 Joint and Several Liability: If the Contractor constitutes (under applicable Law?) a joint venture, consortium or other unincorporated grouping of two or more persons:</p> <ul style="list-style-type: none"> a. these persons shall be deemed to be jointly and severally liable to the Employer for the performance of the Contract; b. these persons shall notify the Employer of their leader who shall have authority to bind the Contractor and each of these persons; and c. the Contractor shall not alter his composition or legal status without the prior consent of the Employer.
<p>6. Corrupt Practices</p>	<p>6.1 Anticorruption Policy requires bidders, suppliers, and contractors under, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Employer:</p> <p>defines, for the purposes of this provision, the terms set forth below as follows:</p> <ul style="list-style-type: none"> (i) “corrupt practice” means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party; (ii) “fraudulent practice” means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation; (iii) “coercive practice” means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

	<p>(iv) “collusive practice” means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party.</p> <p>(f) will reject a proposal for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract; and</p> <p>(g) will sanction a firm or an individual, at any time, in accordance with Employer’s Anticorruption Policy and Integrity Principles and Guidelines (both as amended from time to time), including declaring ineligible, either indefinitely or for a stated period of time, to participate in Employer-financed or Employer-administered activities or to benefit from an Employer-financed or Employer administered contract, financially or otherwise, if it at any time determines that the firm or individual has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive or other prohibited practices; and</p> <p>(h) will have the right to require suppliers and contractors to permit the Employer or its representative to inspect their accounts and records and other documents relating to the bid submission and contract performance and to have them audited by auditors appointed by the Bank.</p>
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B. Subject Matter of Contract

7. Scope of Works and Services	<p>7.1 Unless otherwise expressly limited in Section 6, Employer's Requirements, the Contractor's obligations cover the design, execution and maintained of all Works, provision of all equipment and materials and the performance of all Services required to reduce water losses, provide continuous pressurized potable quality water supply and provide support services to Employer for timely resolution of customer complaints within the Site specified in the Employer's Requirements. The Works and Services include the (i) Design & Construction Phase Works includes preparation of SIP, DMA Establishment Works, Construction Works, Water Loss Reduction and , (ii) O&M Services with performance standards in water loss reduction, Continuous pressurized water supply, faster resolution to customer complaints (excluding billing, collection & commercial issues) and maintaining water quality.</p> <p>Construction Works including Pipe Replacement, Meter Installation and Unforeseen Works in accordance with the plans, procedures, specifications, drawings, codes and any other documents as specified in Section 6, Employer's Requirements. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labor, materials, equipment, construction utilities and supplies; temporary materials, structures and facilities; transportation (including, without limitation, unloading and hauling to, from and at the Site); and storage, except for those supplies, works and services that will be provided or performed by the Employer, as set forth in Section 6, Employer's Requirements.</p> <p>7.2 The execution of Construction Works shall be requested by the Engineer who will issue a Work Order defining the requested works to be carried out by the Contractor, based on the activities and prices in the Bill of Quantities. The Work Order shall specify the activities to be carried out and the corresponding price. The contractor shall confirm his acceptance by signing the Work Order.</p> <p>7.2.1 Work Orders shall be issued in writing and shall include the date on which the Work Order was issued and signed by the Engineer. Two (2) copies of the Work Order shall be transmitted to the Contractor by the Engineer, and the Contractor shall immediately countersign one (1) copy including the date of acceptance, and return the same to the Engineer.</p>
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	<p>7.2.2 If the Contractor has any objection to a Work Order, Project manager shall notify the Engineer of his reasons for such objection within ten (10) days of the date of issuing the Work Order. Within five (5) days of the Water Loss Manager's objection, the Engineer shall cancel, modify or confirm the Work Order in writing.</p> <p>7.3 The Contractor shall, unless specifically excluded in Section 6, Employer's Requirements perform all such work and/or supply all such items and materials as being required for attaining completion of the Works and Services.</p>
<p>8. Phases of the Contract</p>	<p>8.1 The Contract is divided into two phases:</p> <p>(a) Design & Construction Phase – the period of time given to the Contractor as specified in the PCC from the signing of the Contract to construction completion period it includes Mobilization, SIP, Construction Works, Establishment of DMAs, Pipe Replacement, Meter Installation and Unforeseen Works for Water loss reduction, conversion to continuous pressurized water supply and O&M from Initial Take over date for DMAs commissioned before final takeover date as defined in contract. At the end of Construction Phase, the Contractor will receive a Certificate of Completion following the requirements of GCC Clause 32</p> <p>(b) O&M Phase – the period of time as specified in the PCC which begins from Final take Over Date as defined in PCC after the receipt of the Certificate of Completion by the Contractor as per GCC Clause 32 for which the Contractor is obligated to maintain the Service levels as specified in the PCC. At the end of the O&M Phase the Contractor will receive a Taking-Over Certificate following the requirements of GCC Sub-Clause 33.1</p>
<p>9. Time for Commencement and Completion</p>	<p>9.1 The Contractor shall commence the Works and Services within the period specified in GCC Clause 8 and the PCC and without prejudice to GCC Sub-Clause 35.2 hereof, the Contractor shall thereafter proceed in accordance with the time schedule specified in the PCC.</p> <p>9.2 The Contractor shall attain completion of the Works and Services or of a part where a separate time for completion of such part is specified in the PCC, within the time stated in the PCC or within such extended time to which the Contractor shall be entitled under GCC Clause 48 hereof</p>

	<p>9.3 Bar Chart</p> <p>The contractor shall be required to submit a detailed programme for completion of work within the stipulated period including the period for flushing, disinfection and commissioning of pipeline in the form of a Bar Chart, covering all major activities and indicating milestones to the Engineer within 30days from the date of award of work. Modifications suggested by the Engineer shall be incorporated in the Bar Chart. It will be ensured by the contractor that the time schedule as laid down in the aforesaid Bar Chart is adhered to. Action for not achieving the milestones as mentioned in the Bar chart shall be taken as per the provisions given in the Clauses of contract.</p>
<p>10. Contractor's Responsibilities</p>	<p>10.1 The Contractor shall design and carry out the Works and Services, including associated purchases and/or subcontracting, necessary to comply with the requirements established in Section 6, Employer's Requirements with due care and diligence.</p> <p>10.2 The Contractor confirms that it has entered into this Contract on the basis of a proper examination and interpretation of the data relating to the Works and Services provided by the Employer, and on the basis of information that the Contractor could have obtained from a visual inspection of the Site if access thereto was available and of other data readily available to it relating to the Works and Services as of the date twenty-eight (28) days prior to bid submission. The Contractor understands that leak detection might be technically difficult given the low-pressure situation in the Site. The Contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve it of its responsibility for properly estimating the difficulty or cost of successfully performing the Works and Services.</p> <p>10.3 The Contractor shall acquire and pay for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located which such authorities or undertakings require the Contractor to obtain in its name and which are necessary for the performance of the Contract, including, without limitation, visas for the Contractor's and Subcontractor's personnel and entry permits for all imported contractor's equipment. The Contractor shall acquire all other permits, approvals and/or licenses that are not the responsibility of the Employer under GCC Sub-Clause 11.4 hereof and that are necessary for the performance of the Contract.</p> <p>10.4 The Contractor shall comply with all laws in force in the country where the Works and Services are to be implemented.</p>

The laws will include all local, state, national or other laws that affect the performance of the Contract and bind the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Subcontractors and their personnel, but without prejudice to GCC Sub-Clause 11.1 hereof.

10.5 Any materials and services that will be incorporated in or be required for the Works and Services and other supplies shall have their origin in an eligible country as defined under Section 5, Eligible Countries. Any subcontractors retained by the Contractor shall be from an eligible country as specified in Section 5, Eligible Countries.

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

10.7 If the Contractor is a joint venture or consortium of two or more persons, all such persons shall be jointly and severally bound to the Employer for the fulfillment of the provisions of the Contract and shall designate one of such persons to act as a leader with authority to bind the joint venture or consortium. The composition or the constitution of the joint venture or consortium shall not be altered without the prior consent of the Employer.

10.8 The Easementary Rights are granted to the Contractor for the purpose of fulfilling the obligations of the Contractor under this Agreement and not for any other purposes.

10.9 The Contractor shall not part with or create any Encumbrance on the whole or any part of the Service Area.

10.10 Contractor and Employer shall prior to transfer of the Project Facilities shall

(a) Jointly create and agree upon an inventory of Existing Assets, their condition and status, current performance indicators. This would act as the baseline inventory for implementation of the Project. The details arrived from this joint survey shall be as per Employers requirements.

10.11O & M Obligations of Contractor

10.11.1 The O&M of a zone of selected area shall vest with Employer till Initial take over date of the zone. There after the O&M of the zone shall vest with the Contractor and O&M obligations shall be carried out by operation.

- i. The Contractor shall during the O&M Period, undertake all services relating to operation and maintenance of the Project Facilities in conformity with Employer's Requirements. During development period the obligations shall vest with Employer.
- ii. The Contractor shall along with the Approved Implementation Plan, submit to the PMC & Employer a plan for operation and maintenance of the Project Facilities ("O&M Plan") in conformity with the Employers Requirements and Performance Standards.
- iii. The O&M Plan shall set out in detail the standards, schedules, procedures, type, periodicity and other details of the operation and maintenance activities to be carried out for the Project during the Agreement Period so as to meet the Employer's Requirements as well as details of the management information system to be incorporated, reports to be submitted and procedure for reviews, including developing a mechanism for grievance redressal.
- iv. Within 30 days of receipt of the O&M Plan, the PMC & Employer shall review the same and convey its comments/observations to the Contractor on the O&M Plan, including the need, if any, to modify the same. If the comments/observations of the PMC & Employer require the O&M Plan to be modified, the Contractor shall suitably modify the O&M Plan. The O&M Plan shall be finalized with mutual consent.
- v. Notwithstanding any review or failure to review by the Contractor or the comments/ observations of the PMC & Employer, the Contractor shall be solely responsible for the adequacy of the O&M Plan and the conformity thereof with the Performance Standards, Employer Requirements and shall not be relieved or absolved in any manner whatsoever of any of its obligations hereunder.
- vi. The Contractor shall within a reasonable period inform Employer details of its key personnel responsible for O&M and subsequent changes, if any, from time to time.

vii. The Contractor shall incorporate good management practices and appropriate technologies required for meeting the Performance Standards.

viii. The Contractor shall, during the Agreement Period;

a. have requisite organization and designate and appoint suitable officers / representatives as it may deem appropriate to supervise the Project, to deal with the PMC & Employer and to be responsible for all necessary exchange of information required pursuant to this Agreement;

b. for the purposes of determining that the Project Facilities are being maintained in accordance with the Employer's Requirements, the Contractor shall with due diligence carry out all necessary and periodical Tests in accordance with the instructions and under the supervision of the PMC & Employer. The Contractor shall maintain proper record of such Tests and the remedial measures taken to cure the defects or deficiencies, if any, indicated by the Test results.

c. conduct all Tests to ascertain compliance with Employer's Requirements.

suspend forthwith the whole or any part of the O&M activities upon receiving a written notice from the PMC & Employer, who may require the Contractor to suspend the activities in whole or part if in the reasonable opinion of the PMC & Employer, the operations are being carried on in a manner that is not in conformity with the Employers Requirements.

ix. The Contractor shall as per pre agreed format record the system performance and periodically provide the same to PMC & Employer.

In the event the Contractor has failed to operate and maintain the Project in accordance with the Employers Requirements, and such failure has not been remedied despite a notice to that effect issued by the PMC & Employer ("**Notice to Remedy**"), Employer may, without prejudice to any of its other rights / remedies under this Agreement, be entitled to operate and maintain the Project or cause to repair and maintain the Project Facilities at the risk and cost of the Contractor. The Contractor shall reimburse all 150% of the costs incurred by Employer on account of such operation and maintenance or repair and maintenance within 7 days of receipt of Employer claim therefor.

x. The Contractor shall be deemed to be in material breach of Employers Requirements if the PMC & Employer acting

reasonably and in accordance with the provisions of this Agreement, has determined that due to breach of its obligations by the Contractor:

- a. there has been failure / undue delay in carrying out scheduled / planned maintenance or the scheduled / planned maintenance has not been carried out in accordance with the Employers Requirements;
- b. the maintenance of the Project Facilities or any part thereof has deteriorated to a level which is below the acceptance level prescribed by the Employers Requirements;
- c. there has been a serious or persistent let up in adhering to the Employer's Requirements and thereby the Project Facilities or any part thereof is not safe for operations;
- d. there has been persistent breach of Employers Requirements. For avoidance of doubt, persistent breach shall mean:
 - i. any breach of Employers Requirements by the Contractor which has not been remedied by the Contractor despite a Notice to Remedy in respect thereof issued by the PMC & Employer ;
 - ii. recurrence of a breach by the Contractor, during the pendency of Notice to Remedy by the PMC & Employer requiring the Contractor to remedy a breach, and
 - iii. repeated occurrence of a breach notwithstanding that earlier breach has been remedied pursuant to Notice to Remedy or otherwise.

Upon occurrence of a material breach of Employers Requirements, Employer shall, without prejudice to and notwithstanding any other consequences provided therefore under this Agreement, be entitled to terminate this Agreement as per clause 50.2.

10.11.2 General Obligations

The Contractor shall

- a. from the Initial Take Over Date of a zone of selected service area, undertake all services relating to operation and maintenance of the Project Facilities in conformity with

Employers Requirements.

b. supply Treated Water to Consumers within the Selected Service Area and shall meet its Performance Standards.

c. identify Critical Measurement Points in the distribution network, in consultation with PMC & Employer for installation of pressure measurement data loggers.

d. carryout repair to any leakages in the distribution network during O&M.

e. repair or replace the defective water meters or in the events where the water meters are damaged due to mis-handling or negligence of the same by Consumer, to repair or replace it and advice Employer to collect charges for the same from such Consumer as per the Applicable Law..

f. During O&M period only, carry out the following activities in the Service Area:

i. Undertake repairs and maintenance of the Project Facilities, at its own cost and expense.

ii. Ensure that the Treated Water shall be supplied at a positive pressure being never less than 8 (Eight) meters after Final take Over date, measured at all the Critical Measurement Points in the Selected Service Area at all times.

iii. Continuously log pressure readings at all pressure-metering points installed at Critical Measurement Points, which shall also include a point where pressure is routinely experienced at the minimum level in the Service Area, and monitor continuous pressured water supply on a daily basis in accordance with the prudent utilities practice.

iv. Upon instructions by Employer, provide connection to a property within a period of seven (7) days from such instruction.

v. carry on basic plumbing and shall replace, as per instructions of the Employer, illegal property water connections with legal connections where the property owner accepts to legitimize the connection, and if the property owner does not so opt to legitimize the connection, to facilitate in disconnection of such unauthorised connections by Employer.

vi. be expected to co-operate with Employer in the implementation of the communications program to foster

ownership of the Project by the local stakeholders and encourage their support for the work. The Contractor shall disseminate to the Consumers the communication materials prepared by the Employer by effecting their availability at the Consumer Service Centers established in the Service Area. The communication material shall include information on significance of safe quality water supplied including water conservation and benefits of continuous water supply to the Consumers. The Contractor shall do nothing that would hinder the work of those involved in implementing the communications program.

vii. report to Employer in respect of unauthorized water connections. Within 30 days or as per policy of Employer of such intimation Employer shall undertake remedial actions by way of either regularizing the unauthorized connections or disconnecting such properties from the network within the Service Area and initiate proceedings as necessary for collecting the dues from such connections. Contractor shall provide the plumbing support.

viii. Set up water quality surveillance program to undertake daily, weekly and monthly testing of water quality at Consumer taps for checking the residual chlorine content and also chemical and bacteriological quality of the supplied water.

10.11.3 Other Operation and Maintenance Obligations

The Contractor shall

a. achieve the Performance Standards in accordance with the Employers requirements.

b. ensure that the total water losses including Leakage Losses are minimized and are in adherence to the Performance Standards as set out in Employers requirements.

c. set up three Consumer Service Centre (Back Office) in the Selected Service Areas, at an appropriate location designated by Employer, which would have a minimum of three (3) operational dedicated phone lines for receiving the complaints from EMPLOYER.. The effective and consumer oriented

functioning of service centre shall vest with Employer Contractor shall provide support to Employer to undertake prudent consumer grievance redressal mechanisms, which shall be duly documented.

d. Customer Services shall continue with Employer. Contractor shall be responsible for back office support to resolve the complaints (other than commercial complaints and billing issues) within specific time limit in the contract. Attend the consumer complaints received through Employer by personal visit of consumer, letters, telephone calls, emails, sms, etc. and respond to the consumer through Employer's designated officers / staff within 24 hours from the time of receipt of such complaint and resolve the complaint within 5 working days from the time of receipt of the said complaint. Any complaints related to no water or poor quality water shall be attended within 6 hours from the time of receipt of complaint and resolved within 24 hours.

e. initiate innovative steps without additional cost to Employer, to improve system efficiency i.e. efficiency in Consumer service (non commercial), non-revenue water management and manpower deployment etc. in water supply and distribution.

f. maintain daily records of the following and submit the same to Employer and the PMC & Employer by the 10th day of every Month or in case the 10th day of a Month is a holiday then on the following working day of such Month:

- i. Quantum of Treated Water as measured at the Inlet/outlet of ESR/GSR/DMA's
- ii. Results of the residual chlorine measurement in the network and the periodical measurement for chemical and bacteriological analysis of the water supplied to the Consumers
- iii. Quantum of Treated Water supplied to the Consumers based on the Water Supply and Consumption Statement
- iv. Estimation of the Leakage Losses and
- v. Pressure at the Critical Measurement Points

vi. Redressal of Consumer complaints.

g. provide to the Employer, a report on the project operational data ("Project Operational Data"), including technical and cost data, , in relation to the period of twelve weeks commencing from the Initial Takeover Date and for every subsequent period of twelve weeks commencing from expiry of the previous twelve week period. The last report on Project Operational Data should represent the period from expiry of the previous twelve-week period to the expiry of the Agreement. Every report on Project Operational Data shall include description of service levels, state of Project

h. Facilities, physical improvements carried and consequent investments made, operational issues including Consumer service, and, maintenance of records, connections and disconnections.

continuously log pressure readings at pressure-metering points installed at Critical Measurement Points on the distribution network as approved by the Employer including a point where pressure is routinely experienced at the minimum level in Service Area and to measure and monitor continuous pressured water supply on a daily basis in accordance with the Prudent Utility Practice.

i. take necessary action as may be appropriate and in accordance with Prudent Utility Practices in the event of an emergency or risk of danger or damage to persons or property (including the Project Facilities).

GIS based asset information system:- The Contractor shall update the information every quarter on regular basis.

j. During the subsistence of a Water Shortage Period, Contractor shall undertake such measures so as to minimize the supply interruptions to the Consumers

10.11.4 O&M Cost Obligation

The O&M fees includes following O&M Cost obligation with other contractual obligation within the project area.

- (i) Establishment cost.
- (ii) Maintenance & repairs of Project facilities
- (iii) O&M obligations under this contract from initial take over date.

10.11.5 Obligation to make connections to a water main

- (i) Employer shall forward to Contractor the eligible application

form of consumer seeking connection. The Contractor shall prepare the estimate as per approved rates of Employer for providing water connection in which the cost of plumbing upto water meter and water meter shall be included. Apart from inclusion of applicable cost and charges in accordance with Employer's water supply bye laws, the cost shall also include the cost of road cutting if any and restoration to original or better condition thereof. The demand note for the above cost shall be issued by the Employer to the intending consumer. On payment to Employer by intending consumer the cost of new connection as per demand note and receipt of a copy of agreement from the Employer, the Contractor shall provide such connection within seven days upon completion of all connection work and affixation of a metering device. The Employer shall reimburse to the Contractor the cost of providing water connection. The Contractor shall be fully responsible for the restoration of road cutting to the original or better condition thereof.

10.11.6 Joint inspection prior to contract completion

Not less than six months prior to the expiry date of the Operation Service Period, the Employer's Representative and the Contractor shall carry out a joint inspection of the Works and, within 28 days of the completion of the joint inspection, the Contractor shall submit a report on the condition of the Works identifying maintenance works (excluding routine maintenance works and the correction of defects), replacements and other works required to be carried out to satisfy the requirements of the Operation and Maintenance Plan after the Contract Completion Date. The Contractor shall submit a programme for carrying out such works over the remainder of the Operation Service Period.

Following receipt of the Contractor's report, the Employer's Representative may, throughout the remainder of the Operation Service Period, instruct the Contractor to carry out all or part of the works identified in the Contractor's report at contractor's cost.

Upon satisfactory completion of the items identified in this Sub-clause the Employer shall instruct the Contractor to commence the Tests Prior to Contract Completion.

10.12 Changes in constitution of firm to be notified

In case of tender by partners, any changes in the constitution of a firm shall be forthwith notified by the contractor to the Engineer - in - Charge for his information. Change in JV

	partners are not allowed .
<p>11. Employer's Responsibilities</p>	<p>11.1 The Employer shall apply due diligence to ensure the accuracy of all information and/or data to be supplied as described in Section 6, Employer's Requirements,</p> <p>11.2 The Employer does not warrant the accuracy of data specifically, the water distribution network drawings, water loss levels, and general conditions of the infrastructure.</p> <p>11.3 The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access thereto, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract, including all requisite rights of way, as specified in Section 6, Employer's Requirements. The Employer shall give full possession of and accord all rights of access thereto on or before the date(s) specified in the PCC.</p> <p>11.4 The Employer shall acquire and pay for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located which (a) such authorities or undertakings require the Employer to obtain in the Employer's name, (b) are necessary for the execution of the Contract, including those required for the performance by both the Contractor and the Employer of their respective obligations under the Contract, and (c) are specified in Section 6, Employer's Requirements.</p> <p>11.5 If requested by the Contractor, the Employer shall use its best endeavors to assist the Contractor in obtaining in a timely and expeditious manner all permits, approvals and/or licenses necessary for the execution of the Contract from all local, state or national government authorities or public service undertakings that such authorities or undertakings require the Contractor or Subcontractors or the personnel of the Contractor or Subcontractors, as the case may be, to obtain.</p> <p>11.6 Grant of Rights to The Contractor</p> <p>11.6.1 Subject to and in accordance with the terms and conditions set forth in this Agreement, Employer hereby authorizes the Contractor:</p> <p>a. To investigate, study, design, engineer, procure, construct, augment, rehabilitate, operate and maintain the Project Facilities and to exercise and / or enjoy the rights, powers, benefits, privileges, authorizations and entitlements as set forth in this Agreement to provide the Services in Service Area as per</p>

Employers requirements.

- b. To enter upon and use the Service Area as per Employers requirements during the Agreement Period of as per PCC including all rights of way and easements relating to the Project and access to the Project Facilities, including the Existing Assets, so that the Contractor, its agents, sub-contractors and any third party it might designate may perform its rights and obligations under this Agreement, including the right to conduct any kind of work in the streets and other public places of the Service Area, in order to have access to the Project Facilities.
- c. To receive Treated Water to ESR / OHR to supply in a zone of selected areas wherein Construction works are completed in all respect, without interruption in accordance with the provisions of this Agreement. The maximum quantum of treated water supply quantum contemplated by Employer in the year through shall be as given in Employers requirements but shall not be less than the domestic demand at lpcd rate specified in PCC and add non domestic demand as assessed after completion for consumer survey by Contractor.. *Employer shall arrange additional water provided Contractor meets the revised yearly target as per Employers requirements.*
- d. To fulfill its obligations under this Agreement, the Contractor shall have the right to undertake activities either by itself or through subcontracting arrangements as per PCC.
- e. To exercise such other rights as Employer may determine as being necessary or desirable and which it consents to in writing, for the purposes incidental and necessary for the provision of the Services having regard to the needs of the Consumers.
- f. (i) Undertake Construction works in accordance with contract
(ii) To receive payment based on the accepted bid of the Contractor
- g. Provided that the Contractor may, with the prior written consent of Employer, carry out suitable temporary or permanent modifications to the Existing Assets.

11.7 Actions in support of Contractor

Employer ensures the maintenance of law and order at the Project Facilities, and provide, at no cost to the Contractor such police personnel, as may be necessary, for the maintenance or

reinstatement of law and order at the Project Facilities and further alert and warn Contractor of any information or intelligence it may receive relating to a threat towards the security of the Project Facilities.

11.8 Specific Obligations

Employer shall

a. Provide the Contractor the permission to repair and replace the Project Facilities which the Contractor is responsible for, and the right to lay new water mains on behalf of Employer, including the right of way to carry out the Services;

b. Handover to the Contractor, the “as-built drawings” and all other technical and financial information of the Existing Assets and Consumers in the Service Area as available on the Appointed Date;

c. Receive applications for approvals of new connections, reconnection and disconnections in the Service Area and inform the Contractor for further action within a reasonable time;

d. During the period upto taking over of each zone of selected area, the obligation to supply water to the Service Area shall be that of the Employer and the Contractor shall not be held responsible for the same;

11.9 Continue existing/ arrange for electricity connection / disconnection for project facilities as per requirements of Contractor and pay the bills to service provider.

11.10 The Employer shall allow the Contractor to utilize the space (or spaces) for stores and workshop on free occupation basis.

11.11 Employer shall provide spaces from the available premises.

11.12 Cost of Obligation

a. Employer to share hundred percent of Employer’s estimated cost for Construction Works.

b. Replacement cost of old pipes of after Final take Over date unless it is replaced by Contractor during Construction period.

c. Energy cost for entire contract period for pumps & project

facilities handed over to Contractor.

d. Bulk water cost for entire contract period in project areas.

e. Payment to Contractor as per contract.

f. Road repairs & restoration fees to concerned authorities during contract period.

g. Capital cost outside the project area for improvement of water supply or for whatsoever reasons.

h. To full fill the Employer obligation as per this contract.

11.13 Water Shortage Period

1 A Water Shortage Period shall commence when Employer has failed to supply designated quantity of Treated Water to the reservoirs for zones of selected area for any of the following reasons not attributable to the negligence of Contractor: If supply is reduced by more than 10% on any given date shall be termed as water shortage.

i. Employer notifying the commencement of a Water Shortage Period or

ii. The determination by Contractor of shortage of water and certification thereof by the Employer

Employer shall notify the commencement of a Water Shortage Period to the Consumers through suitable means, which shall be deemed to have commenced from the first hour of such notification.

The Water Shortage Period shall cease when the Employer notifies and supplies the designated quantity of Treated Water to the zone of selected area.

Provided that during a Water Shortage Period or otherwise, Employer shall have rights to direct the Contractor to modify the water supply and regulate the allocation of potable water among the Consumers.

11.14 O&M of a zone / existing project facilities till the initial take over date.

C Payment

12. Contract Price	<p>12.1 The Contract Price shall be included in Section 4, Bid Forms.</p> <p>12.2 Subject to GCC Sub-Clauses 10.2, 11.2 and 43 hereof, the Contractor shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract.</p> <p>12.3 Payment</p> <p>The Contractor must understand clearly that the rates quoted are for completed items of work & include all taxes, levy & duties etc., cost due to labour, all leads & lifts involved & scaffolding, plants, supervision, service roads, dewatering, power, etc. & to include all expenses to cover the cost of night & round the clock work as & when required & no claim for additional payment beyond the prices or rates quoted will be entertained. The contractor will not be entitled subsequently to make any claim on the ground of any representation or on any promise by any person or on the ground of any failure on his part to obtain all necessary information for the purpose of making, his tender & fixing the several prices & rates therein & shall not relieve him from any risks or liabilities arising out of or consequence upon the submission of the tender.</p>
13. Terms of Payment	<p>13.1 The Contract Price for the Design & Construction Works and O&M Services shall be paid as follows:</p> <p>(a) Design & Construction Works</p> <p>(i) Construction Works: Monthly bill payment as per unit price included in Bills Of Quantity against actual measurement; as per methods & terms defined in PCC.</p> <p>(ii) for every DMA established as per the size of DMAs submitted through number of connections; as per methods & terms defined in PCC</p> <p>(b) O&M Services:</p> <p>O&M payment shall be made from Initial take over date as per number of registered connections in all DMA's taken</p>

over by contractor for O&M

- (i) Fixed Fee: a definite lump sum to be paid in two installments i.e. 50% of fixed fees monthly and balance fees will be paid quarterly along with performance fees as defined in Schedule 5 of PCC;
- (ii) Performance Fee: as per Schedule 5 of PCC shall be paid quarterly.

13.1. (i) The Payment for Construction Works

The payment of monthly R.A. bill is normally released in 30 days from the date of acceptance of the bill recorded in the measurement book. No excuse for delay in completion of work / prolongation of the contract shall be entertained on account of the reason of delay in payment. The bidder therefore, must take into consideration of his / their financial capability to carry out and to continue the work without any constraints.

It shall be the contractual obligations on the part of the contractor to submit with each running bill photocopies of the

-
- (i) Purchase vouchers / bills for the main items purchased for the works like CI/DI/MS/RCC/PSC Pipes, meter, manhole frame and covers, footrests, sluice valves, fire hydrants and other fixtures and accessories used in the works;
 - (ii) Guarantee certificates, wherever applicable;
 - (iii) Manufacturer's test reports of cement, steel, MS plates, sluice valves etc.;
 - (iv) Insurance policy for the labour working at site.
 - (v) Copy of the inspection note / observations / compliance of the observations shall be placed on record with the running bills before passing of running account bills.
 - (vi) At the time of final bill, clearance from state labour department will be required.
 - (vii) Labour license from labour office for construction works.

The original vouchers shall be produced before the Engineer for verification, as and when desired by him.

13.2 Monthly Statements

13.2.1 The Contractor shall submit to the Engineer monthly statements of the value of Works and Services in GCC Sub-Clause 13.1 (a) to (a) in separate items for the corresponding monthly in a form acceptable to the Engineer.

13.2.2 The Engineer shall check the Contractor's monthly statement and certify within twenty one (21) days the amount to be paid to the Contractor.

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

13.3 Payments shall be adjusted for deductions for advance payments and retention. The Employer shall pay the Contractor the amounts certified by the Engineer in accordance with GCC Clause 13.2, within forty two (42) days from the date of each certificate. If the Employer makes a late payment, the Contractor shall be paid interest on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made at the prevailing rate of interest as mentioned in PCC.

13.4 If an amount certified is increased in a later certificate of payment or as a result of an award by the Dispute Board, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute. The interest rate shall be determined as per GCC Sub-Clause 13.3.

13.5 The Contractor shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract.

13.6 No payment made by the Employer herein shall be deemed to constitute acceptance by the Employer of any part(s) thereof.

13.7 In the event that the Employer fails to make any payment by its respective due date or within the period set forth in the Contract, the Employer shall pay to the Contractor interest on the amount of such delayed payment at the rate(s) stated in GCC Sub Clause 13.3 for the period of delay until payment has been made in full, whether before or after judgment or arbitration award.

13.8 The currency or currencies in which payments are made to the Contractor under this Contract shall be specified in the PCC subject to the general principle that payments will be made in the currency or currencies in which the Contract Price has been stated in the Contractor's bid.

13.9 Lump sums in estimates

When the estimate on which a tender is made includes lump sums in respect of parts of the work the contractor shall be entitled to payment in respect of the items of work involved or the part of work in question at the same rates as are payable

	<p>under this contract of each item, or if the part of work in question is not in the option of the Engineer capable of measurement, the Engineer may as his discretion pay the lump sum amount entered in the estimate and the certificate in writing of the Engineer shall be final and conclusive against the contractor with regard to any sum or sums payable to him under the provision of this clause.</p> <p>13.10 Contractor's percentage whether applied to net or gross amount of bill</p> <p>The percentage referred to in the contract price shall be deducted from/ added to the gross of the bill before deducting the value of any stock issued.</p> <p>13.11 All quarry fees, royalties and ground rent for stacking materials if any should be paid by the contractor.</p> <p>(a) When the work is carried in the proximity to any place where there is a risk or drawing all necessary equipment shall be provided and kept ready for use and all necessary steps shall be taken for the prompt rescue of any person in danger.(c) Adequate provisions shall be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.</p> <p>13.12 Method of payment</p> <p>Payments to contractors shall be made as defined in PCC</p>
<p>14. Measurement</p>	<p>14.1 DMA Establishment Works will be measured on number of connections in respective DMA established by the Contractor and approved by the Engineer as per PCC.</p> <p>14.2 O&M Services will be measured in accordance with the methodology described in PCC</p> <p>14.3 Construction Works will be measured on the basis of the agreed Work Orders and in accordance with the unit of measurement used for the unit prices of items included in the Bill of Quantities as per PCC</p> <p>14.3.1 Payment on intermediate certificate to be regarded as advances</p> <p>No payment shall be made for any work, estimated to cost less than rupees one thousand till after the whole of work shall have been completed and a certificate of completion given. But in the case of works estimated to cost more than rupees one thousand the Contractor shall on submitting a monthly bill therefore be entitled to receive payment proportionate to the part of the work than approved and passed by the Engineer, whose certificate of such approval and passing of the sum so payable</p>

shall be final and conclusive against the Contractor. All such intermediate payments shall be regarded as payment by way of advance against the final payment only and not as payment for work actually done and completed and shall not preclude the Engineer from requiring any bad, unsound imperfect or unskillful work to be removed or taken away and reconstructed, or re-erected nor shall any such payment be considered as an admission of the due performance of the contract or any part thereof in any respect or the occurring of any claim nor shall it conclude, determine or effect in any other way powers of the Engineer as to the final settlement and adjustment of the accounts or otherwise, or in any other way vary or effect the contract. The final bill shall be submitted by the Contractor within one month of the date fixed for the completion of the work, otherwise the Engineer-in Charges certificate of the measurements and of the total amount payable for the work shall be final and binding on all parties.

14.3.2 Payment on reduced rates on account of items of work not accepted as completion as per discretion of Engineer

The rates of several items of work estimated to cost more than Rs. 1000/- agreed to within, shall be valid only when the item concerned is accepted as having been completed fully in accordance with the sanctioned specifications. In case where the item of work are not accepted as so completed by the Engineer-in Charge may make payment on account of such item at such reduced rates as he may consider reasonable in the preparation of final or on account bills.

14.3.3 Bill to be submitted monthly

A bill shall be submitted by the Contractor in each month on or before the date fixed by the Engineer for all work executed in the previous month and the Engineer shall take or cause to be taken the requisite measurement for the purpose of having the same verified and the claim, so far as it is admissible, shall be adjusted, if possible, within 10 days from the presentation of the bill. If the contractor does not submit the bill within the time fixed as aforesaid, the Engineer may depute a subordinate to measure up the said work in the presence of the contractor or his duly authorized agent whose countersignature to the measurement list shall be sufficient warrant, and the Engineer may prepare a bill from such a list which shall be binding on the contractor in all respects.

14.3.4 Bill to be on printed forms

The contractor shall submit all bills on the printed forms to be had in the application at the office of the Engineer. The charges to be made in the bill shall always be entered at the rates

	<p>specified in the tender or in the case of any extra work ordered in pursuance of these conditions, and not mentioned or provided for in the tender at the rates hereinafter provided for such work.</p>
<p>15. Variations</p>	<p>15.1 Items of the Construction Works for which no rate or price has been entered in the Bill of Quantities will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract except if it is a Variation ordered by the Engineer in accordance with PCC.</p> <p>15.2 The Contractor shall provide the Engineer with a quotation for carrying out the Variation when requested to do so by the Engineer. The Engineer shall assess the quotation, which shall be given within seven days (7) of the request or within any longer period stated by the Engineer and before the Variation is ordered. If the work in the Variation corresponds with an item description in the Bill of Quantities the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work. If the Contractor's quotation is unreasonable, the Engineer may order the Variation and make a change to the Contract Price, which shall be based on the Engineer's own forecast of the effects of the Variation on the Contractor's costs</p>
<p>16. Advance Payment</p>	<p>16.1 The Employer shall make advance payment to the Contractor of the amounts and by the date stated in the PCC, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest will not be charged on the advance payment</p> <p>16.2 The Contractor is to use the advance payment only to pay for equipment, materials, and mobilization expenses required specifically for the execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Engineer.</p> <p>16.3 The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works and Services on a payment basis as indicated in the PCC.</p>

	<p>16.4 All amounts whatsoever which the contractor is liable to pay to the Corporation in connection with the execution of the work including the amount payable in respect of (i) materials and or stores supplied /issued hereunder by the Corporation to the Contractor (ii) hire charges in respect of heavy plant, machinery and equipment given on hire by the Corporation to the contractor for execution by him of the work and/or on which advances have been given by the Corporation to the contractor shall be deemed to be arrears of the Land Revenue and the Corporation may without prejudice to any other rights and remedies of the Corporation recover the same from the contractor as arrears of revenue.</p>
<p>17. Price Adjustment</p>	<p>17.1 Prices shall be adjusted for fluctuations in the cost of inputs only if provided for in the PCC. If so provided, the amounts certified in each payment certificate, before deducting for Advance Payment, shall be adjusted by applying the respective price adjustment factor to the payment amounts due and shall be paid as defined in PCC.</p>
<p>18. Retentions and Deductions</p>	<p>18.1 The Employer shall retain a percentage indicated in the PCC from each payment due to the Contractor for Design & Construction Works and O&M services.</p> <p>18.2 On completion of the Works & Services end of the O&M Phase and the calculation of the Final Contract Achievement in Section 6, Employer's Requirements, the total amount retained as per GCC Sub- Clause 18.1 shall be repaid to the Contractor.</p> <p>18.3 Penalty & Deductions against failure to meet project milestones during Design & Construction Phase shall be as per employer's requirement.</p> <p>18.4 On the date stated in taking over certificate as per GCC sub clause 33. Design & Construction Works and O&M as per GCC Sub-Clause 18.4, fifty percent (50%) of the total amount retained shall be immediately repaid to the Contractor and the other fifty percent (50%) shall be repaid six (6) months thereafter and after the Engineer has certified that all defects, if any, notified by the Engineer to the Contractor have been corrected before the end of this period.</p> <p>18.6 At the final take over date, the Contractor may substitute retention money with an "on demand" Bank guarantee.</p> <p>18.7 The deduction on account of performance standards as per PCC Schedule 5 is non refundable deduction for contractor</p> <p>18.9 If key personal are not available for continuous period of 15 days, upto 10 % of DMA establishment / O&M services payment</p>

will be deducted from Contractor payment for the corresponding period.

18.10 Road Maintenance and Inter-Utility Code of Conduct

The contractor shall be under contractual obligations to follow the provisions under the contract for road maintenance and inter-utility services. Under the contract as stipulated in the conditions contractor is required to provide proper G.I. sheet barricading, provide board indicating the name of work etc, to take up the work in the limited stretches, removing the surplus earth / malba so as to avoid any bottle neck to the flow of traffic and inconvenience to the public, and take all necessary precautions for the safety of the trenches, workers, prevention of damage to the property, service etc. etc. Proper road maintenance and inter-utility code of contract to be followed by the contractor shall be subjected to the check by the Engineer of the area or any of the other authorities. In case of any lapse noticed necessary penalty as per details given hereunder shall be imposed on the contractor, which shall be final and binding.

a)	Non-installation of Boards on either ends of trenches	Rs. 500/- per day till implementation.
b)	Non shoring of walls of trenches to prevent collapse of the excavated portion. (Beyond 1.5 m and where proper stepping is not provided.)	Rs. 1000/- per day till the shoring is fixed.
c)	Digging of trenches beyond a stretch of 500 m for Employer and others while 1000m in case of telephones.	Rs. 500/- per day till the damage is restored.
d)	Non barricading of trenches with the depth of more than 1.5 meter.	Rs. 500/- per day till completed.
e)	Excavation of trenches across and along roads during day time(8 AM to 8 PM) without permission	Rs. 500/- per day
f)	Non removal of excess earth and other stones etc. which are causing inconvenience to the road users	Rs. 1000/- per day till completed.
g)	Non consolidating the earth while back filling into the trenches to the required level	Rs. 500/- per day till completed.
h)	Non-submission of prescribed forms for re-instatement of trenches	Rs. 500/- per day
i)	Road cutting without permission	Rs. 1250/- per day
j)	Non-stacking of materials pipe etc. in an orderly manner during execution causing inconvenience to the road users.	Rs. 1000/- .
k)	Failure to observe provisions of para 5.4.3 of the code.	Rs. 250/- till completed

19. Final Statement and Final Payment Certificate

19.1 The Contractor shall supply the Engineer with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Engineer shall issue a Defects Liability

	<p>Certificate and certify any final payment that is due to the Contractor within fifty-six (56) days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer shall issue within fifty-six (56) days a schedule that states the scope of the corrections or additions that are necessary. If the Final Statement is still unsatisfactory after it has been resubmitted, the Engineer shall decide on the amount payable to the Contractor and issue a Final Payment Certificate.</p>
<p>20. Discharge</p>	<p>20.1 Upon submission of the Final Statement, the Contractor shall give to the Engineer, a written discharge confirming that the total of the Final Statement represents full and final settlement of all monies due to the Contractor arising out of or in respect of the Contract. Provided that such discharge shall become effective only after the payment due under the Final Payment Certificate issued pursuant to GCC Clause 19 has been made and the performance security referred to in GCC Sub-Clause 21.3, if any, has been returned to the Contractor.</p>
<p>21. Securities</p>	<p>21.1 Issuance of Securities</p> <p>The Contractor shall provide the securities specified below in favor of the Employer at the times, and in the amount, manner and form specified below.</p> <p>21.2 Advance Payment Security</p> <p>21.2.1 The Contractor shall, within twenty-eight (28) days of the notification of contract award, provide a security in an amount equal to the advance payment calculated in accordance with the PCC, and in the same currency or currencies.</p> <p>21.2.2 The security shall be in the form provided in the bidding documents or in another form acceptable to the Employer. The amount of the security shall be reduced in proportion to the value of the Works and Services executed by and paid to the Contractor from time to time, and shall automatically become null and void when the full amount of the advance payment has been recovered by the Employer. The security shall be returned to the Contractor immediately after its expiration.</p> <p>21.3 Performance Security</p> <p>21.3.1 The Contractor shall, within twenty-eight (28) days of the notification of contract award, provide a security for the due performance of the Contract in the amount specified in the PCC.</p> <p>21.3.2 The security shall be denominated in the currency or currencies of the Contract, or in a freely convertible currency</p>

	<p>acceptable to the Employer, and shall be in one of the forms of bank guarantees provided in the bidding documents, as stipulated by the Employer in the PCC, or in another form acceptable to the Employer.</p> <p>21.4 Unless otherwise specified in the PCC, the security shall be reduced by half on the date of completion of the take over date as per GCC sub clause 33. The Security shall become null and void, seventy two months after final take over date or one hundred and eighty (180) days after Taking Over certificates, whichever occurs first; provided, however, that if the Defects Liability Period has been extended on any part of the Works pursuant to GCC Sub-Clause 37.8 hereof, the Contractor shall issue an additional security in an amount proportionate to the Contract Price of that part. The security shall be returned to the Contractor immediately after its expiration.</p>
<p>22. Taxes and Duties</p>	<p>22.1 Except as otherwise specifically provided in the Contract, the Contractor shall bear and pay all taxes, duties, levies and charges assessed on the Contractor, its Subcontractors or their employees by all municipal, state or national government authorities in connection with the Works and Services in and outside of the country where the Site is located.</p> <p>22.2 If any tax exemptions, reductions, allowances or privileges may be available to the Contractor in the country where the Site is located, the Employer shall use its best endeavors to enable the Contractor to benefit from any such tax savings to the maximum allowable extent.</p> <p>22.3 For the purpose of the Contract, it is agreed that the Contract Price specified in the Contract Agreement is based on the taxes, duties, levies and charges prevailing at the date twenty-eight (28) days prior to the date of bid submission in the country where the Site is located. If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of Contract, which was or will be assessed on the Contractor, Subcontractors or their employees in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or deduction therefrom, as the case may be, in accordance with GCC Clause 44 hereof.</p> <p>22.4 Employer would indemnify Contractor for paying service tax liability over Contractor's remuneration or part of its remuneration. However Contractor shall be responsible for payment of service tax on services of sub-contractor appointed by Contractor.</p> <p>22.5 In case of materials that may remain surplus with the</p>

	contractor from those issued for the work contracted for, the date of ascertainment of the materials being surplus will be taken as the date of sale for the purpose of Sales Tax and the Sales Tax will be recovered on such sale
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D. Intellectual Property

23. Copyright	23.1 The copyright in all drawings, documents and other materials containing data and information furnished to the Employer by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Employer directly or through the Contractor by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.
24. Confidential Information	<p>24.1 The Employer and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this GCC Clause 24.</p> <p>24.2 The Employer shall not use such documents, data and other information received from the Contractor for any purpose other than the operation and maintenance of the Works. Similarly, the Contractor shall not use such documents, data and other information received from the Employer for any purpose other than the design, procurement of Plant, construction or such other work and services as are required for the performance of the Contract.</p> <p>24.3 The obligation of a party under GCC Sub-Clauses 24.1 and 24.2 above, however, shall not apply to that information which</p> <ul style="list-style-type: none">(a) now or hereafter enters the public domain through no fault of that party(b) can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party hereto(c) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality. <p>24.4 The above provisions of this GCC Clause 24 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Works or Services or any part thereof.</p>

24.5 The provisions of this GCC Clause 24 shall survive termination, for whatever reason, of the Contract.

E. Execution of Works and Services

25. Representatives	<p>25.1 Engineer</p> <p>If the Engineer is not named in the Contract, then within fourteen (14) days from the signing of the Contract, the Employer shall appoint and notify the Contractor in writing of the name of the Engineer. The Employer may from time to time appoint some other person as the Engineer in place of the person previously so appointed, and shall give a notice of the name of such other person to the Contractor without delay. No such appointment shall be made at such a time or in such a manner as to impede the progress of the Works and Services. Such appointment shall only take effect upon receipt of such notice by the Contractor. The Engineer shall represent and act for the Employer at all times during the performance of the Contract. All notices, instructions, orders, certificates, approvals and all other communications under the Contract shall be given by the Engineer, except as herein otherwise provided. All notices, instructions, information and other communications given by the Contractor to the Employer under the Contract shall be given to the Engineer, except as herein otherwise provided.</p> <p>25.1.1 Project Monitoring</p> <ul style="list-style-type: none">• Appointment of Project Management Consultant (PMC)<ul style="list-style-type: none">a. Employer has appointed to perform functions and duties or part of it as assign to Engineer.b. The term of the PMC shall continue till the completion of contract of PMC, or until such date as renewed thereon at the discretion of the Employer.c. In the event Employer decides not to renew the term of the PMC or in the absence of PMC for any reason whatsoever, Engineer shall assume the functions of the PMC.d. The PMC shall consult and seek approvals from Engineer, wherever deemed necessary, for discharge of its duties and functions.• Payments to PMC All fees, costs, charges and expenses payable to the PMC in accordance with the terms of its appointment shall be paid by Employer.
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However any expenses on account of field test or witness of test etc.i.e. travelling, accommodation out side the project city shall be responsibility of contractor

- Duties and Functions of the PMC

The PMC shall discharge its duties and functions substantially in accordance with the terms of reference set forth in PMC contract.

25.2 Key -Personal requirements (Mandatory Provisions)

1. In general, staffing levels and qualifications are to be decided by the Contractor apart from minimum and mandatory personnel requirements specified in in this section, the following minimum number of experienced key-personnel has to be available for entire project period for the scope of services under this assignment. The number of Key man-months for each position is to be understood as the absolute minimum requirement. Evidence of the physical presence of these listed staff members have to be provided in the quarterly Progress Reports. Non-availability of key persons shall result into imposition of penalty as per contract agreement.
2. It has to be understood that it might be necessary to bring significantly more specialists to the Site in order to achieve the objectives of the Contract. All costs of such additional personnel have to be included in the Contract Price.
3. Project Manager cum O & M specialist- having a minimum of 84 man-months of a person meeting the following minimum experience criteria shall be required during entire project duration:
 - (a) 15 years experience with water distribution networks
 - (b) Technical University degree, for example Water and Sanitary Engineering, Civil Engineering or Mechanical Engineering
 - (c) Project Management & operation Experience
 - (d) 10 years of developing county experience
 - (e) 5 years experience with 24x7 Water supply operations in large city
4. Water Loss / DMA and Pressure Management Specialist(s)- having a minimum of 84 man-months of one or more person(s) meeting the following minimum experience criteria shall be required during entire project duration:

(a) 7 years experience with water loss / NRW leakage reduction projects, particularly with pressure reducing valves, Hydarulic Modelling, controllers, data loggers and similar

(b) 2 years developing country experience

5. Leak Detection Specialist(s)- having a minimum of 84 man-months of one or more person(s) meeting the following minimum experience criteria:

(a) 7 years experience with leakage reduction projects, particularly with pressure reducing valves, controllers, data loggers and similar

(b) 2 years developing country experience

25.2.1 If the Project Manager and other Key -Personals is not named in the Contract, then within fourteen (14) days from the signing of the Contract, the Contractor shall appoint the Water Loss Manager and shall request the Employer in writing to approve the person so appointed. If the Employer makes no objection to the appointment within fourteen (14) days, the Water Loss Manager shall be deemed to have been approved. If the Employer objects to the appointment within fourteen (14) days giving the reason therefore, then the Contractor shall appoint a replacement within fourteen (14) days of such objection, and the foregoing provisions of this GCC Sub-Clause 25.2.1 shall apply thereto.

25.2.2 The Project Manager shall represent and act for the Contractor at all times during the performance of the Contract and shall give to the Engineer all the Contractor's notices, instructions, information and all other communications under the Contract. All notices, instructions, information and all other communications given by the Employer or the Engineer to the Contractor under the Contract shall be given to the Project Manager or, in its absence, its DMA Specialist, except as herein otherwise provided. The Contractor shall not revoke the appointment of the Project Manager and Other Key Personals without the Employer's prior written consent, which shall not be unreasonably withheld. If the Employer consents thereto, the Contractor shall appoint some other person as the Key - Personals, pursuant to the procedure set out in GCC Sub-Clause 25.2.1.

25.2.3 The Project Manager may, subject to the approval of the Employer which shall not be unreasonably withheld, at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such

	<p>delegation or revocation shall be subject to a prior notice signed by the Project Manager, and shall specify the powers, functions and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Employer and the Engineer.</p> <p>Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with this GCC Sub-Clause 25.2.3 shall be deemed to be an act or exercise by the Key -Personals.</p> <p>25.2.4 From the commencement of the Contract at the Site until completion of the O&MPhase, the Project Manager shall supervise all work done at the Site by the Contractor and shall be present at the Site throughout normal working hours except when on leave, sick or absent for reasons connected with the proper performance of the Contract. Whenever the Project Manager is absent from the Site, the DMA Specialist to act as deputy. Whatsoever be the reason all three key personal shall not leave the project city at same period and ensure the availability of minimum one key person at project city.</p> <p>25.2.5 The Employer may by notice to the Contractor object to any representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Employer, may behave inappropriately, may be incompetent or negligent, or may commit a serious breach of the Site regulations provided under GCC Sub-Clause 30.4. The Employer shall provide evidence of the same, whereupon the Contractor shall remove such person from the Site.</p> <p>25.2.6 If any representative or person employed by the Contractor is removed in accordance with GCC Sub-Clause 25.2.5, the Contractor shall, where required, promptly appoint a replacement.</p>
<p>26. Work Program</p>	<p>26.1 Contractor’s Organization</p> <p>At the start of the Mobilization Phase the Contractor shall supply to the Employer and the Engineer a chart showing the proposed organization to be established by the Contractor for carrying out the Works and Services. The chart shall include the identities of the key personnel and the curricula vitae of such key personnel to be employed as included in the Contractor’s Bid. The Contractor shall promptly inform the Employer and the Engineer in writing of any revision or alteration of such an organization chart. Failure by the Contractor to deploy the key personnel as included in the Contractor’s Bid within the period</p>

as specified in the Program of Performance in GCC Clause 26.2 entitles the Employer to deduct a penalty if indicated in the PCC.

26.2 Program of Performance

Within three (3) months from the start of the Design & Construction Phase, the Contractor shall submit to the Engineer a detailed program of performance of the Contract, made in a form to be agreed with the Engineer, and showing the sequence in which it proposes to design and carry out the Works and Services. The Contractor shall update and revise the program as and when appropriate or when required by the Engineer, but without modification to the Time for Completion given in the PCC and any extension granted in accordance with GCC Clause 48, and shall submit all such revisions to the Engineer.

26.3 Quarterly Progress Report

The Contractor shall monitor progress of all the activities specified in the program referred to in GCC Sub-Clause 26.2 above, and supply a quarterly progress report to the Engineer together with the quarterly statement as per GCC Sub Clause 13.2.

The progress report shall be in a form acceptable to the Engineer and shall indicate: (a) percentage completion achieved compared with the planned percentage completion for each activity; and (b) where any activity is behind the program, giving comments and likely consequences and stating the corrective action being taken.

26.4 Progress of Performance

If at any time the Contractor's actual progress falls behind the program of performance referred to in GCC Sub-Clause 26.2, or it becomes apparent that it will so fall behind, the Contractor shall, at the request of the Employer or the Engineer, prepare and submit to the Engineer a revised program, taking into account the prevailing circumstances, and shall notify the Engineer of the steps being taken to expedite progress so as to attain completion of the Works and Services within the Time for Completion under GCC Sub-Clause 9.2, any extension thereof entitled under GCC Sub-Clause 48.1, or any extended period as may otherwise be agreed upon between the Employer and the Contractor.

26.5 Procedures

The Contract shall be executed in accordance with the Contract Documents including the procedures given in the

	<p>Forms and Procedures in Section 6, Employer’s Requirements.</p> <p>The Contractor may execute the Contract in accordance with its own standard project execution plans and procedures to the extent that they do not conflict with the provisions contained in Section 6, Employer’s Requirements.</p>
27. Subcontracting	<p>27.1 The Contractor may subcontract activities listed in the PCC. Activities not in listed in the PCC may be subcontracted with the prior approval of the Engineer. Such approval by the Engineer to subcontract the activity shall not relieve the Contractor from any of its obligations, duties or responsibilities under the Contract.</p> <p>27.2 For items or parts of the Works and Services that are small as listed in the PCC, the Contractor may employ Subcontractors as it may select, at its discretion.</p> <p>27.3 Each sub-contract shall include provisions which would entitle the Employer to require the sub-contract to be assigned to the Employer under GCC Sub Clause 27.4 (if and when applicable), or in event of termination by the Employer under GCC Sub Clause 50.2.</p> <p>27.4 If a sub-contractor's obligations extend beyond the expiry date of the relevant Defects Liability Period and the Engineer, prior to that date, instructs the Contractor to assign the benefits of such obligations to the Employer, then the Contractor shall do so.</p>
<p>28. Design Responsibility</p>	<p>28.1 Specifications and Drawings</p> <p>28.1.1 The Contractor shall execute the basic and detailed design and the engineering work in compliance with Section 6, Employer’s Requirements, or where not so specified, in accordance with good engineering practice.</p> <p>The Contractor shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other technical documents that it has prepared, whether such specifications, drawings and other documents have been approved by the Engineer or not, provided that such discrepancies, errors or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the Employer.</p> <p>28.1.2 The Contractor shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designated by or on behalf of the Employer, by giving a notice of such disclaimer to the Engineer.</p> <p>28.2 Codes and Standards</p>

Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date twenty-eight (28) days prior to date of bid submission shall apply unless otherwise specified. During Contract execution, any changes in such codes and standards shall be applied subject to approval by the Employer and shall be treated in accordance with GCC Clause 47.

28.3 Approval/Review of Technical Documents by Engineer

28.3.1 The Contractor shall prepare and furnish to the Engineer the documents mentioned in Section 6, Employer's Requirements for its approval or review.

Any part of the Works covered by or related to the documents to be approved by the Engineer shall be executed only after the Engineer's approval thereof.

GCC Sub-Clauses 28.3.2 through 28.3.7 shall apply to those documents requiring the Engineer's approval, but not to those furnished to the Engineer for its review only.

28.3.2 Within fourteen (14) days after receipt by the Engineer of any document requiring the Engineer's approval in accordance with GCC Sub-Clause 28.3.1, the Engineer shall either return one copy thereof to the Contractor with its approval endorsed thereon or shall notify the Contractor in writing of its disapproval thereof and the reasons therefore and the modifications that the Engineer proposes.

If the Engineer fails to take such action within the said fourteen (14) days, then the said document shall be deemed to have been approved by the Engineer.

28.3.3 The Engineer shall not disapprove any document, except on the grounds that the document does not comply with the Contract or that it is contrary to good engineering practice. If the Engineer disapproves a document, he shall specify the reasons for his decision.

28.3.4 If the Engineer disapproves the document, the Contractor shall modify the document and resubmit it for the Engineer's approval in accordance with GCC Sub-Clause 28.3.2. If the Engineer approves the document subject to modification(s), the Contractor shall make the required modification(s), whereupon the document shall be deemed to have been approved.

28.3.5 If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the Engineer of any document and/or any modification(s) thereto that cannot be settled between the

	<p>parties within a reasonable period, then such dispute or difference may be referred to a Dispute Board for determination in accordance with GCC Sub-Clause 53.3 hereof. If such dispute or difference is referred to a Dispute Board, the Engineer shall give instructions as to whether and if so, how, performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the Engineer's instructions, provided that if the Dispute Board upholds the Contractor's view on the dispute and if the Employer has not given notice under GCC Sub-Clause 53.3 hereof, then the Contractor shall be reimbursed by the Employer for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Dispute Board shall decide, and the Time for Completion shall be extended accordingly.</p> <p>28.3.6 The Engineer's approval, with or without modification of the document furnished by the Contractor, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Engineer.</p> <p>28.3.7 The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Engineer an amended document and obtained the Engineer's approval thereof, pursuant to the provisions of this GCC Sub-Clause 28.3.</p> <p>If the Engineer requests any change in any already approved document and/or in any document based thereon, the provisions of GCC Clause 47 shall apply to such request.</p>
<p>29. Customs</p>	<p>29.1 The Contractor shall, at its own expense, handle all imported materials and Contractor's equipment at the point(s) of import and shall handle any formalities for customs clearance, subject to the Employer's obligations under GCC Sub-Clause 11.4, provided that if applicable laws or regulations require any application or act to be made by or in the name of the Employer, the Employer shall take all necessary steps to comply with such laws or regulations. In the event of delays in customs clearance that are not the fault of the Contractor, the Contractor shall be entitled to an extension in the Time for Completion, pursuant to GCC Clause 48.</p>
<p>30. Execution of Works and Services</p>	<p>30.1 Setting Out/Supervision</p> <p>30.1.1 Bench Mark</p> <p>(a) The Contractor shall be responsible for the true and</p>

proper setting-out of the Works in relation to benchmarks, reference marks and lines provided to it in writing by or on behalf of the Employer.

(b) If, at any time during the progress of the Works, any error shall appear in the position, level or alignment of the Works, the Contractor shall forthwith notify the Engineer of such error and, at its own expense, immediately rectify such error to the reasonable satisfaction of the Engineer.

30.1.2 Contractor's Supervision

The Contractor shall give or provide all necessary superintendence during the installation of the Works, and the Water Loss Manager or its deputy shall be constantly on the Site to provide full-time superintendence of the installation. The Contractor shall provide and employ only technical personnel who are skilled and experienced in their respective callings and supervisory staff who are competent to adequately supervise the work at hand.

30.1.3 Site Office

The contractor shall construct a temporary site office for supervisory staff of the department and shall also provide necessary furniture including electricity as per requirement of the Engineer- in-charge. No extra payment for this shall be made on this account.

Employer may consider request for space required for storage of pipes, equipments and other material, etc if any space constraints are encountered at site of works. However, Tenderer himself will have to identify suitable land / premises under the control of Employer and shall have to segregate the same if required. No extra charges of any kind will be payable to the Contractor on this account. At the same time Employer shall not recover any storage charges from the contractor. After the successful completion of works, it will be the responsibility of the contractor to remove all the material / pipes / equipment from the said premises as per the directions of Engineer before final payments are released.

30.1.4 Contractor to supply plant, ladder, scaffolding etc

The contractor shall supply at his own cost all materials (except such special material, if any as many in accordance with the contract, be supplied from the Engineering Departmental Stores), plant tools appliances implements, ladders, cordage, tackle scaffolding and temporary works requisite or proper for the proper execution of the work, whether, in the original,

altered or substituted form and whether including in the specification or other documents forming part of the contract or referred to in these conditions or not and which may be necessary for the purpose of satisfying or complying with the requirement of the Engineer in -Charge as to any matter as to which these conditions, he is entitled to be satisfied, or which he is entitled to require together with the carriage therefore to and from the work. The contractor shall also supply without charge the requisite number of persons with the means and materials necessary for the purpose of setting out works and counting, weighing and assisting in the measurement or examination at any time and from time to time of the work or the material, failing which the same may be provided by the Engineer at the expenses of the contractor and the expenses may be deducted from any money due to the contractor under the contract or from his security deposit or the proceeds of sale thereof, or of a sufficient portion thereof. The contractor shall provide all necessary fencing and lights required to protect the public from accidents, and shall also be bound to bare the expenses of defense of every suit, action or other legal proceedings, that may be brought by any person for injuries sustained obeying to neglect of the above precautions, and to pay any damages and costs which may be avoided in any such suit actions or proceedings to any such person, or which may with consent of the contractor to be paid for compromising any claim by any such person. List of machinery in contractor's possession and which they propose to use on the work should be submitted along with the tender.

(a) the contractor shall provide suitable scaffolds and

working platforms gangways and stairways and shall comply with the following regulations in connection therewith: -(a)Suitable scaffolds shall be provided for workmen for all works that cannot be safely done from a ladder or by other means.(b)A scaffold shall not be constructed, taken down or substantially altered except- (i)Under the supervision of a competent and responsible person: and

(i)As far as possible by competent workers possessing adequate experience in this kind of work. (c) All scaffolds and appliances connected therewith and ladders shall (i)Be sound of material, (ii)Be of adequate strength having regards to the loads and strains to which they will be subjects, and (iii)Be maintained in proper condition (d) Scaffolds shall be so constructed that no part thereof can

be displaced in consequence of normal use. (e) Scaffolds shall not be overloaded and so far as practicable the load shall be evenly distributed. (f) Before installing lifting gear on scaffolds special precautions shall be taken to ensure the strength and stability of the Scaffolds. (g) Scaffolds shall be periodically inspected by a competent person. (h) Before allowing a scaffold to be used by his workmen the contractor shall, whether the scaffold has been erected by his workmen or not, take steps to ensure that it complies fully with the regulation herein in specified. (i) Working platform, gangways, stairways shall (ii) Be so constructed that no part of thereof can sag unduly or unequally. (iii) Be so constructed and maintained having regard to the prevailing conditions as to reduce as far as practicable risks of persons tripping or slipping, and (iv) Be kept free from any unnecessary obstruction. (j) In case of working platform, gangway, working places and stairways at a height exceeding three meters. (i) Every working platform and every gangway shall be closely boarded unless other adequate measures are taken to ensure safety. (ii) Every working platform and gangway shall have adequate width and (iii) Every working platform, gangway, working place and stairway shall be suitably fenced. (k) Every opening in the floor of a building or in a working platform shall accept for the time and to the extent required to allow the excess of persons for the transport for shifting of materials to be provided with suitable means to prevent the fall of persons or materials. (l) When persons are employed on roof where there is a danger of falling from a height exceeding 3 meters. Suitable precautions shall be taken to prevent the fall of persons or material. (m) Suitable precautions shall be taken to prevent persons being struck by articles, which might fall from scaffolds or other working places. (n) Safe means of access shall be provided to all working platforms and other working places. (o) The contractor(s) will have to make payments to the laborers as per minimum wages Act.

(b) The contractor shall comply with the following regulations as regards the hoisting appliances to be used by him. (a) Hoisting machine and tackle, including the attachments anchorages and supports shall, (i) Be of good mechanical construction, sound material and adequate strength and free from patent defect and (ii) Be kept in good repair and in working order. (b) Every rope used in hoisting or lowering materials or as a mean of suspension shall be of suitable quality and adequate strength and free from patent defect. (c) Hoisting machines and tackle shall

be examined and adequately tested after erection on the site and before used and be reexamined in position at intervals to be prescribed by the Corporation. (d)Every chain, ring, hook, shackle swivel and pulley block used in hoisting and lowering materials or as a mean of suspension shall be periodically examined. (e)Every crane driver or hoisting appliance Contractor shall be properly qualified. (f)No person who is below the age of 18 years shall be control of any hoisting machine, including any scaffold which, or give signals to the Contractor. (g)In case of every hoisting machine and of every chain, ring, hook, shackle, swivel pulley block used in hoisting or Lowering or as a mean of suspension, the safe working load shall be as ascertained by adequate means.

(a)Every hoisting machine and all gear referred to in preceding regulation shall be plainly marked with the safe working load.(b)In the case of a hoisting machine having a variable safe working load each safe working load and the condition under which it is applicable shall be clearly indicated.(c)No part of any hoisting machine or of any geared referred to in regulation (g) above shall be loaded beyond the safe working load except for the purpose of testing.(d)Motors, gearing transmissions, electric wiring and other dangerous part of hoisting appliances shall be provided with efficient safeguards.(e)Hoisting appliances shall be provided with such means as will reduce to minimum, and the risk of the accidental descent of a load (f) Adequate precautions shall be taken to reduce to a minimum the risk of any part of a suspended load becoming accidentally displaced

30.2 Staff and Labor

30.2.1 Engagement of Staff and Labor

(a) Except as otherwise stated in Section 6, Employer's Requirements, the Contractor shall make arrangements for the engagement of all staff and labor, local or otherwise, and for their payment, housing, feeding and transport.

(b) The Contractor shall employ the key experts staff named in the Contractor's Bid, to carry out the functions stated in Section 6, Employer's Requirements. However, the Contractor may replace the key staff in the Contractor's Bid provided that their relevant qualifications and abilities are substantially equal or

better than those in the Contractor's Bid and provided further, that the Engineer approves the same.

(c) The Contractor shall provide and employ on the Site in the installation of the Works and Services such skilled, semi-skilled and unskilled labor as is necessary for the proper and timely execution of the Contract. The Contractor is encouraged to use local labor that has the necessary skills.

(d) The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the entry of all labor and personnel to be employed on the Site into the country where the Site is located. The Employer will, if requested by the Contractor, use his best endeavors in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national or government permission required for bringing in the Contractor's personnel.

(e) The Contractor shall at its own expense provide the means of repatriation to all of its and its Subcontractor's personnel employed on the Contract at the Site to the place where they were recruited or to their domicile. Its shall also provide suitable temporary maintenance of all such persons from the cessation of their employment on the Contract to the date programmed for their departure. In the event that the Contractor defaults in providing such means of transportation and temporary maintenance, the Employer may provide the same to such personnel and recover the cost of doing so from the Contractor.

30.2.2 Removal of Staff

The Engineer may request the Contractor in writing to remove any member of the Contractor's staff and labor, including the Contractor's key staff, stating the reasons therefore, and the Contractor shall ensure that the person leaves the Site within seven (7) days and has no further connection with the work under the Contract. The Contractor must replace the key staff within 15 days from receipt of the Engineer's written request. Failure to do so entitles the Employer to deduct a penalty if specified in the PCC.

30.2.3 Persons in the Service of Employer

The Contractor shall not recruit, or attempt to recruit, staff and labor from amongst the Employer's Personnel or representatives.

30.2.4 Labor Laws

- (a) The Contractor shall comply with all the relevant labor Laws applicable to the Contractor's personnel, including laws relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights.
- (b) The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous or disorderly conduct or behavior by or amongst its employees and the labor of its Subcontractors.
- (c) The Contractor shall, in all dealings with its labor and the labor of its Subcontractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the employment of labor.

30.2.5 Rates of Wages and Conditions of Labor

- (a) The Contractor shall pay rates of wages, and observe conditions of labor, which are not lower than those established for the trade or industry where the work is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by Employers whose trade or industry is similar to that of the Contractor.
- (b) The Contractor shall inform the Contractor's personnel about their liability to pay personal income taxes in the Country in respect of such of their salaries, wages and allowances as are chargeable under the laws for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws.
- (c) Wages to be paid to the skilled and unskilled labourers engaged by the Contractor. The contractor shall pay the labourers skilled and unskilled according to the wages prescribed by the Minimum Wages Act of 1948 applicable to the area in which the work of the contract is located. The contractor shall comply with the provisions of the Apprentices Act 1961 and the rules and Orders issued there under from time to time, if he fails to do so, his failure will be a breach of the contract and the Engineer, may in his discretion, cancel the contract. The

contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provision of Act. The contractor shall pay the labourers skilled and unskilled according to wages prescribed by Minimum Wages Act applicable to the area in which the work lies.

d. In case of any disputes with labour (skilled or unskilled) and charges are claimed against the contractor, the Engineer shall have the full authority to deduct the same from the bill of the contractor, so as to enable him to settle the disputes.

30.2.6 Working Hours

(a) No work shall be carried out on the Site on locally recognized days of rest, or outside the normal working hours stated in the PCC, unless:

(i) the Engineer gives consent, or

(ii) the work is unavoidable, or necessary for the protection of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer.

(b) If and when the Contractor considers it necessary to carry out work at night or on public holidays so as to meet the Time for Completion and requests the Engineer's consent thereto, the Engineer shall not unreasonably withhold such consent.

(c) This GCC Sub-Clause 30.2.6 shall not apply to any work which is customarily carried out at night or by rotary or double-shifts as stated in the PCC. For this reason, the Employer's consent is deemed granted for all leak detection and related activities which are necessarily conducted during night hours.

(d) The work is likely to be executed during night also. Nothing extra shall be paid on account of it.

30.2.7 Facilities for Staff and Labor

(a) Except as otherwise stated in Section 6, Employer's Requirements, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's personnel. The Contractor shall also provide facilities for the Employer's personnel as stated in the Specification.

(b) The Contractor shall not permit any of the Contractor's personnel to maintain any temporary or permanent living quarters within the structures forming part of

the permanent works.

(c) Labour Camp and Hutments: It shall be the responsibility of the contractor to make his own arrangement for labour camp and hutments at the site. In case adequate space is available, the contractor shall provide labour camps there. Employer shall not recover any space charges from the contractor. If the space available is not sufficient to house the labour camp, the contractor shall arrange the land beyond the site as per his requirement. The Employer may extend help in getting permissions from the land owning agencies but it shall be the responsibility of the contractor for arranging the same at his own cost. No excuse whatsoever shall be entertained.

On completion of the work the contractor shall remove hutments failing which the department will dismantle and clear the site at his risk and cost.

The contractor shall at all the times during the progress of work take all requisite precautions and use his best endeavors for preventing any riotous or unlawful behavior by or among the workers and other employees at the work and shall preserve peace and protection of the inhabitants and the security of property in the neighborhood of the work.

If the contractor or his working people or servants break, deface, injure or destroy any part of building in which they may be working, or any building, road, road curb, fence, enclosure, water pipe, cables, drains electric or telephone post or wires, trees, grass or grasslands, or cultivated ground contiguous to the premises on which the work or any part is being executed or if any damage shall happen to the work while in progress, from any cause whatsoever, the contractor shall make the same good at his own expense or in default the Engineer cause the same to be made good by other workman and deduct the expense from any sums that may be due or at any time thereafter may become due to the contractor, or from his security deposit or the proceeds of sale thereof or of a sufficient portion thereof.

30.2.8 Health, Safety & Welfare

(a) Compensation under Workmans Compensation Act:

The contractor shall be responsible for and shall pay any compensation to his workmen payable under the WorkmensCompensation Act 1923 (VIII of 1923) (hereinafter called the said Act)for injuries caused to the workmen. If such compensation is payable paid by corporation as principal under sub section (1) of section 12 of the said Act on behalf of the contractor under subsection (2) of the said section. Such compensation shall be recovered from contractor amount or through performance security.

(b) the contractor shall be responsible for and shall at the expenses of providing medical aid to any workmen who may suffer abodily injury as a result of an accident. If Corporation does it and incurs expenses the same shall berecoverable from the contractor forthwith and such expensededucted from the contractor without prejudice to any other remedy of Corporation for any amount due or that may be due to the contractor.

(c) The contractor shall provide all necessary personal safety equipment's and first aid apparatus available for use of persons employed on site and shall maintain the same condition suitable for immediate use at any time and shall comply with the following regulations in connection therewith.(a) The workers shall be required to use the equipment so provide by the contractor shall take adequate steps to ensure proper use of the equipment by those concerned.

(d) The Contractor shall at all times take all reasonableprecautions to maintain the health and safety of the Contractor's personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer'spersonnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.

(e) The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the performance of the Contract, the Contractor shall provide whatever is required by this person to exercise this

responsibility and authority.

(f) The Contractor shall send, to the Engineer, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Engineer may reasonably require.

30.2.9 Funeral Arrangements

In the event of the death of any of the Contractor's personnel or accompanying members of their families, the Contractor shall be responsible for making the appropriate arrangements for their return or burial, unless otherwise specified in the SCC

30.2.10 Records of Contractor's Personnel

The Contractor shall keep accurate records of the Contractor's personnel, including the number of each class of Contractor's personnel on the Site and the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis in a form approved by the Engineer and shall be available for inspection by the Engineer until the Contractor has completed all work.

30.2.11 Supply of Foodstuffs

The Contractor shall arrange for the provision of a sufficient supply of suitable food if required by the PCC at reasonable prices for the Contractor's personnel for the purposes of or in connection with the Contract.

30.2.12 Supply of Drinking Water and Sanitation

The Contractor shall so far as reasonable, having regard for local conditions provide on the Site and at its expense, adequate supply of drinking water for the use of Contractor's and Employer's personnel and representatives, together with sanitary facilities (portable toilets or latrines), to the satisfaction of the Engineer.

30.2.13 Measures against Insect and Pest Nuisance

The Contractor shall at all times take the necessary precautions to protect the Contractor's personnel employed on the Site from insect and pest nuisance, and to reduce their danger to health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.

30.2.14 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give barter or otherwise

dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift barter or disposal by Contractor's personnel.

30.2.15 Arms and Ammunition

The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's personnel to do so.

30.2.16 Prohibition of All Forms of Forced or Compulsory Labor

The Contractor shall not employ "forced or compulsory labor" in any form. "Forced or compulsory labor" consists of all work or service, not voluntarily performed, that is extracted from an individual under threat of force or penalty.

30.2.17 Prohibition of Harmful Child Labor

The Contractor shall not employ any child to perform any work that is economically exploitative, or is likely to be hazardous to, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.

30.2.18 Employment of female labour

The employment of female labors on works in neighborhood of soldiers barracks should be avoided as far as possible. The contractor shall employ the labor registered with the nearest employment exchange.

30.2.19 The contractor shall duly comply with the provision of the Apprentices Act(III of 1961) the rules made there under and the orders that may be issued from time to time under the Act the said Rules.

30.2.20 No contractor shall employ donkeys or other animals with breeching of string or thin rope the breeching must be at least three inches wide and should be of tape (Nawar).No animals suffering from sores lameness or emaciation or which is immature shall be employed on the work.

30.2.21 The Engineer or his agent is authorized to remove from the work any person or animal found working which does not satisfy these conditions and no responsibility shall be accepted by Corporation for any delay caused in the completion of work by such removal.

30.2.22 If Government declares a state of scarcity or famine to exit in any village situated within 10 miles of the work, the contractor shall employ upon such parts of work, as are suitable for unskilled labour ,any person certified to him by the Executive Engineer, or be any person to whom the Executive

Engineer may have delegated this duty in writing to be in need of relief and shall be bound to pay to such person wages not below the minimum which government may have fixed in this behalf. Any disputes which may arise in connection with the implementation of this clause shall be decided by the Executive Engineer whose decision shall be final and binding on the contractor.

30.2.23 The contractor shall employ at least 80 percent of the total number of unskilled labour to be employed by him on the said work from out of the persons ordinarily residing in the district in which site of the said work is located. Provided, however; that if the required number of unskilled labour from that district is not available, the contractor shall in the first instance employ such number of persons as is available and thereafter may with previous permission in writing of the Executive Engineer of the said work, obtain the rest of the requirement of unskilled labour from outside district.

30.3 Contractor's Equipment

30.3.1 All of Contractor's equipment brought by the Contractor onto the Site shall be deemed to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the Engineer's consent that such Contractor's equipment is no longer required for the execution of the Contract.

30.3.2 Unless otherwise specified in the Contract, upon completion of the Works and Services, the Contractor shall remove from the Site all equipment brought by the Contractor onto the Site and any surplus materials remaining thereon.

30.3.3 The Employer will, if requested, use its best endeavors to assist the Contractor in obtaining any local, state or national government permission required by the Contractor for the export of the Contractor's equipment imported by the Contractor for use in the execution of the Contract that is no longer required for the execution of the Contract.

30.3.4 The contractor shall provide list of machineries i.e. horizontal boring machines, equipments, tools and plants, heavy capacity big size pumps for dewatering and pumping out water, specialized and latest technology machines, JCB, Crane and Generator etc. Required for the trench less work, in the owner ship or collaboration of the firm.

30.4 Site Regulations and Safety

The Employer and the Contractor shall establish Site regulations setting out the rules to be observed in the execution of the Contract at the Site and shall comply therewith. The Contractor shall prepare and submit to the Employer, with a copy to the Engineer, proposed Site regulations for the Employer's approval, which approval shall not be unreasonably withheld.

Such Site regulations shall include, but shall not be limited to, rules in respect of security, safety, gate control, sanitation, medical care, and fire prevention.

No blasting shall be allowed. Edges in the trench shall be got rounded off to prevent the damage of pipes.

30.5 Opportunities for Other Contractors

30.5.1 The Contractor shall, upon written request from the Employer or the Engineer, give all reasonable opportunities for carrying out the work to any other contractors employed by the Employer on or near the Site.

30.5.2 If the Contractor, upon written request from the Employer or the Engineer, makes available to other contractors any roads or ways the maintenance for which the Contractor is responsible, permits the use by such other contractors of the Contractor's equipment, or provides any other service of whatsoever nature for such other contractors, the Employer shall fully compensate the Contractor for any loss or damage caused or occasioned by such other contractors in respect of any such use or service, and shall pay to the Contractor reasonable remuneration for the use of such equipment or the provision of such services.

30.5.3 The Contractor shall also so arrange to perform its work as to minimize, to the extent possible, interference with the work of other contractors. The Engineer shall determine the resolution of any difference or conflict that may arise between the Contractor and other contractors and the workers of the Employer in regard to their work.

30.5.4 The Contractor shall notify the Engineer promptly of any defects in the other contractors' work that come to its notice, and that could affect the Contractor's work. The Engineer shall determine the corrective measures, if any, required to rectify the situation after inspection of the Works. Decisions made by the Engineer shall be binding on the Contractor.

30.6 Emergency Work

If, by reason of an emergency arising in connection with and during the execution of the Contract, any protective or remedial work is necessary as a matter of urgency to prevent damage to the Works, the Contractor shall immediately carry out such work.

If the Contractor is unable or unwilling to do such work immediately, the Employer may do or cause such work to be done as the Employer may determine is necessary in order to prevent damage to the Works. In such event the Employer shall, as soon as practicable after the occurrence of any such emergency, notify the Contractor in writing of such emergency, the work done and the reasons therefore. If the work done or caused to be done by the Employer is work that the Contractor was liable to do at its own expense under the Contract, the reasonable costs incurred by the Employer in connection therewith shall be paid by the Contractor to the Employer. Otherwise, the cost of such remedial work shall be borne by the Employer.

30.7 Site Clearance

30.7.1 Site Clearance in Course of Performance

In the course of carrying out the Contract, the Contractor shall keep the Site reasonably free from all unnecessary obstruction, store or remove any surplus materials, clear away any wreckage, rubbish or temporary works from the Site, and remove any Contractor's equipment no longer required for execution of the Contract.

30.7.2 Clearance of Site after Completion

After Completion of the Works, the Contractor shall clear away and remove all wreckage, rubbish and debris of any kind from the Site, and shall leave the Site in a clean and safe condition.

30.7.2.1 Clearance of Site

The site shall be cleared off all malba / debris etc. after completion of work and shall ensure removal of temporary structure erected for execution of works, hutments put up by his laborer at site, if any before handing over site to the department in workable condition. No final payment for the work shall be made to the contractor till full satisfaction of the Engineer.

30.7.3 Measure for prevention of fire

The contractor shall not set fire to any standing jungle, trees,

bush woods or grass without a written permit from the Executive Engineer. When such permit is given, and also in all cases when destroying cut or dug up trees bush wood, grass etc. by fire; the

contractor shall take necessary measure to prevent such fire spreading to or otherwise damaging surrounding property. The contractor shall make his own arrangements for drinking water for the labors employed by him.

30.8 Watching and Lighting

The Contractor shall provide and maintain at its own expense all lighting, fencing, and watching when and where necessary for the proper execution and the protection of the Works, or for the safety of the owners and occupiers of adjacent property and for the safety of the public.

3.8.1 Watch and Ward

Adequate arrangements shall be made for lighting, Chowkidar etc. to safeguard against accidents & suitable passageways shall be provided wherever needed during the progress of the work for access to the site/ buildings.

It shall be responsibility of the contractor to watch & ward all fittings and fixtures till such time the possession of the work is handed over to Engineer.

Wherever necessary the contractor shall at his own cost provide adequate temporary fencing to the whole or part of the site for the safety, convenience of workmen, public, live stock and for execution of works. Nothing extra shall be paid on this account unless otherwise specified in the Bill of Quantity.

30.9 Environmental Mitigation Measures

30.9.1 Site Environmental Plan

The Contractor shall prepare a detailed Site Environmental Plan (SEP) for the work site, base camp, etc., showing arrangements for disposal of sanitary and other waste, location of fuel, oil and lubricant depots, sheds for equipment, labor and housing facilities, etc., prior to the construction for approval of the Engineer.

The contractor's SEP shall also take into account the implementation of all measures stated in Environmental Management Plan and the Environmental Monitoring Plan in Section 6, Employer's Requirements.

30.9.2 Safety, Security and Protection of the Environment

The Contractor shall take all necessary precautions against pollution or interference with the supply, or obstruction of the flow of, surface or underground water. These precautions shall include but not be limited to physical measures such as earth bunds of adequate capacity around fuel, oil and solvent storage tanks and stores, oil and grease traps in drainage systems from workshops, vehicle and plant washing facilities and service and fueling areas and kitchens, the establishment of sanitary solid and liquid waste disposal systems, the maintenance in effective condition of these measures, the establishment of emergency response procedures for pollution events, and dust suppression, all in accordance with normal good practice and to the satisfaction of the Engineer. Should any pollution arise from the Contractor's activities he shall clean up the affected area immediately at his own cost and to the satisfaction of the Engineer, and shall pay full compensation to any affected parties.

30.9.3 Protection of Trees and Vegetation

The Contractor shall ensure that no trees or shrubs or waterside vegetation are felled or harmed except for those required to be cleared for execution of the Works. The Contractor shall protect trees and vegetation from damage to the satisfaction of the Engineer. No tree shall be removed without the prior approval of the Engineer and any competent authorities. Should the Contractor become aware during the period of the Contract that any tree or trees designated for clearance have cultural or religious significance he shall immediately inform the Engineer and await his instructions before proceeding with clearance. In the event that trees or other vegetation not designated for clearance are damaged or destroyed, they shall be repaired or replaced to the satisfaction of the Engineer, who shall also impose a penalty to twice the commercial value of any timber affected, as assessed by the Engineer.

30.9.4 Use of Wood as Fuel

The Contractor shall not use wood as a fuel for the execution of any part of the Works, including but not limited to the manufacture of bricks for use in the Works, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all his camps and living accommodations.

30.10 Sign Board

The contractor shall provide board indicating complete name of work, date of start, date of completion as per work order / actual, cost of work, name of the department, name of the

Executive Engineer with office address and telephone number & name of the executing agency at his own cost at the site of work and at the site office.

Sign Board showing “Men at work” and “Work in Progress” & “EMPLOYER Work” are to be provided by the contractor at work places at his own cost.

30.11 Additional Conditions

In the event of any restrictions being imposed by the Security agencies, EMPLOYER, Traffic or any other authority in the working area or movement. The contractor shall strictly follow such restrictions and nothing shall be excused from doing the stipulated work on this account. The loss of time on this account, if any, shall have to be made by generating additional resources etc. other restrictions are given as under:-

- a) The movement of trucks and vehicles shall be regulated in accordance with rules and Regulations as approved by competent authority.
- b) The Contractor shall inform in advance, the truck registration numbers, ownerships of the trucks, names and address of the drivers for necessary action by the security agency.
- c) Names and address of laborers/staff etc. Working at site shall be furnished to EMPLOYER in advance.
- d) The laborers/staff should not be changed too frequently once the verification of the character and antecedents is done.
- e) Uniform: The Contractor shall provide two Pairs of Uniforms (Winter and Summer) to his workers while on duty. The workers shall always be in uniform. Workers and Supervisors must wear neat and clean ironed uniform (including proper name badges).
- f) After verification of antecedents of workers, identification badges will be issued to them by the contractor. The cost of badges and uniforms etc would be borne by the contractor. Workers shall wear Identity Card and Uniform while on duty.
- g) The contractor shall be responsible for behavior and conduct of his laborers. No labourer with doubtful integrity or having a bad record shall be engaged by the concessionaire.

h) The workers of the contractor should strictly observe code of conduct and manner befitting security. If any employee of the Contractor fails to absolve proper conduct, the contractor shall be liable to remove him from deployment, immediately in receipt of the instructions of the EMPLOYER.

i) The Contractor shall be responsible for the conduct and behavior of its workers employed for the work.

j) The EMPLOYER shall not be responsible for any compensation, which may be required to be paid to the worker(s) of the Contractor consequent upon any injury/mishap.

30.12Leveling Instrument/Survey Equipments

The contractor must always make available an accurate leveling instrument at the site of work. Necessary levels will be given by the contractor or his authorized site engineer and the same will be checked by the site staff of the department.

30.13Execution of Work

The work is to be carefully executed strictly in accordance with the approved drawing submitted by the contractor or with such modifications as may be approved by the Engineer from time to time. Any additional amended, revised or detailed drawings that may be issued by the Engineer or approved in writing by him during the progress of the work are to be considered to form the part of the work and as such being included in the contract. No claim whatsoever shall be considered on this account.

The order of sequence of execution of the work and general condition of the work shall be subject to the approval and direction of the Engineer whose approval or direction shall however in no way relieve the contractor of the responsibility for the proper and satisfactory execution of the work according to the terms of contract and within stipulated period. No claim of the contractor whatsoever will be entertained on this account.

The information given in the drawing including the conditions of ground or the information regarding the depth of water to be met with means of access, or any other such matter shall

not relieve the contractor from the fulfillment of the contract. The contractor is liable to check all the points mentioned in the drawing.

The contractor shall establish at his own cost at suitable points additional reference points lines Bench marks as may be necessary. The contractor will be responsible and must check and satisfy himself the accuracy of levels, lines positions, dimensions, sizes etc. of the finished work in accordance with the contract.

30.14 Materials Brought at Site

Materials brought at site consisting of plant, machinery, tools, tackles, raw material etc. required for execution of work shall not be removed except for use in the work unless permission in writing is given by the Engineer. The contractor however, shall be responsible for loss or damage such materials and goods.

All the material / chemicals / consumables brought at site shall be protected suitably, duly wrapped / packed and stored so as to avoid any damage during loading / transportation / unloading & handling due to weather conditions etc. at any stage.

30.15 Covering of Works

No work will be covered or put out of view without approval of the Engineer or his representative and the contractor shall afford full opportunity for the Engineer or his representative to examine and measure any work which is about to be covered up or put out of view.

30.16 Inconvenience to Public

The contractor shall not dump / deposit materials on site, which will seriously cause inconvenience to the public. The Engineer may require the contractor to remove any materials, which are considered by him to be of danger, or to cause inconvenience to public and have them to be removed at the contractor's cost.

The bidder shall visit the site and examine the availability of space in detail for execution of the work and deployment of machinery. The Contractor has to ensure that the general public/ tourist are not hindered in any manner while operate and maintain the project.

The project is required in Public Place in EMPLOYER area as

define herein which is a sensitive and high footfall/ crowded area. The concessionaire shall follow the security and safety requirements in his day-to-day work as per site condition.

30.17 Responsibility of Damage to Person or Property

The contractor will be absolutely and solely responsible for any accident that may occur during the progress on the work and for injury or damage to the persons or property of any description whatsoever which may be caused by or result from the execution of the work. The contractor shall at his own expenses take all necessary and timely precautions against injury or accident to the work or any person or property and shall forth-with protect and support all such structures or properties or electric poles or the things which may be effected by the execution of the work and make good any damage so caused. In the event of the accident to any person or persons or death or injury of any descriptions to any person, structure, animal or things the contractor will be solely responsible for the same and will indemnify Employer for the same.

In the event of any damage occurring to any work, life and property during the execution of work included in the contract Clause due to settlement of ground slips, flooding from any sources breakage of water main/ sewer line or any other cause, the contractor will be solely responsible and must reconstruct, repair and make good all such at his own cost.

When the work is done near a place where there is risk of danger/ accident, all necessary equipments should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

If any accident occurs the contractor shall report to the Employer, within 24 hours of its occurrence.

30.18 Contractor to Indemnify

The contractor shall be liable for and shall also indemnify the Employer against all liabilities, losses, claims, demands, proceedings, damages, costs, charges and expenses and further agrees to defend, indemnify and hold the PCMC harmless from any penalty whatsoever in respect of any injury, accident or damage to any property or to personnel during the execution of work or by the action of any central or state or local authority for violation by the contractor or sub-contractor engaged on the work.

30.19 Electricity

The contractor shall pursue / arrange at his own cost the electricity / power connection of required capacity for carrying out the construction works. In the name Executive Engineer, the Employer will issue the recommendation letter to concerned electrical authorities for getting the power connection. The persuasion, the formalities, the required monthly payments shall be made by the contractor and he will bear all the charges towards security installation, consumption of electricity / power etc. till completion of the work. The photocopy of the paid bills shall be enclosed with Running account bills in confirmation of timely payments made by the contractor to concerned electrical authorities.

The payment of final bill to the contractor shall be made by Employer on submission of no dues / clearance certificate from the Electric Power authority / the authority in-charge of the Electric power.

The temporary electric fitting shall be provided and maintained as per the power sanctioning/maintaining authority rules and regulations by the contractor at his own cost and nothing extra shall be paid by the Employer.

In case concerned Power authority is not in a position to sanction the electric connection, the contractor shall make his own arrangements i.e. required numbers of generators of adequate capacity to execute the work or in case the sanction of electric connection is delayed by the authority it shall also be on to the part of the contractor to arrange electricity at his own cost and no claim whatsoever shall be entertained on this account.

30.20 Generator Set

Generators arranged by the contractor for the work shall be operated and maintained for use at his own cost during non-availability of power. It shall be contractor's responsibility to obtain approvals & permissions from any statutory authority in accordance with the statutory rules & regulations.

The quoted rates shall be inclusive of POL cost and other miscellaneous expenditures to be incurred for running & maintaining the generator set.

30.21 Records & Usage of Equipment/ Material

The Contractor shall maintain a detailed report of all equipment/materials received at the site in his stores or

	<p>storage and working areas in the vicinity of the site and shall make such records available to the Engineer at such times as the latter may reasonably require.</p> <p>30.23 The running and maintenance charges of machines i.e. cost of fuel, battery, lubricants, replacement of parts etc. shall be borne by the Contractor.</p> <hr/> <p>All machines provided by Contractor shall be exclusively for use in Project Area.</p>
<p>31. Test and Inspection</p>	<p>31.1 The Contractor shall at its own expense carry out on the Site all such tests and/or inspections of the Works as are specified in Section 6, Employer’s Requirements, as well as tests not explicitly listed but required by the Engineer, and in accordance with the procedures described in Section 6, Employer’s Requirements.</p> <p>31.2 The Employer and the Engineer or their designated representatives shall be entitled to attend the aforesaid test and/or inspections.</p> <p>31.3 Whenever the Contractor is ready to carry out any such test and/or inspection, the Contractor shall give a reasonable advance notice of such test and/or inspection and of the place and time thereof to the Engineer. The Contractor shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Employer and the Engineer or their designated representatives to attend the test and/or inspection.</p> <p>31.4 The Contractor shall provide the Engineer with a certified report of the results of any such test and/or inspection.</p> <p>If the Employer or Engineer or their designated representative fails to attend the test and/or inspection, or if it is agreed between the parties that such persons shall not do so, then the Contractor may proceed with the test and/or inspection in the absence of such persons, and may provide the Engineer with a certified report of the results thereof.</p> <p>31.5 The Engineer may require the Contractor to carry out any test and/or inspection not required by the Contract, provided that the Contractor’s reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impede the progress of Works and/or the Contractor’s performance of its other obligations under the Contract, due allowance will be made in respect of the Time for Completion and the other obligations so affected.</p> <p>31.6 If any DMA Establishment Works, Construction Works fail to</p>

pass any test and/or inspection, the Contractor shall either rectify or replace such Works or part thereof and shall repeat the test and/or inspection upon giving a notice under GCC Sub-Clause 31.3.

31.7 If any dispute or difference of opinion shall arise between the parties in connection with or arising out of the test and/or inspection of the Works or part thereof that cannot be settled between the parties within a reasonable period of time, it may be referred to a Dispute Board for determination in accordance with GCC Sub-Clause 53.3.

31.8 The Contractor shall afford the Employer and the Engineer, at the Employer's expense, access at any reasonable time to any place where the Works are being installed, in order to inspect the progress and the manner of installation, provided that the Engineer shall give the Contractor a reasonable prior notice.

31.9 The Contractor agrees that neither the execution of a test and/or inspection of Works or any part thereof, nor the attendance by the Employer or the Engineer, nor the issue of any test certificate pursuant to GCC Sub-Clause 31.4, shall release the Contractor from any other responsibilities under the Contract.

31.10 No part of the Works shall be covered up on the Site without the Contractor carrying out any test and/or inspection required under the Contract. The Contractor shall give a reasonable notice to the Engineer whenever any such parts of the Works are ready or about to be ready for test and/or inspection; such test and/or inspection and notice thereof shall be subject to the requirements of the Contract.

31.11 The Contractor shall uncover any part of the Works, or shall make openings in or through the same as the Engineer may from time to time require at the Site, and shall reinstate and make good such part or parts.

If any parts of the Works or foundations have been covered up at the Site after compliance with the requirement of GCC Sub-Clause 31.10 and are found to be executed in accordance with the Contract, the expenses of uncovering, making openings in or through, reinstating, and making good the same shall be borne by the Employer, and the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been delayed or impeded in the performance of any of its obligations under the Contract.

31.12 Testing of Construction

i) The contractor shall carryout mandatory tests of materials

as specified in the Indian standard code/ PWD Specifications and maintains the record of the test accordingly.

ii) Test shall be got done from any of the following laboratories as directed by the Engineer.

- PWD Laboratory
- Government Laboratory
- Government Engineering College
- Any other laboratory as approved by Engineer in case the tests are not done in the first three laboratories.

iii) Testing of cubes to the extent of 10% of due tests for crushing strength, shall be carried out from a laboratory as above. For the balance 90% due tests the Contractor may however be allowed by the Engineer to have his own lab at site and cube testing may be carried out in this lab, subject to approval by Engineer.

iv) Samples of various materials required for testing shall be provided free of charge by the Contractor. Testing charges shall be borne by the Contractor along with expenditure required to be incurred for taking the samples, conveyance, packing etc.

Even if the site laboratory is setup, more than 10% of total mandatory tests required for various items shall have to be got tested from outside laboratory approved by the Engineer. Materials

31.13 Samples and Testing of Materials

a) All materials to be used on work, such as structural steel, nuts and bolts, paints, cement, lime, bricks, aggregates, steel, structural and high tensile steel, bearings, expansion joints, stones, asphalt, woods, tiles, etc. shall be got approved in advance from Engineer and shall pass the test and analysis required by him, which will be (a) as specified in the specifications of the items concerned and / or (b) as specified by the India Road Congress Standard Specifications and code of practice for Roads and Bridges or (c) I.S.I. specification (wherever and whenever applicable) or (d) such recognised specifications acceptable to the Engineer as equivalent thereto or in the absence of such authorised specification (e) such requirements / tests and / or analysis as may be specified by the Engineer-in- Charge in the order of precedence given above.

b) The Contractor shall establish a well equipped field laboratory

at his cost for testing of construction materials like sieve analysis moisture content flakiness index & compressive strength of concrete cubes, testing of cement, aggregates etc. for testing as specified in MoRT&H Specification for road & bridges.

- c) The Contractor shall at his risk and cost make all arrangement and/or shall provide for all such facilities as the Engineer may require for collecting, preparing, and forwarding required number of samples for tests or for analysis at such time and to such place or places as may be directed by the Engineer and bear all charges and cost of testing including transport.

Such samples shall also be deposited with the Engineer-in-Charge till these are sent for testing. Samples of material shall also be preserved during the construction period.

The Contractor shall, if and when required, submit at his cost the samples of materials to be tested or analysed and if so directed shall not make use or incorporate in the work any materials until required tests have been made & the test results of the materials are finally accepted by Engineer-in-Charge.

The contractor shall arrange for necessary testing equipment and conduct the testing in consultation with Employer Engineers before commencement of work and after completion of wearing course. Tests for Bituminous work must be performed in Third Party Laboratory approved by Employer and the cost such tests shall be borne by contractor.

In case of non-conformance to the quality control checks in accordance to the quality assurance plan for Hot-mix & other works related works, 10% of the value of work shall be deducted from RA bill.

31.14 Third Party Inspection

Third Party inspection agencies as defined in PCC, approved by Employer is applicable for this work. Contractor has to bear all the cost required for testing, sampling & inspection as per procedures & rules of third party. Testing & inspection shall be done as per approved QAP of Employer.

31.15 Defects Pointed Out by the Other Agencies

The inspection of one agency / authority / team shall not absolve the contractor of his responsibility on to the defects pointed out by the other agencies and rectification thereto. Recoveries, if any, proposed by any of the inspection agency on account of short comings in respect of quality / quantity in the work shall be recovered from the contractors payment

	<p>otherwise he shall be responsible to reimburse the amount of all such recoveries which will be final and binding.</p>
<p>32. Certificate of Sectional Completion, Initial Take Over Date & Final Take Over Date</p>	<p>32.1 Certificate of Completion : At the end of the DMA Establishment Phase when the Design & construction Works & water loss reduction phase have been substantially completed for respective DMAs or Sub DMAs in accordance with Section 6, Employer’s Requirements, the Contractor shall request the Engineer to issue a Certificate of Sectional Completion for Design & Construction Works, and the Engineer within twenty one (21) days from receipt thereof, either issue to the Contractor a Certificate of Sectional Completion or give instructions in writing to the Contractor specifying all the conditions to be complied with and all the work which are required to be done by the Contractor before the issuance of such Certificate. Upon deciding that the work is complete, the Engineer shall thereafter issue a Certificate of Sectional Completion to the Contractor.</p> <p>32.2 Initial Take Over date : If Certificate of sectional completion is issued by Engineer to any construction works or part of it including DMA establishment works or Sub DMA establishment works as per clause 32.1 above, before the completion of Design &Construction Period as specified in PCC. Contractor shall take over the O&Mof such DMAs or Construction works and eligible for payment as per O&M period till completion of Construction period or Final take Over date , whichever is earlier.</p> <p>32.3 Final take Over date : Completion of Design &Construction period or commencement of O&M Phase whichever is later shall be paid according to O&M payment from Final take Over date.</p> <p>32.4 Virtual Completion</p> <p>The Contractor shall not be eligible for receipt of the virtual completion certificate until all tests have been completed and accepted by the various statutory bodies and all other authorities apart from the Engineer till the project is commissioned as intended by the competent authority.</p>
<p>33. Taking Over Certificate</p>	<p>33.1 At the end of the O&M Phase, the Contractor may give notice to that effect to the Engineer, accompanied by a written undertaking to finish with due expedition any outstanding work during the Defects Liability Period. Such notice and undertaking shall be deemed to be a request by the Contractor for the Engineer to issue a Taking-Over Certificate in respect of</p>

the Works and Services. The Engineer shall, within twenty-one (21) days of the date of delivery of such notice, either issue to the Contractor a Taking-Over Certificate, stating the date on which the Works and Services were substantially completed or give instructions in writing to the Contractor specifying all the conditions to be complied with and all the work which are required to be done by the Contractor before the issuance of such Certificate. The Engineer shall also notify the Contractor of any defects in the Works and Services affecting completion that may appear after such instructions and before completion of the Taking- Over Certificate within twenty-one (21) days of completion, to the satisfaction of the Engineer, of the Works and Services so specified and remedying any defects so notified.

33.2 Similarly, in accordance with the procedure set out in Sub-Clause 33.1, the Contractor may request the Engineer for the issuance of a Taking-Over Certificate for:

- (a) Any Works and Services in which a separate Time for Completion is provided in the PCC,
- (b) Any substantial part of the Works and Services outside the DMAs which has been completed to the satisfaction of the Engineer and, otherwise than as provided for in the Contract, occupied or used by the Employer, or
- (c) Any part of the Works and Services which the Employer has elected to occupy or use prior to completion where such prior occupation or use is not provided for in the Contract or has not been agreed by the Contractor as a temporary measure. Other than the Works and Services specified in GCC Clause 33.2, the Contractor will not be allowed to request the Engineer for a Taking-Over Certificate. For the avoidance of doubt, the Contractor will not request for a Taking-Over Certificate for all works and services in relation to DMA establishment and Water Loss Reduction and Management Services until the end of the O&M Phase.

33.3 Handback of Project Facilities

33.3.1 Ownership

Without prejudice and subject to the rights granted under this Agreement, the ownership of the Project Facilities, including all improvements made therein by the Contractor, shall at all times remain that of EMPLOYER.

33.3.2 Contractor's Obligations

- a. Project Facilities
 - i. The Contractor shall on the date of expiry of Agreement

Period, hand back on as-is where-is basis, the Project Facilities to Employer free of cost and in good operable condition. For the purpose of clarity, the Contractor shall leave behind all assets in good and operable condition including tools, spares, inventory, machinery and all other movables required for continuous water supply.

- ii. At least 12 (twelve) months before the expiry of the Agreement Period a joint inspection of the Project Facilities shall be undertaken by Employer and the Contractor. Employer shall, within 45 days of such inspection prepare and furnish to the Contractor a list of works/ jobs (“Handback Requirements”), if any, to be carried out so as to conform to the Employer’s Requirements. The Contractor shall promptly undertake and complete such works / jobs at least 3 (three) months prior to the expiry of Agreement Period and ensure that the Project Facilities continue to meet such requirements until the same are handed back to Employer. On Expiry Date, the parties shall undertake a joint inspection of the Project Facilities so as to ensure that Handback Requirements are met. The release of the final installment of the Contractor Payment and other outstanding payments, if any, shall be subject to the Handback Requirements being fully met to the satisfaction of Employer.
- iii. Employer shall, within 45 days of the joint inspection undertaken under preceding clause (ii) prepare and furnish to the Contractor a list of items, if any, with corresponding distinctive descriptions, which are to be compulsorily handed back to Employer.
- iv. The Contractor, upon written request by the Employer no later than 180 days prior to the Transfer Date, shall provide assistance to the Employer during a transitional period of up to 60 days prior to the Transfer Date. (“Transition Assistance”) The purpose is to ensure a smooth transition between Contractor and a subsequent manager of the Project Facilities. The scope of the assistance shall be determined by Employer provided that

	<p>the assistance shall be related to only transition services.</p> <p>v. If the Employer makes a request for assistance, the Transition Assistance shall be provided by those staff identified by Employer and the identified staff shall be resident in India until the completion of the Transition Assistance.</p> <p>b. The Contractor hereby acknowledges Employer's rights specified in Clause 33.3 enforceable against it upon Termination and its corresponding obligations arising there from. The Contractor undertakes to comply with and discharge promptly all such obligations.</p>
<p>34. As Built Drawings and Manuals</p>	<p>34.1 If “as built” Drawings and/or manuals are required, the Contractor shall supply them by the dates stated in the PCC.</p> <p>34.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the PCC, or they do not receive the Engineer’s approval, the Engineer shall deduct an amount stated in the PCC from payments due to the Contractor as a penalty.</p>

F. Guarantees and Liabilities

<p>35. Completion Time Guarantee</p>	<p>35.1 The Contractor guarantees that it shall attain completion of the Works and Services (or a part for which a separate time for completion is specified) within the Time for Completion specified in the PCC pursuant to GCC Sub-Clause 9.2, or within such extended time to which the Contractor shall be entitled under GCC Clause 48 hereof.</p> <p>35.2 If the Contractor fails to attain completion of the Works and Services or any part thereof within the Time for Completion or any extension thereof under GCC Clause 48, the Contractor shall pay to the Employer liquidated damages in the amount specified in the PCC as a percentage rate of the Contract Price or the relevant part thereof. The aggregate amount of such liquidated damages shall in no event exceed the amount specified as “Maximum” in the PCC as a percentage rate of the Contract Price. Once the “Maximum” is reached, the Employer may consider termination of the Contract, pursuant to GCC Sub-Clause 50.2.2.</p> <p>Such payment shall completely satisfy the Contractor’s obligation to attain completion of the Works or the relevant part thereof within the Time for Completion or any extension thereof under GCC Clause 48. The Contractor shall have no further liability whatsoever to the Employer in respect thereof.</p> <p>However, the payment of liquidated damages shall not in any way relieve the Contractor from any of its obligations to complete the Works or from any other obligations and liabilities of the Contractor under the Contract.</p> <p>Save for liquidated damages payable under this GCC Sub-Clause 35.2, the failure by the Contractor to attain any milestone or other act, matter or thing by any date specified in the PCC or other work program prepared pursuant to GCC Sub-Clause 26.2 shall not render the Contractor liable for any loss or damage thereby suffered by the Employer.</p>
<p>36. Performance Obligations and Liquidated Damages</p>	<p>36.1 The Contractor guarantees the attainment of the following:</p> <ul style="list-style-type: none"> (a) The minimum number of DMAs established per quarter (b) Completion of all construction works within the Design & construction period as specified in PCC (c) The performance standard to be maintained within a range as specified in Section 6, Employer’s Requirements and performance standard as per Schedule 7 of PCC. <p>36.2 If, for reasons attributable to the Contractor, the minimum number of DMAs established per quarter are not met, the</p>

Contractor shall choose to either:

- (a) Make such changes, modifications and/or additions to the Works and Services or any part thereof that are necessary to meet the requirements within 90 days from the end of the previous quarter at its own cost and expense, or;
- (b) Pay to the Employer liquidated damages in the amount specified in the PCC, prepare a revised schedule for DMA establishment and submit to the Engineer for approval.

36.3 If, for reasons attributable to the Contractor, construction works is not completed within the design & construction period, the Contractor shall choose to either:

- (a) Make such changes, modifications and/or additions to the Works and Services or any part thereof that are necessary to meet the requirements within 30 days after the target date at its own cost and expense, or;
- (b) Pay to the Employer liquidated damages in the amount specified in the PCC.

36.4 If, for reasons attributable to the Contractor, During O&M period performance levels in the DMAs deteriorated beyond the maximum deduction for any. Parameters as specified in Schedule 5 & 7 of PCC. The parameters are water loss continuity of supply, water quality & consumer complaint the Contractor shall choose to either:

- (a) Make such changes, modifications and/or additions to the Works and Services or any part thereof that are necessary to meet the requirements at its own cost and expense, or
- (b) Pay to the Employer liquidated damages in an amount specified in the PCC.

36.5 The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities.

36.6 At the end of the Design & Construction phase the payment of liquidated damages under GCC Sub-Clause 36.2 and 36.3 up to the limitation of liability specified in the PCC, shall completely satisfy the Contractor's guarantees under GCC Sub-Clause 36.1(a) and (b) and the Contractor shall have no further liability whatsoever to the Employer.

36.7 At the end of each year of O&M Phase the payment of liquidated damages under GCC Sub-Clause 36.4 (b) up to the limitation of liability specified in the PCC, shall completely satisfy the Contractor's guarantees under GCC Sub-Clause 36.1(c) for the respective year and the Contractor shall have no

	further liability to the Employer.
37. Defect Liability	<p>37.1 The Contractor warrants that the Works and Services or any part thereof shall be free from defects in the design, engineering, materials and workmanship of the Works and Services supplied and executed.</p> <p>37.2 The Defect Liability Period shall be One hundred Eighty (180) days from the date of completion of the O&M Phase as per GCC Clause 32 (or any part thereof) or one hundred and eighty (180) days from the date a Taking Over Certificate is issued pursuant to GCC Sub-Clause 33.2 for a particular part of the Works and Services, whichever comes first.</p> <p>If during the Defect Liability Period any defect should be found in the design, engineering, materials and workmanship of the Works and Services executed by the Contractor, the Contractor shall promptly, in consultation and agreement with the Employer regarding appropriate remedying of the defects, and at its cost, repair, replace or otherwise make good as the Contractor shall determine at its discretion, such defect as well as any damage to the water distribution system caused by such defect. The Contractor shall not be responsible for the repair, replacement or making good of any defect or of any damage to the water distribution system arising out of or resulting from any of the following causes:</p> <ul style="list-style-type: none"> (a) Improper operation or maintenance of the water distribution system maintained by the Employer; (b) Operation of the water distribution system outside the procedures provided in the Operations Manual submitted by the Contractor to the Engineer; or (c) Normal wear and tear of existing retained assets. <p>37.3 The Contractor's obligations under this GCC Clause 37 shall not apply to:</p> <ul style="list-style-type: none"> (a) Any materials that are normally consumed in operation, or have a normal life shorter than the Defect Liability Period stated herein; (b) Any designs, specifications or other data designed, supplied or specified by or on behalf of the Employer or any matters for which the Contractor has disclaimed responsibility herein; or (c) Any other materials supplied or any other work executed by or on behalf of the Employer, except for the work executed by the Employer under GCC Clause 37.6. (d) Leaks in new locations that occur after the last day of

	<p>the O&M Period.</p> <p>37.4 The Employer shall give the Contractor a notice stating the nature of any such defect together with all available evidence thereof, promptly following the discovery thereof. The Employer shall afford all reasonable opportunity for the Contractor to inspect any such defect.</p> <p>37.5 The Employer shall afford the Contractor all necessary access to the Works and the Site to enable the Contractor to perform its obligations under GCC Clause 36, 37.</p> <p>37.6 The Contractor may, with the consent of the Employer, remove from the Site any part of the Works that are defective if the nature of the defect, and/or any damage to the Works caused by the defect, is such that repairs cannot be expeditiously carried out at the Site.</p> <p>37.7 If the Contractor fails to commence the work necessary to remedy such defect or any damage to the Works caused by such defect within a reasonable time (which shall in no event be considered to be less than fifteen (15) days), the Employer may, following notice to the Contractor, proceed to do such work, and the reasonable costs incurred by the Employer in connection therewith shall be paid to the Employer by the Contractor or may be deducted by the Employer from any monies due the Contractor or claimed under the Performance Security.</p> <p>37.8 If the Works or any part thereof cannot be used by reason of such defect and/or making good of such defect, the Defect Liability Period of the Works or such part, as the case may be, shall be extended by a period equal to the period during which the Works or such part cannot be used by the Employer because of any of the aforesaid reasons.</p> <p>37.9 Except as provided in GCC Clauses 37 and 41, the Contractor shall be under no liability whatsoever and howsoever arising, and whether under the Contract or at law, in respect of defects in the Works or any part thereof, design or engineering or work executed that appear after completion of the Works and Services at the end of the Water Loss Reduction Phase or any part thereof, except where such defects are the result of the gross negligence, fraud, criminal or willful action of the Contractor.</p>
<p>38. Liability for Burst Mains and Water Interruptions</p>	<p>38.1 The Contractor cannot be held liable for damages of any kind arising out of water pipeline bursts unless the bursts have been caused directly by excavation works, criminal acts, willful misconduct or gross negligence of the Contractor.</p> <p>38.2 The Contractor will not be held liable for damages of any</p>

	<p>kind to any third party arising out of water supply interruptions, including any indirect or consequential loss or damage to property, loss of use, loss of production, or loss of profits or interest costs, illness or death unless the same has resulted from the Contractor's criminal acts, willful misconduct or gross negligence.</p>
<p>39. Limitation of Liability</p>	<p>39.1 Except in cases of criminal negligence or willful misconduct,</p> <ul style="list-style-type: none"> (a) the Contractor shall not be liable to the Employer, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Contractor to pay liquidated damages to the Employer and (b) the aggregate liability of the Contractor to the Employer, whether under the Contract, in tort or otherwise, shall not exceed a multiple of the Contract Price specified in the PCC or, if a multiple is not so specified, the total Contract Price.

G. Risk Distribution

40. Care of Works

40.1 The Contractor shall be responsible for the care and custody of the Works or any part thereof until the date of completion of the Works pursuant to GCC Clauses 32 and 33 or, where the Contract provides for completion of the Works in parts, until the date of completion of the relevant part, and shall make good at its own cost any loss or damage that may occur to the Works or the relevant part thereof from any cause whatsoever during such period. The Contractor shall also be responsible for any loss or damage to the Works caused by the Contractor or its Subcontractors in the course of any work carried out, pursuant to GCC Clause 37. Notwithstanding the foregoing, the Contractor shall not be liable for any loss or damage to the Works or that part thereof caused by reason of any of the matters specified or referred to in paragraphs (a), (b) and (c) of GCC Sub-Clause 40.2 and 46.1.

40.2 If any loss or damage occurs to the Works or any part thereof or to the Contractor's temporary facilities by reason of:

(a) insofar as they relate to the country where the Site is located, nuclear reaction, nuclear radiation, radioactive contamination, pressure wave caused by aircraft or other aerial objects, or any other occurrences that an experienced contractor could not reasonably foresee, or if reasonably foreseeable could not reasonably make provision for or insure against, insofar as such risks are not normally insurable on the insurance market and are mentioned in the general exclusions of the policy of insurance, including War Risks, taken out under GCC Clause 42 hereof; or

(b) any use or occupation by the Employer or any third party other than a Subcontractor, authorized by the Employer of any part of the Works ; or

(c) any use of or reliance upon any design, data or specification provided or designated by or on behalf of the Employer, or any such matter for which the Contractor has disclaimed responsibility herein,

the Employer shall pay to the Contractor all sums payable in respect of the Works executed, notwithstanding that the same be lost, destroyed or damaged, and will pay to the Contractor the replacement value of all temporary facilities and all parts thereof lost, destroyed or damaged. If the Employer requests

	<p>the Contractor in writing to make good any loss or damage to the Works thereby occasioned, the Contractor shall make good the same at the cost of the Employer in accordance with GCC Clause 47. If the Employer does not request the Contractor in writing to make good any loss or damage to the Works thereby occasioned, the Employer shall either request a change in accordance with GCC Clause 47, excluding the performance of that part of the Works thereby lost, destroyed or damaged, or, where the loss or damage affects a substantial part of the Works, the Employer shall terminate the Contract pursuant to GCC Sub-Clause 50.1 hereof.</p> <p>40.3 The Contractor shall be liable for any loss of or damage to any of its equipment, or any other property of the Contractor used or intended to be used for purposes of the Works, except (i) as mentioned in GCC Sub-Clause 40.2 with respect to the Contractor’s temporary facilities, and (ii) where such loss or damage arises by reason of any of the matters specified in GCC Sub-Clauses 40.2 (b) and (c) and 46.1.</p> <p>40.4 With respect to any loss or damage caused to the Works or any part thereof or to the Contractor’s equipment by reason of any of the matters specified in GCC Sub-Clause 46.1, the provisions of GCC Sub-Clause 46.3 shall apply.</p>
<p>41. Loss of or Damage to Property; Accident or Injury to Workers; Indemnification</p>	<p>41.1 Subject to GCC Sub-Clause 41.3, the Contractor shall indemnify and hold harmless the Employer and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney’s fees and expenses, in respect of the death or injury of any person or loss of or damage to any property other than the Works whether accepted or not, arising in connection with the supply and installation of the Works and by reason of the negligence of the Contractor or its Subcontractors, or their employees, officers or agents, except any injury, death or property damage caused by the negligence of the Employer, its contractors, employees, officers or agents.</p> <p>41.2 If any proceedings are brought or any claim is made against the Employer that might subject the Contractor to liability under GCC Sub- Clause 41.1, the Employer shall promptly give the Contractor notice thereof and the Contractor may at its own expense and in the Employer’s name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Contractor fails to notify the Employer within twenty-eight (28) days after receipt of such notice that it intends to</p>

	<p>conduct any such proceedings or claim, then the Employer shall be free to conduct the same on its own behalf. Unless the Contractor has so failed to notify the Employer within the twenty-eight (28) day period, the Employer shall make no admission that may be prejudicial to the defense of any such proceedings or claim.</p> <p>The Employer shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim, and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing.</p> <p>41.3 The Employer shall indemnify and hold harmless the Contractor and its employees, officers and Subcontractors from any liability for loss of or damage to property of the Employer, other than the Works not yet taken over, that is caused by fire, explosion or any other perils, in excess of the amount recoverable from insurances procured under GCC Clause 42, provided that such fire, explosion or other perils were not caused by any act or failure of the Contractor.</p> <p>41.4 The party entitled to the benefit of an indemnity under this GCC Clause 41 shall take all reasonable measures to mitigate any loss or damage which has occurred. If the party fails to take such measures, the other party's liabilities shall be correspondingly reduced.</p>
<p>42. Insurance</p>	<p>42.1 To the extent specified in the PCC, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions specified in the said PCC. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, who should not unreasonably withhold such approval.</p> <p>(a) Third Party Liability Insurance Covering bodily injury or death suffered by third parties including the Employer's personnel, and loss of or damage to property occurring in connection with the supply and installation of the Facilities.</p> <p>(b) Automobile Liability Insurance Covering use of all vehicles used by the Contractor or its Subcontractors, whether or not owned by them, in connection with the execution of the Contract.</p> <p>(c) Workers' Compensation In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is executed.</p> <p>(d) Employer's Liability In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is</p>

	<p>executed.</p> <p>(e) Other Insurances Such other insurances as may be specifically agreed upon by the parties</p> <p>42.2 The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCC Sub-Clause 42.1, except for the Third Party Liability, Workers' Compensation and Employer's Liability Insurances, and the Contractor's Subcontractors shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCC Sub-Clause 42.1 except for the Workers' Compensation and Employer's Liability Insurances. All insurer's rights of subrogation against such co-insured for losses or claims arising out of the performance of the Contract shall be waived under such policies.</p> <p>42.3 The Contractor shall deliver to the Employer certificates of insurance or copies of the insurance policies as evidence that the required policies are in full force and effect. The certificates shall provide that no less than twenty-one (21) days' notice shall be given to the Employer by insurers prior to cancellation or material modification of a policy.</p> <p>42.4 The Contractor shall ensure that, where applicable, its Subcontractor(s) shall take out and maintain in effect adequate insurance policies for their personnel and vehicles and for work executed by them under the Contract, unless such Subcontractors are covered by the policies taken out by the Contractor.</p> <p>42.5 Unless otherwise provided in the Contract, the Contractor shall prepare and conduct all and any claims made under the policies effected by it pursuant to this GCC Clause 42, and all monies payable by any insurers shall be paid to the Contractor. The Employer shall give to the Contractor all such reasonable assistance as may be required by the Contractor. With respect to insurance claims in which the Employer's interest is involved, the Contractor shall not give any release or make any compromise with the insurer without the prior written consent of the Employer. With respect to insurance claims in which the Contractor's interest is involved, the Employer shall not give any release or make any compromise with the insurer without the prior written consent of the Contractor.</p>
<p>43. Unforeseen Conditions</p>	<p>43.1 If, during the execution of the Contract, the Contractor shall encounter on the Site any physical conditions other than climatic conditions, or artificial obstructions that could not have been reasonably foreseen prior to the date of the Contract Agreement by an experienced Contractor on the basis of reasonable examination of the data relating to the Works provided by the Employer, and on the basis of information that</p>

it could have obtained from a visual inspection of the Site if access thereto was available, or other data readily available to it relating to the Works, and if the Contractor determines that it will in consequence of such conditions or obstructions incur additional cost and expense or require additional time to perform its obligations under the Contract that would not have been required if such physical conditions or artificial obstructions had not been encountered, the Contractor shall promptly, and before performing additional work or using additional equipment, notify the Engineer in writing of

- (a) the physical conditions or artificial obstructions on the Site that could not have been reasonably foreseen;
- (b) the additional work or equipment required, including the steps which the Contractor will or proposes to take to overcome such conditions or obstructions;
- (c) the extent of the anticipated delay; and
- (d) the additional cost and expense that the Contractor is likely to incur.

On receiving any notice from the Contractor under this GCC Sub- Clause 43.1, the Engineer shall decide upon the actions to be taken to overcome the physical conditions or artificial obstructions encountered. Following such consultations, the Engineer shall instruct the Contractor, with a copy to the Employer, of the actions to be taken.

43.1.1 Incorrect information on the condition and location of the distribution network including the incorrectness of maps of the distribution network e.g. wrong location, diameter, material, age or other information of pipelines shown or pipelines additionally found and not shown on the map, or of the overall condition of the network, are expressly excluded from being considered as Unforeseen Conditions under GCC Sub-Clause 43.1 and as such GCC Clause 43 shall not apply.

43.1.2 Actual water loss levels higher or lower than the average figure used for the comparison of the bid prices as well as the technical difficulties with leak detection in low pressure systems and/or at locations with high groundwater levels or high background and traffic noise, are expressly excluded from being considered as Unforeseen Conditions under GCC Clause 43.1 and as such GCC Sub-Clause 43 shall not apply.

43.2 Any reasonable additional cost and expense incurred by the Contractor in following the instructions from the Engineer to overcome such physical conditions or artificial obstructions referred to in GCC Sub-Clause 43.1 shall be paid by the Employer to the Contractor as an addition to the Contract Price.

43.3 If the Contractor is delayed or impeded in the performance of the Contract because of any such physical conditions or

	<p>artificial obstructions referred to in GCC Sub-Clause 43.1, the Time for Completion shall be extended in accordance with GCC Clause 48.</p>
<p>44. Change in Laws and Regulations</p>	<p>44.1 If, after the date twenty-eight (28) days prior to the date of Bid submission, in the country where the Site is located, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed which shall be deemed to include any change in interpretation or application by the competent authorities, that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with the PCC, pursuant to GCC Sub-Clause 17.1.</p>
<p>45. Force Majeure</p>	<p>45.1 “Force Majeure” shall mean any event beyond the reasonable control of the Employer or of the Contractor, as the case may be, and which is unavoidable notwithstanding the reasonable care of the party affected, and shall include, without limitation, the following:</p> <p>war, hostilities or warlike operations whether a state of war be declared or not, invasion, act of foreign enemy and civil war</p> <p>rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion and terrorist acts</p> <p>confiscation, nationalization, mobilization, commandeering or requisition by or under the order of any government or de jure or de facto authority or ruler or any other act or failure to act of any local state or national government authority</p> <p>strike, sabotage, lockout, embargo, import restriction, port congestion, lack of usual means of public transportation and communication, industrial dispute, shipwreck, shortage or restriction of power supply, epidemics, quarantine and plague</p> <p>earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear and pressure waves or other natural or physical disaster</p> <p>shortage of labor, materials or utilities where caused by</p>

	<p>circumstances that are themselves Force Majeure.</p> <p>45.2 If either party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within fourteen (14) days after the occurrence of such event.</p> <p>45.3 The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered or delayed. The Time for Completion shall be extended in accordance with GCC Clause 48.</p> <p>45.4 The party or parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect thereof upon its or their performance of the Contract and to fulfill its or their obligations under the Contract, but without prejudice to either party's right to terminate the Contract under GCC Sub-Clauses 45.6 and 46.5.</p> <p>45.5 No delay or nonperformance by either party hereto caused by the occurrence of any event of Force Majeure shall</p> <ul style="list-style-type: none"> (a) constitute a default or breach of the Contract, or (b) give rise to any claim for damages or additional cost or expense occasioned thereby, subject to GCC Sub-Clauses 40.2, 46.3 and 46.4. <p>if and to the extent that such delay or nonperformance is caused by the occurrence of an event of Force Majeure.</p> <p>45.6 If the performance of the Contract is substantially prevented, hindered or delayed for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of one or more events of Force Majeure during the currency of the Contract, the parties will attempt to develop a mutually satisfactory solution, failing which either party may terminate the Contract by giving a notice to the other, but without prejudice to either party's right to terminate the Contract under GCC Sub-Clause 46.5.</p> <p>45.7 In the event of termination pursuant to GCC Sub-Clause 45.6, the rights and obligations of the Employer and the Contractor shall be as specified in GCC Sub-Clauses 50.1.2 and 50.1.3.</p> <p>45.8 Notwithstanding GCC Sub-Clause 45.5, Force Majeure shall not apply to any obligation of the Employer to make payments to the Contractor herein.</p>
46. War Risks	46.1 "War Risks" shall mean any event specified in paragraphs (a)

and (b) of GCC Sub-Clause 45.1 and any explosion or impact of any mine, bomb, shell, grenade or other projectile, missile, munitions or explosive of war, occurring or existing in or near the country (or countries) where the Site is located.

46.2 Notwithstanding anything contained in the Contract, the Contractor shall have no liability whatsoever for or with respect to

- (a) destruction of or damage to the Works, or any part thereof;
- (b) destruction of or damage to property of the Employer or any third party; or
- (c) injury or loss of life

if such destruction, damage, injury or loss of life is caused by any War Risks, and the Employer shall indemnify and hold the Contractor harmless from and against any and all claims, liabilities, actions, lawsuits, damages, costs, charges or expenses arising in consequence of or in connection with the same.

46.3 If the Works or Contractor's equipment or any other property of the Contractor used or intended to be used for the purposes of the Works shall sustain destruction or damage by reason of any War Risks, the Employer shall pay the Contractor for

- (a) any part of the Works destroyed or damaged to the extent not already paid for by the Employer and so far as may be required by the Employer, and as may be necessary for completion of the Works
- (b) replacing or making good any Contractor's equipment or other property of the Contractor so destroyed or damaged
- (c) replacing or making good any such destruction or damage to the Works or any part thereof.

If the Employer does not require the Contractor to replace or make good any such destruction or damage to the Works, the Employer shall either request a change in accordance with GCC Clause 47, excluding the performance of that part of the Works thereby destroyed or damaged or, where the loss, destruction or damage affects a substantial part of the Works, shall terminate the Contract, pursuant to GCC Sub-Clause 50.1.

If the Employer requires the Contractor to replace or make good on any such destruction or damage to the Works, the Time for Completion shall be extended in accordance with GCC 48.

46.4 Notwithstanding anything contained in the Contract, the Employer shall pay the Contractor for any increased costs or incidentals to the execution of the Contract that are in any way

attributable to, consequent on, resulting from, or in any way connected with any War Risks, provided that the Contractor shall as soon as practicable notify the Employer in writing of any such increased cost.

46.5 If during the performance of the Contract any War Risks shall occur that financially or otherwise materially affect the execution of the Contract by the Contractor, the Contractor shall use its reasonable efforts to execute the Contract with due and proper consideration given to the safety of its and its Subcontractors' personnel engaged in the work on the Works, provided, however, that if the execution of the work on the Works becomes impossible or is substantially prevented for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of any War Risks, the parties will attempt to develop a mutually satisfactory solution, failing which either party may terminate the Contract by giving a notice to the other.

46.6 In the event of termination pursuant to GCC Sub-Clauses 46.3 or 46.5, the rights and obligations of the Employer and the Contractor shall be specified in GCC Sub-Clauses 50.1.2 and 50.1.3.

H Change in Contract Elements

<p>47. Change in the Works and Services</p>	<p>47.1 Introducing a Change</p> <p>47.1.1 Subject to GCC Sub-Clauses 47.2.5 and 47.2.7, the Employer shall have the right to propose, and subsequently require, that the Engineer order the Contractor from time to time during the performance of the Contract to make any change, modification, addition or deletion to, in or from the Works and Services hereinafter called “Change”, provided that such Change falls within the general scope of the Works and Services and does not constitute unrelated work and that it is technically practicable, taking into account both the state of advancement of the Works and Services and the technical compatibility of the Change envisaged with the nature of the Works and Services as specified in the Contract.</p> <p>47.1.2 The Contractor may from time to time during its performance of the Contract propose to the Employer with a copy to the Engineer, any Change that the Contractor considers necessary or desirable to improve the quality, efficiency or safety of the Works and Services. The Employer may at its discretion approve or reject any Change proposed by the Contractor, provided that the Employer shall approve any Change proposed by the Contractor to ensure the safety of the Works and Services.</p> <p>47.1.3 Notwithstanding GCC Sub-Clauses 47.1.1 and 47.1.2, no change made necessary because of any default of the Contractor in the performance of its obligations under the Contract shall be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Completion.</p> <p>47.1.4 The procedure on how to proceed with and execute Changes is specified in GCC Sub-Clauses 47.2 and 47.3, and further details and forms are provided in Section 6, Employer’s Requirements.</p> <p>47.2 Changes Originating from Employer</p> <p>47.2.1 If the Employer proposes a Change pursuant to GCC Sub- Clause 47.1.1, it shall send to the Contractor a “Request for Change Proposal,” requiring the Contractor to prepare and furnish to the Engineer as soon as reasonably practicable a “Change Proposal,” which shall include the following:</p>
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- (a) brief description of the Change
- (b) effect on the Time for Completion
- (c) estimated cost of the Change
- (d) effect on the Works and Services
- (e) effect on any other provisions of the Contract.

47.2.2 Prior to preparing and submitting the "Change Proposal," the Contractor shall submit to the Engineer an "Estimate for Change Proposal," which shall be an estimate of the cost of preparing and submitting the Change Proposal.

Upon receipt of the Contractor's Estimate for Change Proposal, the Employer shall do one of the following:

- (a) accept the Contractor's estimate with instructions to the Contractor to proceed with the preparation of the Change Proposal
- (b) advise the Contractor of any part of its Estimate for Change Proposal that is unacceptable and request the Contractor to review its estimate
- (c) advise the Contractor that the Employer does not intend to proceed with the Change.

47.2.3 Upon receipt of the Employer's instruction to proceed under GCC Sub-Clause 47.2.2 (a), the Contractor shall, with proper expedition, proceed with the preparation of the Change Proposal, in accordance with GCC Sub-Clause 47.2.1.

47.2.4 The pricing of any Change shall, as far as practicable, be calculated in accordance with the rates and prices included in the Contract. If such rates and prices are inequitable, the parties thereto shall agree on specific rates as specified in PCC for the valuation of the Change.

47.2.5 If before or during the preparation of the Change Proposal it becomes apparent that the aggregate effect of compliance therewith and with all other Change Orders that have already become binding upon the Contractor under this GCC Clause 47 would be to increase or decrease the Contract Price by more than fifteen percent (15%), the Contractor may give a written notice of objection thereto prior to furnishing the Change Proposal as aforesaid. If the Employer accepts the Contractor's objection, the Employer shall withdraw the proposed Change and shall notify the Contractor in writing thereof.

The Contractor's failure to so object shall neither affect its right to object to any subsequent requested Changes or Change Orders herein, nor affect its right to take into account, when making such subsequent objection, the percentage increase or decrease in the Contract Price that any Change not objected to by the Contractor represents.

47.2.6 Upon receipt of the Change Proposal, the Employer and the Contractor shall mutually agree upon all matters therein contained. Within fourteen (14) days after such agreement, the Employer shall, if it intends to proceed with the Change, issue the Contractor with a Change Order.

If the Employer is unable to reach a decision within fourteen (14) days, it shall notify the Contractor with details of when the Contractor can expect a decision.

If the Employer decides not to proceed with the Change for whatever reason, it shall, within the said period of fourteen (14) days, notify the Contractor accordingly. Under such circumstances, the Contractor shall be entitled to reimbursement of all costs reasonably incurred by it in the preparation of the Change Proposal, provided that these do not exceed the amount given by the Contractor in its Estimate for Change Proposal submitted in accordance with GCC Sub-Clause 47.2.2.

47.2.7 If the Employer and the Contractor cannot reach agreement on the price for the Change, an equitable adjustment to the Time for Completion, or any other matters identified in the Change Proposal, the Employer may nevertheless instruct the Contractor to proceed with the Change by issue of a "Pending Agreement Change Order."

Upon receipt of a Pending Agreement Change Order, the Contractor shall immediately proceed with effecting the Changes covered by such Order. The parties shall thereafter attempt to reach agreement on the outstanding issues under the Change Proposal.

If the parties cannot reach agreement within sixty (60) days from the date of issue of the Pending Agreement Change Order, then the matter may be referred to the

	<p>Dispute Board in accordance with the provisions of GCC Sub-Clause 53.3.</p> <p>47.2.8 Extension of Service Areas</p> <p>Employer shall reserve the right within contract period, to increase or decrease the geographical coverage of Service Area not exceeding 25% of the Service Area. The extension of service area may include addition of new areas outside or inside the present project area. Change in the geographical coverage of Service Area under this Clause shall not be reckoned as Change of Scope and the Contractor shall continue to perform obligation under this Agreement as per the terms of this Agreement. Further, In the event that the Employer extends the Service Area, so as to require the Contractor to construct, operate and maintain the Project Facilities in respect of such extended Service Area, the provision of the Services to such part of the Service Area as may be specified, shall continue to be subject to the rights and obligations given to Contractor under this Agreement. Employer shall ensure that the rights of the Contractor in relation to the Project shall continue undisturbed and Contractor shall continue to exercise complete and unimpeded control thereon and shall render Service in such extended Service Area as if it was a part to it originally.</p> <p>47.3 Changes Originating from Contractor</p> <p>47.3.1 If the Contractor proposes a Change pursuant to GCC Sub- Clause 47.1.2, the Contractor shall submit to the Engineer a written “Application for Change Proposal,” giving reasons for the proposed Change and including the information specified in GCC Sub-Clause 47.2.1.</p> <p>Upon receipt of the Application for Change Proposal, the parties shall follow the procedures outlined in GCC Sub- Clauses 47.2.6 and 47.2.7. However, should the Employer choose not to proceed, the Contractor shall not be entitled to recover the costs of preparing the Application for Change Proposal.</p>
<p>48. Extension of Time for Completion</p>	<p>48.1 The Time(s) for Completion specified in the PCC shall be extended if the Contractor is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following:</p> <ul style="list-style-type: none"> (a) any Change in the Works and Services as provided in GCC Clause 47 (b) any occurrence of Force Majeure as provided in GCC Clause 46 Unforeseen Conditions as provided in GCC

Clause 43, or other occurrence of any of the matters specified or referred to in paragraphs (a), (b) and (c) of GCC Sub-Clause 40.2

- (c) any suspension order given by the Employer under GCC Clause 49 hereof or reduction in the rate of progress pursuant to GCC Sub-Clause 49.2 or
- (d) any changes in laws and regulations as provided in GCC Clause 45 or
- (e) any default or breach of the Contract by the Employer, or any activity, act or omission of the Employer, or the Engineer, or any other contractors employed by the Employer or
- (f) any other matter specifically mentioned in the Contract
- (g) any delay on the part of a sub-contractor, provided such delay is due to a cause for which the Contractor himself would have been entitled to an extension of time under this sub-clause

by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Contractor.

48.2 Except where otherwise specifically provided in the Contract, the Contractor shall submit to the Engineer a notice of a claim for an extension of the Time for Completion, together with particulars of the event or circumstance justifying such extension as soon as reasonably practicable after the commencement of such event or circumstance. As soon as reasonably practicable after receipt of such notice and supporting particulars of the claim, the Employer and the Contractor shall agree upon the period of such extension. In the event that the Contractor does not accept the Employer's estimate of a fair and reasonable time extension, the Contractor shall be entitled to refer the matter to a Dispute Board, pursuant to GCC Sub-Clause 53.3.

48.3 The Contractor shall at all times use its reasonable efforts to minimize any delay in the performance of its obligations under the Contract.

In all cases where the Contractor has given notice of a claim for an extension of time under GCC 48.2, the Contractor shall consult with the Engineer in order to determine the steps (if any) which can be taken to overcome or minimize the actual or anticipated delay. The Contractor shall thereafter comply with all reasonable instructions which the Engineer shall give in order to minimize such delay. If compliance with such instructions shall cause the Contractor to incur extra costs and

	<p>the Contractor is entitled to an extension of time under GCC 48.1, the amount of such extra costs shall be added to the Contract Price.</p>
<p>49. Suspension</p>	<p>49.1 The Employer may request the Engineer, by notice to the Contractor, to order the Contractor to suspend performance of any or all of its obligations under the Contract. Such notice shall specify the obligation of which performance is to be suspended, the effective date of the suspension and the reasons therefore. The Contractor shall thereupon suspend performance of such obligation, except those obligations necessary for the care or preservation of the Works, until ordered in writing to resume such performance by the Engineer.</p> <p>If, by virtue of a suspension order given by the Engineer, other than by reason of the Contractor’s default or breach of the Contract, the Contractor’s performance of any of its obligations is suspended for an aggregate period of more than ninety (90) days, then at any time thereafter and provided that at that time such performance is still suspended, the Contractor may give a notice to the Engineer requiring that the Employer shall, within twenty-eight (28) days of receipt of the notice, order the resumption of such performance or request and subsequently order a change in accordance with GCC Clause 47, excluding the performance of the suspended obligations from the Contract.</p> <p>If the Employer fails to do so within such period, the Contractor may, by a further notice to the Engineer, elect to treat the suspension, where it affects a part only of the Works and Services, as a deletion of such part in accordance with GCC Clause 47 or, where it affects the whole of the Works and Services, as termination of the Contract under GCC Sub-Clause 50.1.</p> <p>49.2 If</p> <p>(a) the Employer has failed to pay the Contractor any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause or commits a substantial breach of the Contract, the Contractor may give a notice to the Employer that requires payment of such sum, with interest thereon as stipulated in GCC Sub-Clause 13.7, requires approval of such invoice or supporting documents, or specifies the breach and requires the Employer to remedy the same, as the case may be. If the Employer fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, or fails to remedy the breach</p>

	<p>or take steps to remedy the breach within sixty (60) days after receipt of the Contractor's notice or</p> <p>(b) the Contractor is unable to carry out any of its obligations under the Contract for any reason attributable to the Employer, including but not limited to the Employer's failure to provide possession of or access to the Site or other areas in accordance with GCC Sub-Clause 11.3, or failure to obtain any governmental permit necessary for the execution and/or completion of the Works and Services.,</p> <p>then the Contractor may by thirty (30) days' notice to the Employer suspend performance of all or any of its obligations under the Contract, or reduce the rate of progress.</p> <p>49.3 If the Contractor's performance of its obligations is suspended or the rate of progress is reduced pursuant to this GCC Clause 49, then the Time for Completion shall be extended in accordance with GCC Sub- Clause 48, and any and all additional costs or expenses incurred by the Contractor as a result of such suspension or reduction shall be paid by the Employer to the Contractor in addition to the Contract Price, except in the case of suspension order or reduction in the rate of progress by reason of the Contractor's default or breach of the Contract.</p> <p>49.4 During the period of suspension, the Contractor shall not remove from the Site, any part of the Works or any Contractor's equipment, without the prior written consent of the Employer.</p>
<p>50. Termination</p>	<p>50.1 Termination for Employer's Convenience</p> <p>50.1.1 The Employer may at any time terminate the Contract for any reason by giving the Contractor a notice of termination that refers to this GCC Sub-Clause 50.1.</p> <p>50.1.2 Upon receipt of the notice of termination under GCC Sub- Clause 50.1.1, the Contractor shall either immediately or upon the date specified in the notice of termination</p> <p>(a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Works already executed, or any work required to leave the Site in a clean and safe condition</p> <p>(b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) (ii) below</p> <p>(c) remove all Contractor's equipment from the Site,</p>

repatriate the Contractor's and its Subcontractors' personnel from the Site, remove from the Site any wreckage, rubbish and debris of any kind, and leave the whole of the Site in a clean and safe condition, and

- (d) subject to the payment specified in GCC Sub-Clause 50.1.3,
- (i) deliver to the Employer the parts of the Works executed by the Contractor up to the date of termination
- (ii) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Works as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors; and
- (iii) deliver to the Employer all non-proprietary drawings, specifications and other documents prepared by the Contractor or its Subcontractors as at the date of termination in connection with the Works.

50.1.3 In the event of termination of the Contract under GCC Sub-Clause 50.1.1, the Employer shall pay to the Contractor the following amounts:

- (a) the Contract Price, properly attributable to the parts of the Works and Services executed by the Contractor as of the date of termination
- (b) the costs reasonably incurred by the Contractor in the removal of the Contractor's equipment from the Site and in the repatriation of the Contractor's and its Subcontractors' personnel
- (c) costs incurred by the Contractor in protecting the Works and leaving the Site in a clean and safe condition pursuant to paragraph (a) of GCC Sub-Clause 50.1.2
- (d) the cost of satisfying all other obligations, commitments and claims that the Contractor may in good faith have undertaken with third parties in connection with the Contract and that are not covered by paragraphs (a) through (c) above.

50.2 Termination for Contractor's Default

50.2.1 The Employer, without prejudice to any other rights or remedies it may possess, may terminate the Contract forthwith in the following circumstances by giving a notice of termination and its reasons therefore to the

Contractor, referring to this GCC Sub-Clause 50.2.

- (a) if the Contractor becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, if the Contractor is a corporation, a resolution is passed or order is made for its winding up, other than a voluntary liquidation for the purposes of amalgamation or reconstruction, a receiver is appointed over any part of its undertaking or assets, or if the Contractor takes or suffers any other analogous action in consequence of debt
- (b) if the Contractor assigns or transfers the Contract or any right or interest therein in violation of the provision of GCC Clause 51.
- (c) if the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices, as defined in GCC Clause 6, in competing for or in executing the Contract.

50.2.2 If the Contractor

- (a) has abandoned or repudiated the Contract
 - (b) has without valid reason failed to commence the Works and Services promptly or has suspended, other than pursuant to GCC Sub-Clause 49.2, the progress of Contract performance for more than twenty-eight (28) days after receiving a written instruction from the Employer to proceed
 - (c) persistently fails to execute the Contract in accordance with the Contract or persistently neglects to carry out its obligations under the Contract without just cause
 - (d) refuses or is unable to provide sufficient materials, services or labor to execute and complete the Works and Services in the manner specified in the work program furnished under GCC Sub-Clause 26.2 at rates of progress that give reasonable assurance to the Employer that the Contractor can attain completion of the Works and Services by the Time for Completion as extended,
- then the Employer may, without prejudice to any other rights it may possess under the Contract, give a notice to the Contractor stating the nature of the default and requiring the Contractor to remedy the same. If the Contractor fails to remedy or to take steps to remedy the same within fourteen (28) days of its

receipt of such notice, then the Employer may terminate the Contract forthwith by giving a notice of termination to the Contractor that refers to this GCC Sub-Clause 50.2.

50.2.3 Upon receipt of the notice of termination under GCC Sub-Clauses 50.2.1 or 50.2.2, the Contractor shall, either immediately or upon such date as is specified in the notice of termination,

(a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Works already executed, or any work required to leave the site in a clean and safe condition

(b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) below

(c) deliver to the Employer the parts of the Works executed by the Contractor up to the date of termination

(d) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Works as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors

(e) deliver to the Employer all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Works.

50.2.4 The Employer may enter upon the Site, expel the Contractor, and complete the Works and Services itself or by employing any third party. The Employer may, to the exclusion of any right of the Contractor over the same, takeover and use with the payment of a fair rental rate to the Contractor, with all the maintenance costs to the account of the Employer and with an indemnification by the Employer for all liability including damage or injury to persons arising out of the Employer's use of such equipment, any Contractor's equipment owned by the Contractor and on the Site in connection with the Works and Services for such reasonable period as the Employer considers expedient for the completion of the Works and Services.

Upon completion of the Works and Services or at such earlier date as the Employer thinks appropriate, the Employer shall give notice to the Contractor that such Contractor's equipment will be returned to the Contractor at or near the Site and shall return such Contractor's equipment to the Contractor in accordance with such notice. The Contractor shall thereafter without delay and at its cost remove or arrange removal of the same from the Site.

50.2.5 Subject to GCC Sub-Clause 50.2.6, the Contractor shall be entitled to be paid the Contract Price attributable to the Works and Services executed as of the date of termination, and the costs, if any, incurred in protecting the Works and in leaving the Site in a clean and safe condition pursuant to paragraph (a) of GCC Sub-Clause 50.2.3. Any sums due the Employer from the Contractor accruing prior to the date of termination shall be deducted from the amount to be paid to the Contractor under this Contract.

50.2.6 If the Employer completes the Works and Services, the cost of completing the Works and Services by the Employer shall be determined.

If the sum that the Contractor is entitled to be paid, pursuant to GCC Sub-Clause 50.2.5, plus the reasonable costs incurred by the Employer in completing the Works and Services, exceeds the Contract Price, the Contractor shall be liable for such excess.

If such excess is greater than the sums due the Contractor under GCC Sub-Clause 50.2.5, the Contractor shall pay the balance to the Employer, and if such excess is less than the sums due the Contractor under GCC Sub-Clause 50.2.5, the Employer shall pay the balance to the Contractor.

The Employer and the Contractor shall agree, in writing, on the computation described above and the manner in which any sums shall be paid.

50.3 Termination by Contractor

50.3.1 If

(a) the Employer has failed to pay the Contractor any sum due under the Contract within the specified

period, has failed to approve any invoice or supporting documents without just cause, or commits a substantial breach of the Contract, the Contractor may give a notice to the Employer that requires payment of such sum, with interest thereon as stipulated in GCC Sub-Clause 13.7, requires approval of such invoice or supporting documents, or specifies the breach and requires the Employer to remedy the same, as the case may be. If the Employer fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, fails to remedy the breach or take steps to remedy the breach within sixty (60) days after receipt of the Contractor's notice, or

- (b) the Contractor is unable to carry out any of its obligations under the Contract for any reason attributable to the Employer, including but not limited to the Employer's failure to provide possession of or access to the Site or other areas or failure to obtain any governmental permit necessary for the execution and/or completion of the Works and Services,

then the Contractor may give notice to the Employer thereof, and if the Employer has failed to pay the outstanding sum, to approve the invoice or supporting documents, to give its reasons for withholding such approval, or to remedy the breach within sixty (60) days of such notice, or if the Contractor is still unable to carry out any of its obligations under the Contract for any reason attributable to the Employer within sixty (60) days of the said notice, the Contractor may by a further notice to the Employer referring to this GCC Sub-Clause 50.3.1, forthwith terminate the Contract.

50.3.2 The Contractor may terminate the Contract forthwith by giving a notice to the Employer to that effect, referring to this GCC Sub-Clause 50.3.2, if the Employer becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, being a corporation, if a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Employer takes or

suffers any other analogous action in consequence of debt.

50.3.3 If the Contract is terminated under GCC Sub-Clauses 50.3.1 or 50.3.2, then the Contractor shall immediately

(a) cease all further work, except for such work as may be necessary for the purpose of protecting that part of the Works already executed, or any work required to leave the Site in a clean and safe condition

(b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) (ii)

(c) remove all Contractor's Equipment from the Site and repatriate the Contractor's and its Subcontractors' personnel from the Site, and

(d) subject to the payment specified in GCC Sub-Clause 50.3.4,

(i) deliver to the Employer the parts of the Works executed by the Contractor up to the date of termination

(ii) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Works as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors, and

(iii) deliver to the Employer all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Works and Services.

50.3.4 If the Contract is terminated under GCC Sub-Clauses 50.3.1 or 50.3.2, the Employer shall pay to the Contractor all payments specified in GCC Sub-Clause 50.1.3, and reasonable compensation for all loss, except for loss of profit, or damage sustained by the Contractor arising out of, in connection with or in consequence of such termination.

50.3.5 Termination by the Contractor pursuant to this GCC Sub-Clause 50.3 is without prejudice to any other

	<p>rights or remedies of the Contractor that may be exercised in lieu of or in addition to rights conferred by GCC Sub-Clause 50.3.</p> <p>50.4 In this GCC Clause 50, the expression “Works executed” shall include all Works executed and Services provided, or subject to a legally binding obligation to purchase, by the Contractor and used or intended to be used for the purpose of the Works, up to and including the date of termination.</p> <p>50.5 In this GCC Clause 50, in calculating any monies due from the Employer to the Contractor, account shall be taken of any sum previously paid by the Employer to the Contractor under the Contract, including any advance payment paid pursuant to the Contract Agreement.</p>
<p>51. Assignment</p>	<p>51.1 Neither the Employer nor the Contractor shall, without the express prior written consent of the other party which consent shall not be unreasonably withheld, assign to any third party the Contract or any part thereof, or any right, benefit, obligation or interest therein or thereunder, except that the Contractor shall be entitled to assign either absolutely or by way of charge any monies due and payable to it or that may become due and payable to it under the Contract.</p>

T Claims, Disputes, Arbitration

<p>52. Contractor's Claims</p>	<p>52.1 If the Contractor considers himself to be entitled to any extension of the Time for Completion and/or any additional payment, under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall submit a notice to the Engineer, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 28 days after the Contractor became aware, or should have become aware, of the event or circumstance.</p> <p>If the Contractor fails to give notice of a claim within such period of 28 days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Employer shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Sub-Clause 52.1 shall apply.</p> <p>The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance.</p> <p>The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the Engineer. Without admitting the Employer's liability, the Engineer may, after receiving any notice under this Sub-Clause 53.1, monitor the record-keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Engineer to inspect all these records, and shall (if instructed) submit copies to the Engineer.</p> <p>Within 42 days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the Engineer, the Contractor shall send to the Engineer a fully detailed claim which includes full supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect:</p> <ul style="list-style-type: none">(a) this fully detailed claim shall be considered as interim;(b) the Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the Engineer may reasonably require; and(c) the Contractor shall send a final claim within 28 days after the end of the effects resulting from the event or circumstance,
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or within such other period as may be proposed by the Contractor and approved by the Engineer.

Within 42 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Engineer and approved by the Contractor, the Engineer shall respond with approval, or with disapproval and detailed comments. He may also request any necessary further particulars, but shall nevertheless give his response on the principles of the claim within such time.

Each payment certified by the Employer shall include such amounts for any claim as have been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the claim, the Contractor shall only be entitled to payment for such part of the claim as he has been able to substantiate.

The Engineer shall agree with the Contractor or estimate: (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with GCC Clause 48, and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

The requirements of this Sub-Clause 52.1 are in addition to those of any other Sub-Clause which may apply to a claim. If the Contractor fails to comply with this or another Sub-Clause in relation to any claim, any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Sub-Clause 52.1.

In the event that the Contractor and the Employer cannot agree on any matter relating to a claim, either party may refer the matter to the Dispute Board pursuant to GCC Sub Clause 53.3 hereof.

52.2 Claim for compensation for delay in starting the work

No compensation shall be allowed for any delay caused in the starting of the work on account of acquisition of land or in the case of clearance works on account of any delay in according to sanction of estimates.

52.3 Claim for compensation for delay in execution of the work

No compensation shall be allowed for any delay in the execution of the work on account of water standing in borrow pits or compartments the rates are inclusive for hard or cracked soil Excavation in mud, sub soil , water standing in borrow pits and

	<p>no claim for an extra rate shall be entertained, unless otherwise expressly specified.</p>
<p>53. Disputes and Arbitration</p>	<p>53.1 Appointment of the Dispute Board</p> <p>Disputes shall be referred to a DB for decision in accordance with GCC Sub-Clause 53.3. The Parties shall appoint a DB by the date stated in the PCC.</p> <p>The DB shall comprise, as stated in the PCC, either one or three suitably qualified persons (“the members”), each of whom shall be fluent in the language for communication defined in the Contract and shall be a professional experienced in the type of activities involved in the performance of the Contract and with the interpretation of contractual documents. If the number is not so stated and the Parties do not agree otherwise, the DB shall comprise three persons, one of whom shall serve as chairman.</p> <p>If the Parties have not jointly appointed the DB 21 days before the date stated in the PCC and the DB is to comprise three persons, each Party shall nominate one member for the approval of the other Party. The first two members shall recommend and the Parties shall agree upon the third member, who shall act as chairman.</p> <p>However, if a list of potential members is included in the PCC, the members shall be selected from those on the list, other than anyone who is unable or unwilling to accept appointment to the DB.</p> <p>The agreement between the Parties and either the sole member or each of the three members shall incorporate by reference the General Conditions of Dispute Board Agreement contained in the Appendix to these General Conditions, with such amendments as are agreed between them.</p> <p>The terms of the remuneration of either the sole member or each of the three members, including the remuneration of any expert whom the DB consults, shall be mutually agreed upon by the Parties when agreeing the terms of appointment of the member or such expert (as the case may be). Each Party shall be responsible for paying one-half of this remuneration.</p> <p>If a member declines to act or is unable to act as a result of death, disability, resignation or termination of appointment, a replacement shall be appointed in the same manner as the replaced person was required to have been nominated or agreed upon, as described in this Sub-Clause.</p> <p>The appointment of any member may be terminated by mutual agreement of both Parties, but not by the Employer or the Contractor acting alone. Unless otherwise agreed by both</p>

Parties, the appointment of the DB (including each member) shall expire when the Take-Over Certificate has been issued in accordance with GCC Clause 33.

53.2 Failure to Agree Dispute Board

If any of the following conditions apply, namely:

- (a) the Parties fail to agree upon the appointment of the sole member of the DB by the date stated in the first paragraph of GCC Sub-Clause 53.1,
- (b) either Party fails to nominate a member (for approval by the other Party) of a DB of three persons by such date,
- (c) the Parties fail to agree upon the appointment of the third member (to act as chairman) of the DB by such date, or
- (d) the Parties fail to agree upon the appointment of a replacement person within 42 days after the date on which the sole member or one of the three members declines to act or is unable to act as a result of death, disability, resignation or termination of appointment,
- (e) then the appointing entity or official named in the PCC shall, upon the request of either or both of the Parties and after due consultation with both Parties, appoint this member of the DB. This appointment shall be final and conclusive. Each Party shall be responsible for paying one-half of the remuneration of the appointing entity or official.

53.3 Obtaining Dispute Board's Decision

If a dispute (of any kind whatsoever) arises between the Parties in connection with the performance of the Contract, including any dispute as to any certificate, determination, instruction, opinion or valuation of the Engineer, either Party may refer the dispute in writing to the DB for its decision, with copies to the other Party and the Engineer. Such reference shall state that it is given under this Sub-Clause 53.3.

For a DB of three persons, the DB shall be deemed to have received such reference on the date when it is received by the chairman of the DB.

Both Parties shall promptly make available to the DB all such additional information, further access to the Site, and appropriate facilities, as the DB may require for the purposes of making a decision on such dispute. The DB shall be deemed to be not acting as arbitrator(s).

Within 84 days after receiving such reference, or within such other period as may be proposed by the DB and approved by both Parties, the DB shall give its decision, which shall be

reasoned and shall state that it is given under this Sub-Clause 53.3. The decision shall be binding on both Parties, who shall promptly give effect to it unless and until it shall be revised in an amicable settlement or an arbitral award as described below. Unless the Contract has already been abandoned, repudiated or terminated, the Contractor shall continue to proceed with the performance of the Works and Services in accordance with the Contract.

If either Party is dissatisfied with the DB's decision, then either Party may, within 28 days after receiving the decision, give notice to the other Party of its dissatisfaction and intention to commence arbitration. If the DB fails to give its decision within the period of 84 days (or as otherwise approved) after receiving such reference, then either Party may, within 28 days after this period has expired, give notice to the other Party of its dissatisfaction and intention to commence arbitration.

In either event, this notice of dissatisfaction shall state that it is given under this Sub-Clause 53.3, and shall set out the matter in dispute and the reason(s) for dissatisfaction. Except as stated in GCC Sub- Clauses 53.6 and 53.7, neither Party shall be entitled to commence arbitration of a dispute unless a notice of dissatisfaction has been given in accordance with this Sub-Clause.

If the DB has given its decision as to a matter in dispute to both Parties, and no notice of dissatisfaction has been given by either Party within 28 days after it received the DB's decision, then the decision shall become final and binding upon both Parties.

53.4 Amicable Settlement

Where notice of dissatisfaction has been given under GCC Sub-Clause 53.3 above, both Parties shall attempt to settle the dispute amicably before the commencement of arbitration. However, unless both Parties agree otherwise, arbitration may be commenced on or after the fifty-sixth day after the day on which notice of dissatisfaction and intention to commence arbitration was given, even if no attempt at amicable settlement has been made.

53.5 Arbitration

Unless settled amicably, any dispute in respect of which the DB's decision (if any) has not become final and binding shall be finally settled by arbitration. Unless otherwise agreed by both Parties:

- (a) arbitration proceedings shall be conducted as stated in the Special Conditions,
- (b) if no arbitration proceedings is so stated, the dispute shall be

finally settled by institutional arbitration under the Rules of Arbitration of the International Chamber of Commerce,

(c) the dispute shall be settled by three arbitrators, and

(d) the arbitration shall be conducted in the language for communications defined in GCC Sub-Clause 5.2.

The arbitrator(s) shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Engineer, and any decision of the DB, relevant to the dispute. Nothing shall disqualify the Engineer from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute.

Neither Party shall be limited in the proceedings before the arbitrator(s) to the evidence or arguments previously put before the DB to obtain its decision, or to the reasons for dissatisfaction given in its notice of dissatisfaction. Any decision of the DB shall be admissible in evidence in the arbitration.

Arbitration may be commenced prior to or after completion of the Works. The obligations of the Parties, the Engineer and the DB shall not be altered by reason of any arbitration being conducted during the progress of the Works.

53.6 Failure to Comply with Dispute Board's Decision

In the event that a Party fails to comply with a DB decision which has become final and binding, then the other Party may, without prejudice to any other rights it may have, refer the failure itself to arbitration under GCC Sub-Clause 53.5. GCC Sub-Clauses 53.3 and 53.4 shall not apply to this reference.

53.7 Expiry of Dispute Board's Appointment

If a dispute arises between the Parties in connection with the performance of the Contract, and there is no DB in place, whether by reason of the expiry of the DB's appointment or otherwise:

(a) GCC Sub-Clauses 53.3 and 53.4 shall not apply, and

(b) the dispute may be referred directly to arbitration under GCC Sub-Clause 53.5.

APPENDIX A - General Conditions of Dispute Board Agreement

1 Definitions

Each "Dispute Board Agreement" is a tripartite agreement by and between:

- (a) the "Employer";
- (b) the "Contractor"; and
- (c) the "Member" who is defined in the Dispute Board Agreement as being:
 - (i) The sole member of the "DB" and, where this is the case, all references to the "Other Members" do not apply, or
 - (ii) One of the three persons who are jointly called the "DB" (or "dispute board") and, where this is the case, the other two persons are called the "Other Members".

The Employer and the Contractor have entered (or intend to enter) into a contract, which is called the "Contract" and is defined in the Dispute Board Agreement, which incorporates this Appendix. In the Dispute Board Agreement, words and expressions which are not otherwise defined shall have the meanings assigned to them in the Contract.

2 General Provisions

Unless otherwise stated in the Dispute Board Agreement, it shall take effect on the latest of the following dates:

- (a) the Commencement Date defined in the Contract,
- (b) When the Employer, the Contractor and the Member have each signed the Dispute Board Agreement, or
- (c) When the Employer, the Contractor and each of the Other Members (if any) have respectively each signed a dispute board agreement.

This employment of the Member is a personal appointment. At any time, the Member may give not less than 70 days' notice of resignation to the Employer and to the Contractor, and the Dispute Board Agreement shall terminate upon the expiry of this period.

3 Warranties

The Member warrants and agrees that he/she is and shall be impartial and independent of the Employer, the Contractor and the Engineer. The Member shall promptly disclose, to each of them and to the Other Members (if any), any fact or circumstance which might appear inconsistent with his/her warranty and agreement of impartiality and independence.

When appointing the Member, the Employer and the Contractor relied upon the Member's representations that he/she is:

- (a) experienced in the work which the Contractor is to carry out under the Contract,
- (b) experienced in the interpretation of contract documentation, and
- (c) fluent in the language for communications defined in the Contract.

4 General Obligations of the Member

The Member shall:

- (a) have no interest financial or otherwise in the Employer, the Contractor or the Engineer, nor any financial interest in the Contract except for payment under the Dispute Board Agreement;
- (b) not previously have been employed as a consultant or otherwise by the Employer, the Contractor or the Engineer, except in such circumstances as were disclosed in writing to the Employer and the Contractor before they signed the Dispute Board Agreement;
- (c) have disclosed in writing to the Employer, the Contractor and the Other Members (if any), before entering into the Dispute Board Agreement and to his/her best knowledge and recollection, any professional or personal relationships with any director, officer or employee of the Employer, the Contractor or the Engineer, and any previous involvement in the overall project of which the Contract forms part;
- (d) not, for the duration of the Dispute Board Agreement, be employed as a consultant or otherwise by the Employer, the Contractor or the Engineer, except as may be agreed in writing by the Employer, the Contractor and the Other Members (if any);
- (e) comply with the annexed procedural rules and with GCC Sub-Clause 45.3;
- (f) not give advice to the Employer, the Contractor, the Employer's Personnel or the Contractor's Personnel concerning the conduct of the Contract, other than in accordance with the annexed procedural rules;
- (g) not while a Member enter into discussions or make any agreement with the Employer, the Contractor or the Engineer regarding employment by any of them, whether as a consultant or otherwise, after ceasing to act under the Dispute Board Agreement;
- (h) ensure his/her availability for all site visits and hearings as are necessary;
- (i) become conversant with the Contract and with the progress of the Facilities (and of any other parts of the project of which the Contract forms part) by studying all documents received which shall be maintained in a current working file;
- (j) treat the details of the Contract and all the DB's activities and hearings as private and confidential, and not publish or disclose them without the prior written consent of the Employer, the Contractor and the Other Members (if any); and
- (k) be available to give advice and opinions, on any matter relevant to the Contract when requested by both the Employer and the Contractor, subject to the agreement of the Other Members (if any).

5 General Obligations of the Employer and the Contractor

The Employer, the Contractor, the Employer's Personnel and the Contractor's Personnel shall not request advice from or consultation with the Member regarding the Contract, otherwise than in the normal course of the DB's activities under the Contract and the Dispute Board Agreement. The Employer and the Contractor shall be responsible for compliance with this provision, by the Employer's Personnel and the Contractor's Personnel respectively.

The Employer and the Contractor undertake to each other and to the Member that the Member shall not, except as otherwise agreed in writing by the Employer, the Contractor, the Member and the Other Members (if any):

- (a) be appointed as an arbitrator in any arbitration under the Contract;
- (b) be called as a witness to give evidence concerning any dispute before arbitrator(s) appointed for any arbitration under the Contract; or
- (c) be liable for any claims for anything done or omitted in the discharge or purported discharge of the Member's functions, unless the act or omission is shown to have been in bad faith.

The Employer and the Contractor hereby jointly and severally indemnify and hold the Member harmless against and from claims from which he is relieved from liability under the preceding paragraph.

Whenever the Employer or the Contractor refers a dispute to the DB under GCC Sub-Clause 45.3, which will require the Member to make a site visit and attend a hearing, the Employer or the Contractor shall provide appropriate security for a sum equivalent to the reasonable expenses to be incurred by the Member. No account shall be taken of any other payments due or paid to the Member.

6 Payment

The Member shall be paid as follows, in the currency named in the Dispute Board Agreement:

- (a) a retainer fee per calendar month, which shall be considered as payment in full for:
 - (i) being available on 28 days' notice for all site visits and hearings;
 - (ii) becoming and remaining conversant with all project developments and maintaining relevant files;
 - (iii) all office and overhead expenses including secretarial services, photocopying and office supplies incurred in connection with his duties; and
 - (iv) all services performed hereunder except those referred to in sub-paragraphs (b) and (c) of this Clause.

The retainer fee shall be paid with effect from the last day of the calendar month in which the Dispute Board Agreement becomes effective; until the last day of the calendar month in which the Taking-Over Certificate is issued for the whole of the Works.

With effect from the first day of the calendar month following the month in which Taking-Over Certificate is issued for the whole of the Works, the retainer fee shall be reduced by one third. This reduced fee shall be paid until the first day of the calendar month in which the Member resigns or the Dispute Board Agreement is otherwise terminated.

- (b) a daily fee which shall be considered as payment in full for:
 - (i) each day or part of a day up to a maximum of two days' travel time in each direction for the journey between the Member's home and the site, or another location of a meeting with the Other Members (if any);
 - (ii) each working day on site visits, hearings or preparing decisions; and

- (iii) each day spent reading submissions in preparation for a hearing.
- (c) all reasonable expenses including necessary travel expenses incurred in connection with the Member's duties, as well as the cost of telephone calls, courier charges, faxes and telexes: a receipt shall be required for each item in excess of five percent of the daily fee referred to in sub-paragraph (b) of this Clause;
- (d) any taxes properly levied in the Country on payments made to the Member (unless a national or permanent resident of the Country) under this Clause 6.

The retainer and daily fees shall be as specified in the Dispute Board Agreement. Unless it specifies otherwise, these fees shall remain fixed for the first 24 calendar months, and shall thereafter be adjusted by agreement between the Employer, the Contractor and the Member, at each anniversary of the date on which the Dispute Board Agreement became effective.

If the parties fail to agree on the retainer fee or the daily fee the appointing entity or official named in the SCC shall determine the amount of the fees to be used.

The Member shall submit invoices for payment of the monthly retainer and air fares quarterly in advance. Invoices for other expenses and for daily fees shall be submitted following the conclusion of a site visit or hearing. All invoices shall be accompanied by a brief description of activities performed during the relevant period and shall be addressed to the Contractor.

The Contractor shall pay each of the Member's invoices in full within 56 calendar days after receiving each invoice and shall apply to the Employer (in the Statements under the Contract) for reimbursement of one-half of the amounts of these invoices. The Employer shall then pay the Contractor in accordance with the Contract.

If the Contractor fails to pay to the Member the amount to which he/she is entitled under the Dispute Board Agreement, the Employer shall pay the amount due to the Member and any other amount which may be required to maintain the operation of the DB; and without prejudice to the Employer's rights or remedies. In addition to all other rights arising from this default, the Employer shall be entitled to reimbursement of all sums paid in excess of one-half of these payments, plus all costs of recovering these sums and financing charges calculated at the rate specified in accordance with GCC Sub-Clause 12.3.

If the Member does not receive payment of the amount due within 70 days after submitting a valid invoice, the Member may (i) suspend his/her services (without notice) until the payment is received, and/or (ii) resign his/her appointment by giving notice under Clause 7.

7 Termination

At any time: (i) the Employer and the Contractor may jointly terminate the Dispute Board Agreement by giving 42 days' notice to the Member; or (ii) the Member may resign as provided for in Clause 2.

If the Member fails to comply with the Dispute Board Agreement, the Employer and the Contractor may, without prejudice to their other rights, terminate it by notice to the Member. The notice shall take effect when received by the Member.

If the Employer or the Contractor fails to comply with the Dispute Board Agreement, the Member may, without prejudice to his other rights, terminate it by notice to the Employer and the Contractor. The notice shall take effect when received by them both.

Any such notice, resignation and termination shall be final and binding on the Employer, the Contractor and the Member. However, a notice by the Employer or the Contractor, but not by both, shall be of no effect.

8 Default of the Member

If the Member fails to comply with any of his obligations under Clause 4 concerning his impartiality or independence in relation to the Employer or the Contractor, he/she shall not be entitled to any fees or expenses hereunder and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses received by the Member and the Other Members (if any), for proceedings or decisions (if any) of the DB which are rendered void or ineffective by the said failure to comply.

9 Disputes

Any dispute or claim arising out of or in connection with this Dispute Board Agreement, or the breach, termination or invalidity thereof, shall be finally settled by institutional arbitration. If no other arbitration institute is agreed, the arbitration shall be conducted under the Rules of Arbitration of the International Chamber of Commerce by one arbitrator appointed in accordance with these Rules of Arbitration.

Annex - DISPUTE BOARD GUIDELINES

1. Unless otherwise agreed by the Employer and the Contractor, the DB shall visit the site at intervals of not more than 140 days, including times of critical construction events, at the request of either the Employer or the Contractor. Unless otherwise agreed by the Employer, the Contractor and the DB, the period between consecutive visits shall not be less than 70 days, except as required to convene a hearing as described below.
2. The timing of and agenda for each site visit shall be as agreed jointly by the DB, the Employer and the Contractor, or in the absence of agreement, shall be decided by the DB. The purpose of site visits is to enable the DB to become and remain acquainted with the progress of the Works and of any actual or potential problems or claims, and, as far as reasonable, to prevent potential problems or claims from becoming disputes.
3. Site visits shall be attended by the Employer, the Contractor and the Engineer and shall be co-ordinated by the Employer in co-operation with the Contractor. The Employer shall ensure the provision of appropriate conference facilities and secretarial and copying services. At the conclusion of each site visit and before leaving the site, the DB shall prepare a report on its activities during the visit and shall send copies to the Employer and the Contractor.
4. The Employer and the Contractor shall furnish to the DB one copy of all documents which the DB may request, including Contract documents, progress reports, variation instructions, certificates and other documents pertinent to the performance of the Contract. All communications between the DB and the Employer or the Contractor shall be copied to the other Party. If the DB comprises three persons, the Employer and the Contractor shall send copies of these requested documents and these communications to each of these persons.
5. If any dispute is referred to the DB in accordance with GCC Sub-Clause 45.3, the DB shall proceed in accordance with GCC Sub-Clause 45.3 and these Guidelines. Subject to the time allowed to give notice of a decision and other relevant factors, the DB shall:
 - (a) act fairly and impartially as between the Employer and the Contractor, giving each of them a reasonable opportunity of putting his case and responding to the other's case, and
 - (b) adopt procedures suitable to the dispute, avoiding unnecessary delay or expense.
6. The DB may conduct a hearing on the dispute, in which event it will decide on the date and place for the hearing and may request that written documentation and arguments from the Employer and the Contractor be presented to it prior to or at the hearing.
7. Except as otherwise agreed in writing by the Employer and the Contractor, the DB shall have power to adopt an inquisitorial procedure, to refuse admission to hearings or audience at hearings to any persons other than representatives of the Employer, the Contractor and the Engineer, and to proceed in the absence of any party who the DB is satisfied received notice of the hearing; but shall have discretion to decide whether and to what extent this power may be exercised.
8. The Employer and the Contractor empower the DB, among other things, to:
 - (a) establish the procedure to be applied in deciding a dispute,

- (b) decide upon the DB's own jurisdiction, and as to the scope of any dispute referred to it,
 - (c) conduct any hearing as it thinks fit, not being bound by any rules or procedures other than those contained in the Contract and these Guidelines,
 - (d) take the initiative in ascertaining the facts and matters required for a decision,
 - (e) make use of its own specialist knowledge, if any,
 - (f) decide upon the payment of financing charges in accordance with the Contract,
 - (g) decide upon any provisional relief such as interim or conservatory measures,
 - (h) open up, review and revise any certificate, decision, determination, instruction, opinion or valuation of the Engineer, relevant to the dispute, and
 - (i) appoint, should the DB so consider necessary and the Parties agree, a suitable expert at the cost of the Parties to give advice on a specific matter relevant to the dispute.
9. The DB shall not express any opinions during any hearing concerning the merits of any arguments advanced by the Parties. Thereafter, the DB shall make and give its decision in accordance with GCC Sub-Clause 45.3, or as otherwise agreed by the Employer and the Contractor in writing. If the DB comprises three persons:
- (a) it shall convene in private after a hearing, in order to have discussions and prepare its decision;
 - (b) it shall endeavour to reach a unanimous decision: if this proves impossible the applicable decision shall be made by a majority of the Members, who may require the minority Member to prepare a written report for submission to the Employer and the Contractor; and
 - (c) if a Member fails to attend a meeting or hearing, or to fulfil any required function, the other two Members may nevertheless proceed to make a decision, unless:
 - (i) either the Employer or the Contractor does not agree that they do so, or
 - (ii) the absent Member is the chairman and he/she instructs the other Members to not make a decision.

Section 8

Particular Conditions of Contract

Section 8 - Particular Conditions of Contract

The following Particular Conditions of Contract (PCC) shall supplement the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

Part A – Contract Data

Ref of GCC	Data to be Given	Data
1.	Design & Construction Period	24 months from Contract commencement date or Start date
1	Contract commencement date	Date of Work Order unless specified in Work Order
1.	Dispute Board	As specified by PCMC
1.	Employer	Pimpri-Chinchwad Municipal Corporation, Pimpri, Pune-18, Maharashtra, INDIA
1.	Engineer	Joint City Engineer(Water Supply), Pimpri-Chinchwad Municipal Corporation, Pimpri, Pune-18, Maharashtra, INDIA or Person authorised by him
1.	Contract completion date	84 Months from contract commencement date
	Start date	Date Specified in Work Order or Notice to proceed or contract commencement date
1.	Site	Selected operational zones /DMAs given in Employers Requirement Section6
1.	Works& Services	i)Design & Construction works ii) Operation and Maintenance works and all other works specified in scope of services of Section 6:Employers Requirements
3.1	Documents Forming the Contract	Is replaced herewith as follows; The documents forming the contract shall be interpreted in the following order of priority: (a) Agreement (b) Letter of Acceptance (c) Price Bid (d) Particular Conditions of Contract (PCC) (e) General Conditions of Contract (GCC) (f) Employer's Requirements (g) Bill of Quantities (h) Any other document listed in the PCC as forming part of the Contract
5.1	Law and Language & Other Provisions	Union of India, State of Maharashtra,the Maharashtra Municipal Corporation Act. In

		case of conflict, the Laws of Union of India will prevail.
5.2	language for communication	English
8.1(a)	Design & Construction Phase	24 months from the date of commencement
8.1 (a)	O&M for Sectional Completion Work	From Initial take Over date to Final take Over date
8.1 (a)	Initial Take Over date	Commencement date for O&M after sectional completion of Construction Works of a DMA or Sub DMA before Final takeover Date
8.1 (b)	O&M Phase	Maximum 60 months (From Final take over date till Contract completion date)
8.1 (b)	Final take Over date	Commencement date for O&M Phase after completion of construction period of 24 months
8.1	Service Levels	Service Level as Per Employers requirement 1. Water Loss reduction 2. Continuous Pressurized Water supply 3. Resolving Customer complaint for PCMC 4. Water Quality (Residual Chlorine)
9.1	Time for Commencement of works and services	Contract Commencement date
9.1	Time for Completion works and services	84 months from contract commencement date
11.3	Rights of access for Contractor	On or before commencement date
11.6	Minimum Supply of Bulk Water	Gross supply at 200 lpcd as per demand assessment of respective water supply zone + Non Domestic demand
13.1 (a) (i)	Terms of Payment for Construction Works	As Per Schedule 05- Payment Terms
13.1 (a)(ii)	Terms Of Payment for DMA Establishment	As Per Schedule 05- Payment Terms
13.1 (a) (iii)	Terms Of Payment for O&M for Sectional completion certificate	As Per Schedule 05- Payment Terms
13.1 (b) (i)	Terms of Payment for O&M Service Fixed Fees	As Per Schedule 05- Payment Terms
13.1 (b) (ii)	Terms of Payment for O&M Service Performance fees	As Per Schedule 05- Payment Terms
13.3	Rate of Interest	0%
13.8	Currencies for Payments to Contractor	INR (Indian Rupees)
13.12	Method of Payment	Cheque or Electronic Transfer

16.1	Advance Payment to Contractor against BG	3% of contract price
16.3	Advance Payment repaid date	12 months from contract commencement date
17.1	Price Adjustment	As specified in Schedule 6 of section 8 PCC
18.1	% to be retained from Contractor for Design & Construction Works and O&M Services	The retention is fixed at 5%
18.4	% to be retained from Contractor for DMA Establishment works and Pipe Replacement	The retention is fixed at 5%
21.2.1	Advance Payment Security amount to be paid by Contractor	The advance payment security is the same as the advance payment amount. i.e. 3% of contract price.
21.3.1	Security amount for due performance of the contract	The performance security is 10% of the contract price
21.3.2	Format of security to be submitted by Contractor	FDR of Nationalised Bank
26.1	Penalty for Contractor for failing to provide key-personnel	Non providing the Key-Personnel expert resources as per Section 6 : Employers Requirement shall result into penalty upto 1% of Annual O & M (performance) fees per month& DMA establishment. The total penalty shall not exceed 10% of fees payable for the corresponding period.
27.1	Subcontracting activities	The Contractor may Sub Contract : 1 Civil works 2 Pipe Laying works 3 Meter Installation 4 Leak repair 5 Road restoration
27.2	Works and services which are small in nature for sub-contracting	None
30.2.2	Penalty for not removing the Staff of Contractor within 15 days after receipt of employer's written request	as per GCC 26.1 as above
30.2.6	Working hours and locally recognized days of rests	--
30.2.6 (h)	Specific works to be carried out on Working hours and locally recognized days of rests are;	--
30.2.11	Provision of Supply of foodstuff at reasonable prices for the contractor's	--

	personnel	
33.2	Works and services for separate time for completion provided are;	--
34.1	As Built drawings and manuals to be provided by Contractor on	The as-built drawings will be submitted 14 days after the completion of the respective works. The Manuals at the end of the Water Loss Reduction Phase
34.2	Penalty for not providing the as Built drawings and manuals by Contractor	5% of the value of the works for which the as-built drawing applies. (note this will be a penalty not a simple withholding)
36.1	Completion Time Guarantee by Contractor for works and services (or a part for which a separate time for completion is specified)	Design & Contraction Period – 24 Months O&M Period – 84 months from the date of commencement of contract
35.2	Maximum amount of % Contract Price of Liquidated damages to be recovered from Contractor for not completing the Works and Services or any part thereof within the Time for Completion or any extension thereof.	Liquidated damages for delay of overall contract completion are 0.05% per day. The maximum amount of liquidated damages for such delay is 10% of the Contract Price
36.2 (b)	Liquidated damages amount to be paid by Contractor, if the minimum number of DMAs established per quarter are not met	For DMA Establishment Works, the liquidated damages are 10% of the lump sum due to the Contractor for the number of DMAs whose establishment is behind schedule; for every month of delay.
36.3 (b)	Liquidated damages amount to be paid by Contractor, if for reason attribute to the contractor, construction work is not completed within the design& construction period	For the construction works the liquidate damage are 10% of value of balance work is behind the schedule for every month of day.
36.4 (b)	Liquidated damages amount to be paid by Contractor, if performance levels in the DMAs deteriorated beyond the maximum deduction specified in Schedule 5 & 7 of PCC	Additional 10% as Liquidated Damages over and above fees deduction as per Schedule 5 & 7 for the period under consideration.
36.6	Limitation of liability for the liquidated damages payment under clause 36.2 & 36.3 to the Employer, at the end of the Design & Construction period	10% of Gross Annual O&M fees over & above all deducting as per Schedule 5 & 7.
36.7	Limitation of liability for the liquidated damages payment under clause 36.4 (b) to the Employer, at the end of the year	10% of Contract Price
39.1 (b)	Multiple of the contract price or Contract Price for Limitation of liability	The limit of aggregate liability of the contractor to employer shall not exceed the

	– (aggregate liability of the Contractor to the Employer)	contract price.
53.1	Appointment of the Dispute Board by the date	The Parties shall appoint a Dispute Board within 60 days from effective date. The Dispute Board shall comprise 3 persons.
53.1	Dispute Board shall comprises of potential members / persons;	As specified by PCMC
53.2	Failure to agree Dispute Board , final appointing entity or official will be	Bombay High Court.

Additional Clauses& Paras

<p>7.1 Added Clause</p>		<p>Cost of interconnection Cost of interconnection with the existing water main will include all labour involved for performing all acts related with fittings and making the system functional within permitted shut down period. Payment for cost of all materials and work involved in interconnection is to be made as per relevant items in the bill of quantities/ contract. All the interconnections with the existing water main are included in the scope of work. The payment shall be restricted to the provision in the Bill of Quantity. No extra payment shall be made.</p>
<p>7.1 Added Clause</p>		<p>Diversion of Traffic Scope of work will also include diversion of traffic, handling of pipes / specials for crossing drain & inter connections work using mechanical equipments like Hydra etc. for placing pipe/ specials in position during work in addition to use of JCB for time bound excavation. Some of the work shall be executed during night when flow of traffic will be less. Nothing extra shall be paid on this account. The payment shall be restricted to the provision in the Bill of Quantity. The work shall deem to be included in the quoted rate.</p>
<p>9.1 Added Clause</p>		<p>Entering upon or commencing any portion of work The contractor shall not enter upon or commence any portion of work except with the written authority and instructions of the Engineer or of his subordinate in charge of the work. Failing such authority the contractor shall have no claim to ask for measurements of or payment for work.</p>
<p>10.3.1 Added Clause</p>		<p>Permission from Relevant Authorities It is the responsibility of the contractor to persue for getting permission from land owing agencies like PWD, PCNTDA, Railways, Forest Departments, etc The payment for permission charges ,shifting services and road restoration charges shall be made by the PCMC after verification.</p>
<p>11.15 Added Clause</p>		<p>Posting of Assigned PCMC Employees to the Contractor From the Initial Takeover Date the PCMC shall, subject to applicable procedures, may</p>

		<p>assign the same employees of PCMC to the Contractor for duties in Service Area. The PCMC shall provide the Contractor with details i.e. name, age, qualifications, and terms of employment of each PCMC Employee and shall specify the date on which the relevant PCMC Employee shall report to the Contractor for duty. PCMC shall assign the existing employees not exceeding in different hierarchy to Contractor within the project area. However Employer may reduce the number and may decide not to depute any employees to the Contractor. The number of employees deputed to Contractor is only for on job training purpose and not as obligations of PCMC.</p> <p>Non deputation of employees does not alter any cost obligation of Contractor& Employer.</p>
<p>12.4 Added Clause</p>		<p>The price quoted by the contractor shall not in any case exceed the control price, if any, fixed by the Government or reasonable price which it is permissible for him to charge a private purchaser for the same class and description, the controlled price or the price permissible under the hoarding and Profiteering Ordinance,1948 as amended from time to time, if the price quoted exceeds the controlled price or the price permissible under the Hoarding and Profiteering Ordinance, 1948 as amended from time to time, the contractor will specifically mention this fact in his tender along with the reasons for quoting such higher prices. The purchaser at his description will in such case exercise the right of revising the price at any stage so as to confirm with the control price on the permissible under the Hoarding and Profiteering Prevention Ordinance. This discretion will be exercised without prejudice to anyother action that may be taken against the contractor.</p>
<p>14.4 Added Clause</p>		<p>Initial Measurement for Record</p> <p>For proper measurements of the work it is necessary to have an initial set of levels or other measurements taken and the same are recorded in the authorised field book or M.B. of the PCMC by the Engineer or his authorised representative and will be signed by the Contractor who will be entitled to have a true copy of the same made at his cost. Any failure on the part of the Contractor</p>

		<p>to get such level etc. recorded before starting the work will render him liable to accept the decision of the Engineer as to the basis of taking measurements. Likewise the contractor will not cover any work which will render its subsequent measurement difficult or impossible without first getting the same jointly measured by himself and the authorised representative of the Engineer. The record of such measurements will be signed by the Contractor as its acceptance and he will be entitled to have a true copy of the same at his cost.</p>
<p>15.3 Added Clause</p>		<p>Claim of quantities entered in the tender or estimates</p> <p>(1) Quantities in respect of the several items shown in the tender are approximate and no revision in the tendered rate shall be permitted in respect of any of the items so long as subject to any special provision contained in the specifications prescribing a different percentage of permissible variation the quantity of the item does not exceed the tender quantity by more than 25% and so long as the value of the excess quantity beyond this limit as the rate of the item specified in the tender is not more than Rs 50000/-(Rs Fifty Thousand only).(2) The contractor shall if ordered in writing by the Engineer to do so , also carry out any quantities in excess of the limit mentioned in sub-clause(1) hereof on the same conditions as in accordance with the specifications in the tender and at the rates (i) derived from the rates entered in the current schedule of rates and in absence of such rates(ii) at the rate prevailing in the market, the said rates being increased or decreased as the case may be by the percentage which the total tendered amount bears to the estimated cost of work as put to tender based on the schedule of rates applicable to the year in which the tenders were invited. For the purpose of operation of this clause, the total cost shall be taken as derived from the Public Works Department's D.S.R. for Pune district.(3) Claims arising out of reduction in the tendered quantity of any item beyond 25% will be governed by the provision of clause 15 only when the amount of such reduction beyond 25 % at the rate of the item specified in the tender is more than Rs 50000/(Rs Fifty</p>

		<p>Thousand). This reduction is exclusively of the reduction mentioned in clause No 2, 1, 4 of the work and site condition.(4) This clause is not applicable to extra items.(5) There is no change in the rate if excess is less than or equal to 25%. Also there is no change in the rate if quantity of work done is more than 25% of the tendered quantity or the value of the excess work at tendered rates does not exceed Rs 50000/(Rs Fifty Thousand) only.(6) The quantity to be paid at tendered rate shall include-(a) Tendered Quantity plus (b) 25 % excess of the tendered quantity or the excess quantity of the value of 50000/(Rupees Fifty Thousand) at the tendered rates which ever is more (7) This clause shall not be applicable to any items of Electrical work of shifting/laying new cables or any other items specified in the tender.</p>
22.2 Added Para		<p>The rates for specific material and goods falling under Excise Exemption as per Central Excise Notification no. 12/2012-CE dated 17-03-2012 issued & updated by Government of India time to time shall be without any excise duty. Excise Exemption on the materials like pipes, valves, specials, flow meter, instrument, etc. shall be availed under this project. Contractor shall be responsible to get the Exemption and liaison with concerned department. However, PCMC shall assist Contractor to obtain certification towards Exemption of Excise Duties. The responsibility for obtaining any such exemptions from the Competent Authority will remain with the Contractor and the Employer shall not in any way be responsible for admissibility of the claims or eligibility of the Contractor.</p>
22.6 Added Clause		<p>The tendered rates shall be inclusive of all taxes,rates and cesses and shall also be inclusive of the tax leviable in respect of work contract under the provision of Maharashtra sales tax on transfer of property in goods involved in the execution of the Works Contract Act , 1989 (Maharashtra act no. XIX of 1989).</p>
26.5.1 Added Clause		<p>Programme to be furnished</p> <ol style="list-style-type: none"> i. The Contractor shall submit a detailed programme unit wise for execution of various Works allotted to him so as to complete the same within the time

		<p>schedule and adhere to the same. The Contractor shall submit at least 5 copies of PERT/BAR chart, for completion of the Work as per time schedule specified under this contract.</p> <p>ii. The order of sequence of execution of the Work and general conditions of works shall be subjected to the approval and direction of the Engineer-in-Charge whose approval or direction shall however in no way relieve the Contractor from responsibility for the proper and satisfactory execution of the Work according to the terms of Contract and within stipulated period.</p> <p>iii. The Contractor shall prepare a time and progress chart with the approval of the Engineer-in-Charge prior to the commencement of the Work. The chart shall be prepared in direct relation to the time stated in the Contract for completion. It shall indicate the dates of commencement and completion of various activities or section of the Work and may be amended as necessary by agreement between the Engineer - in-Charge and the Contractor within the limitations of the time imposed in the Contract.</p> <p>iv. The Contractor shall regularly review his programme in the light of the progress actually achieved and shall submit for approval updated CPM/PERT network and bar charts at intervals to be agreed with the Engineer. If progress falls behind that needed to ensure timely completion of the various parts of the Works, the Contractor shall submit proposals for improving his methods and pace of working to the satisfaction of the Engineer and shall carry out such measures as are needed to ensure that the Works are completed on time.</p>
<p>28.1.1 Added Para</p>		<p>Action where no specifications In the case of any class of work for which there is no such specification as is mentioned</p>

		in employers requirements such work shall be carried out in accordance with the standard specifications of Public Works Department, and in the event of there being no specification, then in case the work shall be carried out in all respects in accordance with all instructions and requirements of the Engineer - in - Charge.
30.2.4 (d) Added Clause		The contractor shall duly comply with all the provisions of the Contract Labour (Regulation and Abolition) Act , 1970 (37 of 1970) and the Maharashtra Contract Labour (Regulation and Abolition) rules , 1971as amended from to time to time and all other relevant status and statutory provision concerning payment of wages particularly to workmen employed by the contractor and working on the site of the work. In particular the contractor shall pay wages to each worker employed by him on the site of the work at the rates prescribed under the Maharashtra contract labour (Regulation and Abolition) rules 1971.Ifthe contractor fails or neglect to pay wages at the said rates or makes short payment and the Corporation makes such payment of wages in full or part thereof less paid by the contractor, as the case may be ,the amount so paid by the Employer to such workers shall be deemed to be arrears of land revenue and the corporation shall be entitled to recover the same as such from the contractor or deduct same from the amount payable by the corporation to the contractor hereunder or from any other amount payable by the Corporation to the contractor hereunder or fro many other amounts Payable to him by the Corporation
30.2.4 (e) Added Clause		The contractor shall engage apprentices such as Bricks layer, Carpenters, Wireman, Plumber as well as Black Smith as recommended by the State Apprenticeship Advisor, Director of Technical Education, Dhobi Talav, Bombay on the construction work.
30.2.8 (d) Added Clause		Condition For Malaria Eradication (A) The antimaleria and other health measure shall be as directed by the Joint Director (Malaria and Filaria) of Health Services, Pune. (B) Contractor shall see that mosquitoenic conditions are not created so as to keep vector population to minimum level. (C) Contractor shall carry out antimaleria

		<p>measures in the area as per guidelines prescribed under National Malaria Eradication Programme and as directed by the Joint Director (M & F) of Health Services, Pune.</p> <p>(D) In case of default in carrying out prescribed anti-malaria measure resulting in increase in Malaria incidence contractor shall be liable to pay to Government the amount spent by Government on anti-malaria measures to control the situation in addition to fine.</p> <p>(E)Relation with Public authorities The contractor shall make sufficient arrangement for draining away the sullage water as well as water coming from the bathing and washing places and shall dispose of this water in such away as not to cause any nuisance. He shall also keep the premises clean by employing sufficient number of sweepers. The contractor shall comply with all rules, regulations, bye laws and directions given from time to time by any local or public authority in connection with this work and shall pay fees or charges which are leviable on him without any extra cost to Government.</p>
30.2.24 Added Clause		<p>Contractor's Employees:</p> <p>It is expressly understood between the Parties that the employees, other than the Assigned PCMC Employees, who are directly employed by the Contractor shall not have any employment relationship with the PCMC and Contractor's performance under this Agreement does not entitle such employees to claim employment or continuation of employment with the PCMC on expiry or at any time before or after expiry of this Agreement. The Contractor should at all times assume full legal and social responsibility towards such employees as employer and shall not by its acts or omission provide any direct or indirect indication to the employees regarding their employment or chances of employment directly with the PCMC.</p>
31.12 Added Para	Inspection / Checking of Works	<p>This work is open to inspection and checking by a 3rd party agency fixed by PCMC/vigilance wing of PCMC or by any other statutory authority of the Govt. The work can be checked by the agencies as</p>

		<p>mentioned above simultaneously, subsequently, jointly or independently and the contractor is required to cooperate with the agencies and shall be responsible for removing of all defects / deficiencies pointed out at his own cost.</p> <p>The inspection of one agency / authority / team shall not absolve the contractor of his own responsibility on to the defects pointed out by the other agencies and rectification thereto. Recoveries, if any, proposed by any of the inspection agency on account of short comings in respect of quality / quantity, if it is within acceptable limit but not reducing soundness and strength of the work, shall be recovered from the contractor's payments.</p> <p>If the defects noticed are beyond the acceptable limit, the contractor shall have to demolish / dismantle and rectify the same as per instructions of Engineer-in-Charge. PCMC officers will also make visit to the manufacturing unit for which the contractor will make arrangement free of cost for the visit of the officials including boarding, lodging, transportation etc.</p> <p>The Contractor shall inform the Engineer-in-charge in advance for the production of material and fabrication for the factory inspection. The Contractor shall arrange at his own cost inspection of works by Chief Electrical Inspector of Maharashtra Government and seek clearance & submit report for energisation & commissioning.</p>
34.3 Added Clause		<p>As built drawing of pipeline</p> <p>The Contractor shall maintain a detailed as working drawing of pipeline work during construction work and after commissioning the pipeline the contractor need to submit the final as built drawing made based on triangulation method for pipeline and special (such as valve location , bend tee etc.) and submitted in soft copy (autocad /GIS files) and hard copy (printout) to the Engineer in charge for record.</p>

<p>42.6 Added Clause</p>		<p>Insurance Transit cum Storage Insurance for E&M and SCADA Equipments</p> <p>For E&M and SCADA equipments the Contractor shall include transit cum storage cum erection insurance right from the dispatch till handed over to PCMC after satisfactory commissioning/ working. All insurance which the Contractor is required to enter into, under the Contract shall be with Nationalized Insurance Cos. and in terms approved by the Engineer. The Contractor shall produce the policies of insurance and the receipts of payments. The PCMC shall not be liable for, in respect of any damages, losses and compensation payable as per the law or in consequence of any accident or injury to any person in the employment of the Contractor. Insurance of complete plant excluding cost of civil works will be arranged by the contractor in the name of both the PCMC & the contractor. However, the administrative assistance will be provided to the contractor for filling up the forms for replacement value of the station.</p> <p>All the charges for obtaining insurance policy for labour & E&M and SCADA equipments etc. are to be borne by the contractor at his own cost. Nothing extra shall be payable.</p>
<p>47.2.9 Added Clause</p>		<p>Additional Item / Extra Item</p> <p>For extra /addl. Items of works executed at other than project site (which includes present lines for maintenance), the payment shall be made as per the following procedures.</p> <ol style="list-style-type: none"> 1 DSR based items: As per Current DSR of MJP /PWD/MIDC 2 Non schedule items based on Market Rates: Market rates to be considered for analyzing (as per PCMC) such items plus 10% CP
<p>50.1 Added Para</p>		<p>If the project is shelved by the Corporation before commencement, the contractor will have no right to claim any losses or compensation due to the same and for whatsoever reasons.</p>

<p>53.4.1 Added Clause</p>	<p>All disputes and differences of any kind whatever arising out of or in connection with the contract or the carrying out of the work (whether during progress of the works or after their completion and whether before or after the determination, abandonment or breach of the contract) shall be referred to and settled by Joint City Engineer (Water Supply) .But if the contractor is dissatisfied with the decision of the Joint City Engineer (Water Supply) or with holding by the Joint City Engineer (Water Supply) of any certificate of the Joint City Engineer (Water Supply) or as to withholding by the Joint City Engineer (Water Supply) of any certificate to which the contractor may within 60 days after receiving notice of such decision give a written notice to the other party requiring that / may claim to entitled then and in any such case the contractor such matters in disputes be referred to in appeal before a Committee as mentioned below. Such written notice shall specify the manner which are in disputes and such disputes or difference of which such notice has been given and no other shall be and is hereby referred to Committee consisting of the Commissioner Pimpri Chinchwad Municipal Corporation. The Joint City Engineer (Water Supply), Pimpri Chinchwad Municipal Corporation, Legal Adviser and Chief Auditor of Pimpri Chinchwad Municipal Corporation, the decision taken by the committee will be final as amicable settlement.</p> <p>Such reference except as to the with holding of any certificate to which the contractor to be entitled shall not be opened or entered upon until after the completion or alleged completion of the works or until after the practical cessation of the works arising from any cause unless with the written consent of the Joint City Engineer (Water Supply). Provided always that the Corporation shall not withhold the payment of an interim certificate nor the contractor in any way delay the carrying out of the works by reason of any such matters, question or dispute being referred to the Committee but shall, proceed with the work with all the diligence and shall, until the decision of the Committee abide by the decision of the Joint City Engineer (Water Supply) and no award of</p>
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		<p>the Committee shall relieve the contractor of his obligations to adhere strictly to Joint City Engineer (Water Supply)s instructions with regard to the actual carrying out of the works. The Owner and the contractor hereby also agree that the said reference to the Committee under this clause shall be a condition precedent to any right of action under the Contract.</p>
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Schedules to Section 8: Particular Conditions of Contract

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Schedule 1: Service Area

Map of Project area or Service area shown below is Schematic and tentatively marked in color

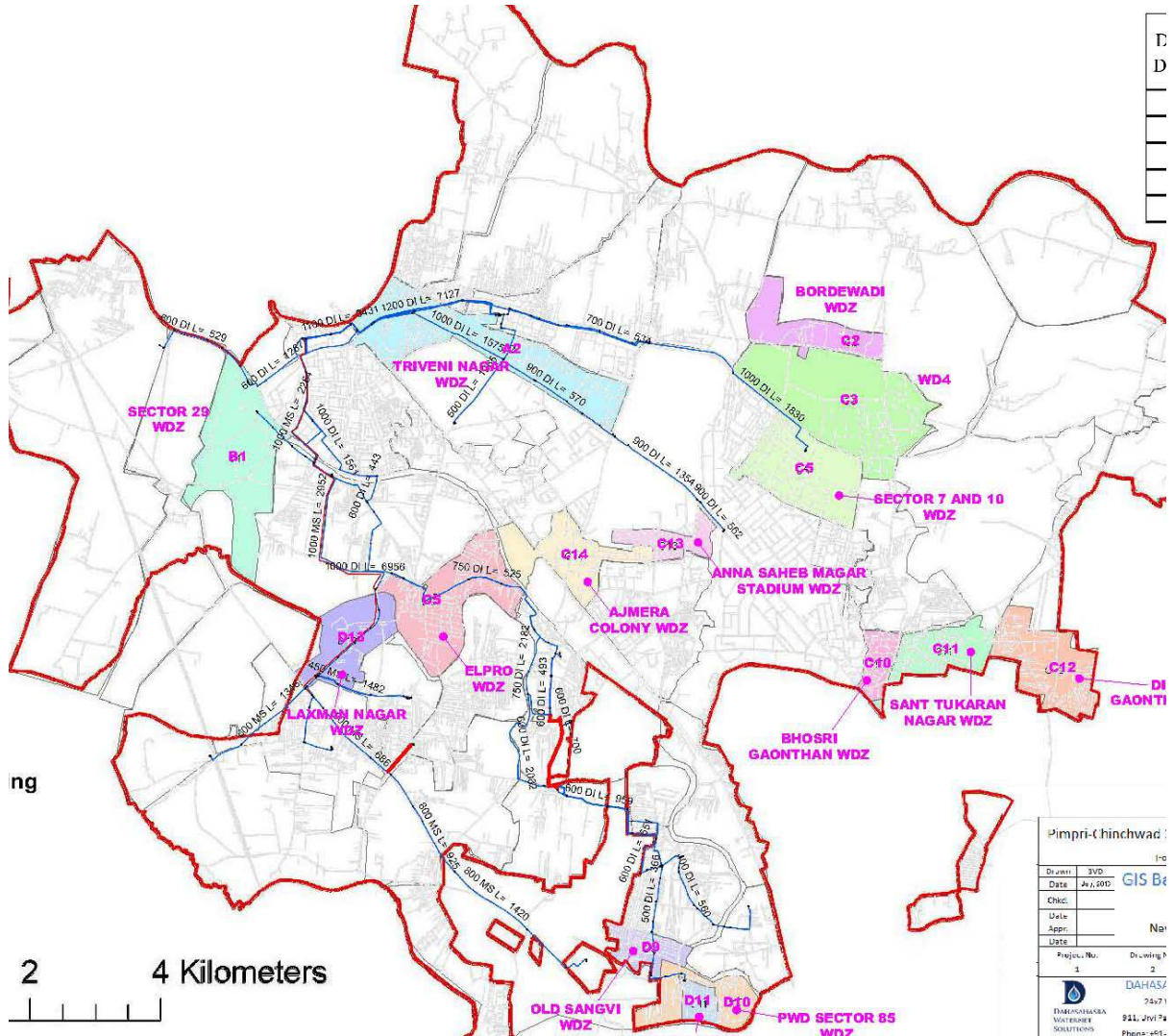


Fig:- Project Area (Source : Detailed Project Report of 40% area)

Note:- Map of service area shown above is tentative and may differ in actual and subject to modification.

Schedule 2: Safety Codes

1. Suitable scaffolds should be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from ladders. When a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well suitable footholds and hand-hold shall be provided on the ladder and the ladder shall be given an inclination not steeper than $\frac{1}{4}$ to 1 ($\frac{1}{4}$ horizontal and 1 vertical.)
2. Scaffolding of staging more than 3.6 m (12ft.) above the ground or floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached or bolted, braced and otherwise secured at least 90 cm. (3ft.) high above the floor, or platform of such scaffolding or staging and extending along the entire length of the outside and ends there of with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.
3. Working platforms, gangways and stairways should be so constructed that they should not sag unduly or unequally, and if the height of the platform or the gangway or the stairway is more than 3.6 m (12ft.) above ground level or floor level, they should be closely boarded; should have adequate width and should be suitably fastened as described in (2) above.
4. Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of person or materials by providing suitable fencing or railing whose minimum height shall be 90 cm. (3ft.)
5. Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9m. (30 ft.) in length while the width between side rails in rung ladder shall in no case be less than 29 cm. (1 11/2") for ladder up to and including 3 m. (10 ft.) in length. For longer ladders this width should be increased at least 1/4" for each additional 30 cm. (1 foot) of length. Uniform step spacing of not more than 30 cm shall be kept. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites or work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defense of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit, action or proceedings to any such person or which may, with the consent of the contractor, be paid to compensate any claim by any such person.
6. Excavation and Trenching - All trenches 1.2 m. (4ft.) or more in depth, shall at all times be supplied with at least one ladder for each 30 m. (100 ft.) in length or fraction thereof Ladder shall extend from bottom of the trench to at least 90 cm. (3ft.) above the surface of the ground. The sides of the trenches which are 1.5 m. (5ft.) or more in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the

danger of sides collapsing. The excavated materials shall not be placed within 1.5 m. (5ft) of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.

7. Demolition - Before any demolition work is commenced and also during the progress of the work,
 - i) All roads and open areas adjacent to the work site shall either be closed or suitably protected
 - ii) No electric cable or apparatus which is liable to be a source of danger or cable or apparatus used by the operator shall remain electrically charged.
 - iii) All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

8. All necessary personal safety equipment as considered adequate by the Engineer-in-Charge should be kept available for the use of the person employed on the site and maintained in a condition suitable for immediate use, and the contractor should take adequate steps to ensure proper use of equipment by those concerned: - The following safety equipment shall invariably be provided.
 - i) Workers employed on mixing asphalt materials, cement and lime mortars shall be provided with protective footwear and protective goggles.
 - ii) Those engaged in white washing and mixing or stacking of cement bags or any material which is injurious to the eyes shall be provided with protective goggles.
 - iii) Those engaged in welding works shall be provided with welder's protective eye Shields.
 - iv) Stone breaker shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.
 - v) When workers are employed in sewers and manholes, which are in active use, the contractors shall ensure that the manhole covers are opened and ventilated at least for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public, in addition, the contractor shall ensure that the following safety measure are adhered to
 - a) Entry for workers into the line shall not be allowed except under supervision of the JE or any other higher officer.
 - b) At least 5 to 6 manholes upstream and downstream should be kept open for at least 2 to 3 hours before any man is allowed to enter into the manhole for working inside.

- c) Before entry presence of Toxic gases should be tested by inserting wet lead acetate paper which changes colour in the presence of such gases and gives indication of their presence.
- d) Presence of Oxygen should be verified by lowering a detector lamp into the manhole. In case, no Oxygen is found inside the sewer line, workers should be sent only with Oxygen kit.
- e) Safety belt with rope should be provided to the workers. While working inside the manholes such rope should be handled by two men standing outside to enable him to be pulled out during emergency.
- f) The area should be barricaded or cordoned off by suitable means to avoid mishaps of any kind. Proper warning signs should be displayed for the safety of the public whenever cleaning works are undertaken during night or day.
- g) No smoking or open flames shall be allowed near the blocked manhole being cleaned.
- h) The malba obtained on account of cleaning of blocked manholes and sewer lines should be immediately removed to avoid accidents on account of slippery nature of the malba.
- i) Workers should not be allowed to work inside the manhole continuously. he should be given rest intermittently. The Engineer-in-Charge may decide the time up to which a worker may be allowed to work continuously Inside the manhole.
- j) Gas masks with Oxygen Cylinder should be kept at site for use in emergency.
- k) Air-blowers should be used for flow of fresh air through the manholes. Whenever called for portable air blowers are recommended for ventilating the manholes. The Motors for these shall be vapour proof and of totally enclosed type. Non sparking gas engines also could be used but they should be placed at least 2 meters away from the opening and on the leeward side protected from wind so that they will not be a source of friction on any inflammable gas that might be present.
- l) The workers engaged for cleaning the manholes/sewers should be properly trained before allowing to work in the manhole
- m) The workers shall be provided with Gumboots or non sparking shoes bump helmets and gloves non sparking tools safety lights and gas masks and portable air blowers (when necessary). They must be supplied with barrier cream for anointing the limbs before working inside the sewer lines.
- n) Workmen descending a manhole shall try each ladder stop or rung careful before putting his full weight on it to guard against insecure fastening due to corrosion of the rung fixed to manhole well.
- o) If a man has received a physical injury, he should be brought out of the sewer immediately and adequate medical aid should be provided to him.

- p) The extents to which these precautions are to be taken depend on individual situation but the decision of the Engineer-in-Charge regarding the steps to be taken in this regard in an individual case will be final.
 - vi) The Contractor shall not employ men and women below the age of 18 years on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, the following precaution should be taken:-
 - a) No paint containing lead or lead products shall be used except in the form of paste or ready made paint.
 - b) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint is dry rubbed and scraped.
 - c) Overalls shall be supplied by the contractors to the workmen and adequate facilities shall be provided to enable the working painters to wash during and on the cessation of work.
9. Contractor shall not employ women and men below the age of 18 on the work of painting with product containing lead in any form. wherever men above the age of 18 are employed on the work of lead painting, the following: principles must be observed for such use:
- i) White lead, sulphate of lead or product containing these pigment, shall not be used in painting operation except in the form of pastes or paint ready for use.
 - ii) Measures shall be taken, wherever required in order to prevent danger arising from the application of paint in the form of spray.
 - iii) Measures shall be taken, wherever practicable, to prevent danger arising out of from dust caused by dry rubbing down and scraping
 - iv) Adequate facilities shall be provided to enable working painters to wash during and on cessation of work.
 - v) Overall shall be worn by working painters during the whole of working period.
 - vi) Suitable arrangement shall be made to prevent clothing put off during working hours being spoiled by painting materials.
 - vii) Cases of lead poisoning and suspected lead poisoning shall be notified and shall be subsequently verified by medical man appointed by competent authority of PCMC
 - viii) PCMC may require, when necessary medical examination of workers.
 - ix) Instructions with regard to special hygienic precautions to be taken in the painting.
10. When the work is done near any place where there is risk of drowning, all necessary equipments should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person In danger and adequate provision, should be made for prompt first aid treatment of all injuries likely to be obtained during the course of the work.

11. Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following standards or conditions
 1. These shall be of good mechanical construction, sound materials and adequate strength and free from patent defects and shall be kept repaired and in good working order.
 2. Every rope used In hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from patent defects.
 3. Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding winch or give signals to operator.
 4. In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or as means of suspension the safe working load shall be ascertained by adequate means. Every hoisting machine and all parts referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load each safe working load and the condition under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.
 5. In case of departmental machines, the safe working load shall be notified by the Electrical Engineer-in-charge. As regards contractors machines the contractors shall notify the safe working load of the machine to the Engineer-in-charge whenever he brings any machinery to site of work and get it verified by the Electrical Engineer concerned.
12. Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce to the minimum the risk of accidental descent of the load. Adequate precautions should be taken to reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations, which are already energized, Insulating mats, wearing apparel, such as. gloves, sleeves and boots as may be necessary should be provided. The worker should not wear any rings, watches and carry keys or other materials, which are good conductors of electricity.
13. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.
14. These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place at work spot. The person responsible for compliance of the safety code shall be named therein by the contractor.
15. To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the contractor shall be open to inspection by the Labour Officer or Engineer-in-Charge of the department or their representatives.

Notwithstanding the above clauses from (1) to (15) there is nothing in these to exempt the contractor from the operations of any other Act or Rule in force In the Republic of India

Schedule 3: Water Quality

Not used

Schedule 4: Employer Personnel

Not Used

Schedule 5: Contractor Payment Terms

1. The total Contractor Payments comprises of three components:

- a. Payment for DMA Establishment;
- b. Payment for Construction Works; and
- c. Payments for O & M services.

2. Payment for DMA Establishment (Item covered – Item No. 1)

This cost includes completion of all works related DMA Establishment including isolation and freezing of final boundary map for DMA, completion of all survey & investigations, creation of hydraulically discreet network, zero pressure test, consumer survey, as built drawing, hydraulic modelling, submission of revised SIP & drawings etc. complete. This shall be paid on demonstration of all establishment works and certification of same from the Engineer.

(A) For DMA Establishment within 40% service area (For Item No.1)

The Payment for DMA shall be calculated based on number of connections in respective DMA. This shall be calculated as below;

$$\text{DMA Establishment Fees} = \frac{\text{Total No. of Consumers in DMA}}{\text{Total No. of consumers (i.e. 54000)}} \times \text{Total fees quoted in (DMA Fees) in Item no. 1}$$

- i. **30% after Establishing of DMA** including all expert services, isolation and freezing of final boundary map for DMA, completion of all survey & investigations, creation of hydraulically discreet network, zero pressure test, consumer survey, as built drawing, hydraulic modelling, submission of revised SIP & drawings etc. complete

(Note:-The cost of Bulk meters/ DMA meters, Valves for isolation, consumer meters and associated civil works like excavation, construction of chambers will be paid separately as per price bid.)

Fees Payable on Establishing of DMA = 30% of DMA Fees

- ii. **50% after completion of water loss reduction (NRW) and commissioning of DMA**(including all expert services, leak detection, leak reduction with latest technologies

like helium gas, smart ball, sahara, listening stick, leak noise correlators or as appropriate) and certification of the same from Engineer.

This shall be calculated for each DMA as below;

Fees payable on completion Water loss Reduction and Commissioning of DMA

$$= (\text{DMA fees} \times 50\%) \pm X$$

Where 'X' = Performance based bonus (+) or deduction (-)

$$= Y (\%) \times \text{DMA Fees}$$

Where Value of 'Y' is calculated as per NRW % as calculated below

$$\text{NRW (\%)} = \frac{\text{Summation of all Consumption meters + Export Meters (in Cum) for The DMA}}{\text{System Input for respective DMAs (In Cum)}} \times 100$$

This further divided in following performance linked payment break up;

Sr. No.	If, NRW %	Corresponding Value of 'Y (%)'
(1)	Less than or equal to (\leq) 7%	$Y(\%) = [5 \times (7\% - \text{NRW} (\%))] + 11\%$
(2)	More than 7% and less than or equal to 10%	$Y(\%) = [2 \times (10\% - \text{NRW} (\%))] + 5\%$
(3)	More than 10% but less than or equal to 15%	$Y(\%) = [1 \times (15\% - \text{NRW} (\%))]$
(4)	More than 15% but less than or equal to 20%	$Y(\%) = 0$
(5)	More than 20% but less than or equal to 30%	$Y(\%) = [-1 \times (\text{NRW} (\%) - 20\%)]$
(6)	More than 30% but less than or equal to 35%	$Y(\%) = [-2 \times (\text{NRW} (\%) - 30\%)] - 10\%$
(7)	More than 35%	$Y(\%) = [-5 \times (\text{NRW} (\%) - 35\%)] - 20\%$

- Note – 1. Bonus shall be calculated as per (1) to (3) in above table
2. deductions shall be calculated as per (5) to (7) in above table
3. The maximum deduction shall not exceed (50% x DMA fees)

- iii. **20% on achieving continuous (24 x 7) pressurized water supply in DMA** and certification of the same from Engineer based 7 days monitoring period or any other period specified by Employer.

3. Payments for Construction Works: The eligibility of payment shall be as follows:

(A) For Carrying out Internal Water Audit in consumer premises

(Item covered : Item No. 2)

100% after final submission of Water Audit report with consent / certification of respective consumer / commissioning of DMA

(B) For providing and stacking of pipe including all pipeline accessories

(Items no. covered : 7,8,9,10,11,27,29,30,31,32,33,34,39,48,49,56,57,58,68,69,72)

- i. 60% of the cost of pipeline on supply and stacking at site
- ii. 25% of the cost of pipeline on laying, jointing, sectional hydro testing and road restoration
- iii. 15% on commissioning of pipelines / DMA

(C) For providing Mechanical/ Electrical, Instrumentation and other items

(Items no. covered: 35,36,37,38,40,41,42,43,44,45,46,52,53,54,55, 59,60,61,62,63,64,75,76)

- i. 60% of the quoted price, against supply and storage at Site;
- ii. 20% after installation of the equipment;
- iii. 10% after testing and trial run completed successfully; and
- iv. 10% on commissioning of the equipment.

(D) For Civil works- like excavation, chamber, disposal, refilling etc.

(Items covered: Item No. 3,4,5,6,12,13,14,15,16,17,18,19,20,21,23,24,25,26,28, 47,50,51,65,66,70,73,74)

100% after final inspection and successful execution of all related works upto to the satisfaction of Engineer

(E) For Horizontal Directional Drilling (HDD)

(Items covered: Item No. 22,67,71)

- i. 70% after laying, jointing,
- ii. 15% after successful sectional hydro testing and road restoration
- iii. 15% on commissioning of pipelines / DMA

- (F) For personnel per day cost, if required during design & construction period or provisional O & M period (Item covered; item no. 78)

Sr. No	Position	Unit	Payment
Personnel during construction period			
1	Meter Reader	month	100% after certification from Engineer
2	Meter Reader Supervisor	Month	

4. Payment for O & M Services (Item Covered : Item No. 77)

Monthly Payment for Operations& Maintenance services from initial takeover date shall be computed as per following;

$$\text{Total Monthly O \& M Fees (TF)} = \text{OR} \times \text{N} \times \text{Pv}$$

Where;

- OR - Rate in INR quoted for each connection month as quoted by Bidder & approved by Employer
 N - No. of Connections covered in Established DMA for O & M for the month under consideration as certified by Engineer
 Pv - Price variation factor (It shall be based on consumer price index of that period of that city / region)

Monthly O & M fees, would comprise two components, namely Fixed fees and Performance fees, as follows from Final takeover date:

- (i) Maximum Fixed Fees equal to 70% of O & M Fees for respective month ;
- (ii) Maximum Performance Fee equal to 30% of O & M Fees for respective month **as per Schedule 7: Performance Target and Measurement**

Employer shall pay the fixed Payment to the Contractor after raising the monthly bills. The monthly payment bills will be reviewed and certified by the Engineer or Employer's representative. Eligible Performance Fees and other charges if any will be paid on certification within 15 days of recommendation by the Engineer or Employer's representative along with a certificate regarding fulfilment of the performance conditions .

4.1 Fixed Fees (FF)

Maximum Eligible Fixed Fees shall be calculated as = Total Monthly O & M fees x 70%

$$\text{Maximum Fixed Fees (FF)} = \text{TF} \times 70\%$$

4.1.1 The Fixed Payment shall be paid to the Contractor on monthly basis subject to fulfilment of the following conditions:

- (i) Maintaining the minimum personnel as specified in contract during the previous month.

- (ii) Compliance with the obligations under this Contract.
- (iii) Providing and maintain continuous pressurised water supply to the respective water districts or DMA's specified in the project area(except the extraordinary situation where water is not supplied by Employer).

4.1.2 The essence of the contract is achieving efficient Operations while providing pressurised water supply to consumers. Towards achieving this, deductions as proposed below shall be made from the fixed Payment in case of below satisfactory or inferior performance in achieving the performance indicators.

Contractor is eligible to get full 70% of the agreed Monthly O & M Fees for services as fixed Fee only if he achieves performance indicators sufficient enough to get 50% of the maximum Performance Fees. In case the Contractor gets less than 50% of the maximum Performance Fee of 30%, deductions shall be made from the fixed fee for below satisfactory or inferior performance.

Performance Payment payable to the Contractor during the payment period (As percentage of total agreed Payment for O & M Services for the corresponding payment period)	Fixed Payment payable to the Contractor (As percentage of total agreed Payment for Operation Services for the corresponding payment period)
15% or More	70%
Less than 15% but more than or equal to 10%	60%
Less than 10%	50%

4.2 Performance Fees(PF) and deductions

Maximum Eligible Performance Fees shall be calculated as = Total monthly O & M Fees x 30%

Maximum Performance Fees (PF)= TF x 30%
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A maximum of 30% of the total agreed fees for Operations & Maintenance services for respective month will be based on achieving actual performance as shown in **Schedule 7: Performance Target and Measurement** during O& M Services under the contract.

Contractor is eligible to get maximum performance Fees i.e 30% if he meets the threshold limits of all the performance indicators. The breakdown of performance payment related to performance indicators are listed below.

Breakup for various performance parameter / criteria is as given below:

Sr. No.	criteria for weightage	Performance Breakup for payment
i	Water loss / NRW level	10 %
ii	continuous (24 x7) water supply	10%
ii	water quality	5%
iv	Customer complaint	5%

Performance Parameter / Indicators as above shall be calculated as per formula specified in Schedule 7 of performance targets and measurement

In case the Contractor performance doesn't meet the threshold limits of all performance Indicators, deductions shall be made from the performance fee for below satisfactory or inferior performance based on **Actual Performance** of respective month computed as per **Schedule 7 Performance Target and Measurement**. In that case the, Performance fees shall be calculated as below;

Performance Fees (PF) = TF x Actual Performance (---%)

Thus, Monthly O & M Fees based on Performance payment shall be computed as per following table for Fixed Fee (FF) and Performance Fee (PF) based on actual performance.

Sr. No.	Performance Payment & eligibility	Monthly Fees Payable (in Rs.)
1	15% or More	Total O & M Fees (TF) = Fixed Fee (FF) + Performance Fee (PF) Where, Fixed Fee (FF) = 70% x TF Performance Fee (PF) = Actual Performance (___%) x TF
2	Less than 15% but more than or equal to 10%	Total O & M Fees (TF) = Fixed Fee (FF) + Performance Fee (PF) Where, Fixed Fee (FF) = 60% x TF Performance Fee (PF) = Actual Performance (___%) x TF
3	Less than 10% but more than 0%	Total O & M Fees (TF) = Fixed Fee (FF) + Performance Fee (PF) Where, Fixed Fee (FF) = 50% x TF Performance Fee (PF) = Actual Performance (___%) x TF
4	Equals to 0%	Liquidated Damages shall be applicable as per PCC

5. Penalty amount recoverable from operator

- A. Non providing the Key-Personnel expert resources as per Section 6 : Employers Requirement shall result into penalty upto 1% of Annual O & M (performance) fees per month.
The total penalty shall not exceed 10% of annual O & M Fees.
- B. Operator shall need to maintain the timelines of various design activities, failing to the same shall result in penalties as below;

S N	Activity	Target period for completion from contract commencement date	Amount of penalty to be recovered in case of delayed output
1	2	3	4
1	Mobilisation on site	30 days	

2	Verification & validation of base map (provided by PCMC), finalisation of DMA boundaries, procurement plan of priority DMA's	60 days	Rs. 10,000 per day
3	Topographical survey and ground profiling of the service area, plot surveys and any other surveys and investigations to ensure accurate design.	60 days	Rs. 25,000 per day
6	Complete system design and drawings, preparation of abstract of final quantities and cost estimates for the designs	90 days	Rs. 75,000 per day
7	Preparing PERT chart, manpower, equipment, mobilisation plan, cash flow plan, detailed methodology of continuous monitoring etc.	60 days	-
8	Detailed O&M plan, Standard Operating Procedures and policies plan, Performance measurement plan, Bulk Supply locational data base for water supply system.	60-90 days	Rs. 75,000 per day
9	Compilation and submission of designs, hydraulic modelling in complete with SIP and procurement plan for priority zones (tentative 5 nos.)	60-90 days	Rs. 75,000 per day
10	Complete designs, survey and all as built drawings for balance DMA's within 40% PCMC area	180 days	

C. Operator shall need to maintain the timelines of various Construction activities as following to deliver the project output failing to the same shall result in penalties / Liquidated damages as per PCC as recommended by Engineer.

S N	Target Period (end of quarter) for completion from contract commencement date	Target Activity: DMA establishment / No. of connection Completion (inclusive of all instrumentation & SCADA works)	Target Activity: Transmission Main /Pipe Laying Completion
1	2	3	4
1	1 st Quarter (Q1)	Door to door Consumer Survey, Network updation, hydraulic modelling, SIP, Procurement Plan, DMA Established (For Priority DMA's)	SIP & Procurement Plan
2	2 nd Quarter (Q2)	2000 number connections & Submission of SIP for balance DMA's	Pipe procurement
3	3 rd Quarter (Q3)	6000 number connections	Laying & testing
4	4 th Quarter (Q4)	14000 number connections	Laying & testing
5	5 th Quarter (Q5)	24000 number connections	Laying & testing
6	6 th Quarter (Q6)	34000 number connections	Commissioning
7	7 th Quarter (Q7)	44000 number connections	
8	8 th Quarter (Q8)	54000 number connections	

Note :- If these targets / connections per quarter as mentioned above (as per Section 6 Employers Requirements), for reasons attributable to the Contractor, are not met and no successful corrective action has been taken to achieve them within a period specified by Engineer, liquidated damages will apply.

Schedule 6: Price Variations

If during the operative period of the contract as defined in condition (1) below there shall be any variation in the Consumer Price Index (new series) for industrial workers for Pune Centre as per the Labour Gazette published by the Commissioner of Labour, Government of Maharashtra and/or in the Wholesale Price Index for all commodities (New Series) prepared by the Office of Economics Advisor, Ministry of Industry, Government of India, for in price of petrol/oil and lubricants then major construction materials like bitumen, cement, steel etc., then, subject to the other conditions mentioned below, Price adjustment on account of

- 1) Labour Component.
- 2) Material Component.
- 3) Petrol, Oil and Lubricants Component.
- 4) Bitumen Component.
- 5) HYSD & Mild Steel Component.
- 6) Cement Component,

Calculated as per the formula here in after appearing, shall be made, apart from these, no other adjustments shall be made to the contract price for any reasons whatsoever, Component percentage as given below are as of the total cost of work put to tender. Total of Labour, Material & Petrol, Oil & Lubricants components shall be 100 as per table below and other components shall be as per actual.

Sr.No	Type of Work	Labour Component (K-1)	Material Component (K-2)	Petrol, Oil & Lubricant Component (K3)
1	Earth Work	48%	47%	4%
2	G.S.B. & W.M.M.	42%	49%	9%
3	B.M., D.B.M., & A.C.B.B.M.	25%	61%	14%
4	C.D. Works, Cross Pipes, Service Pipes etc	41%	52%	7%
5	Other remaining Civil Works	27%	72%	1%
6	Water supply	35%	63%	2%
7	Under ground Drainage	45%	53%	2%

1. Bitumen Component Actual
2. HYSD & Mild Steel Component Actual
3. Cement Component Actual

Note : If cement, Steel, Bitumen, are supplied on Schedule 'A', then respective component shall not be considered.

Also if particular component is not relevant same shall be deleted.

1. Formula for Labour Component:

$$V1 = 0.85 P \{K1/100 \times (L1 - L0) / L0\}$$

Where,

V1 = Amount of Price Variation in Rupees to be allowed for labour component.

P = Cost of work done including accepted tendered rate during the period under consideration minus the total cost of cement, HYSD & Mild Steel, Bitumen calculated as per the basic rate used for preparing estimate for technical sanction including accepted tendered rate or total cost of cement, HYSD & Mild steel, Bitumen calculated as per C0,B0, S0, whichever is higher.

K1 = Percentage of Labour Component as indicated above

L0 = Basic Consumer Price Index for Pune Center, shall be average consumer price index for the quarter preceding the month in which the last date prescribed for receipt of tender, falls

L1 = Average Consumer Price Index for Pune Center for the period under consideration.

2. Formula for Material Component:

$$V2 = 0.85 P \{K2/100 \times (M1 - M0)/M0\}$$

Where,

V2 = Amount of Price Variation in Rupees to allowed for Material component.

P = same as worked out for labour component.

K2 = Percentage of materials Component as indicated above

M0 = Basic Wholesale Price Index shall be average wholesale price index for the quarter preceding the month in which the last date prescribed for receipt of tender, falls.

M1 = Average Wholesale Price Index during the period under consideration.

3. Formula for Petrol, Oil and Lubricant Component:

$$V3 = 0.85 P \{K3/100 \times (P1 - P0)/P0\}$$

Where,

V3 = Amount of Price Variation to be allowed for POL component.

P = same as worked out for labour component.

K3 = Percentage of Petrol, Oil and Lubricant Component

P0 = Average Price of H.S.D. at Pune during the quarter preceding the month in which the last date prescribed for receipt of tender, falls.

P1 = Average Price of H.S.D. at Pune during the period under consideration.

4. Formula for Bitumen Component:

$$V4 = QB (B1 - B0)$$

Where,

V4 = Amount of Price Variation in Rupees to be allowed for Bitumen component.

QB = Quantity of Bitumen (Grade) in metric tones used in the permanent works and approved enabling works during the month under consideration.

B1 = Current, average price as circulated by the office of the City Engineer, Pimpri Chinchwad Municipal Corporation, per metric tones of Bitumen (Grade) under consideration including all taxes (Octroi, Excise, Sales Tax etc.) during the month under consideration.

B0 = Basic rate of Bitumen in rupees per metric tones as considered for working out value of P or average price as circulated by the office of the City Engineer, Pimpri Chinchwad Municipal Corporation, in rupees per metric tones including all taxes (Octroi, Excise, Sales Tax etc.) of bitumen for the grade of bitumen under consideration prevailing month preceding the month

in which the last date prescribed for receipt of tender, falls whichever is higher.

5. Formula for HYSD and Mild Steel Component:

$$V5 = QS (S1 - S0)$$

Where,

V5 = Amount of Price Variation in Rupees to be allowed for HYSD / Mild Steel component.

Qs = Quantity of steel in M.T. used in the work during month under consideration.

S0 = Basic rate of Steel in rupees per metric tone as considered for working out value of 'P' or average price in rupees per M.T. including all taxes, (Octroi, Excise, Sales Tax etc.) as circulated by the office of the City Engineer Pimpri Chinchwad Municipal Corporation, under consideration, prevailing one month preceding the month in which the last date prescribed for receipt of tender, falls, whichever is higher.

S1 = Current average price in rupees per M.T. of steel including all taxes, (Octroi, Excise, Sales Tax etc.) as

circulated by City Engineers office, Pimpri Chinchwad Municipal Corporation, during the month under consideration.

6. Formula for Cement component:

$$V6 = QC (C1 - C0)$$

Where,

V6 = Amount of Price variation in Rupees to be allowed for cement component.

QC = Quantity of cement in M.T. used in the work during month under consideration.

C0 = Basic rate of cement in rupees per M.T. as considered for working value of 'P' or average price per M.T. including all taxes, (Octroi, Excise, Sales Tax etc.) as circulated by the office of the City Engineer Pimpri Chinchwad Municipal Corporation under consideration, prevailing one month preceding the month in which the last date prescribed for receipt of tender, falls, whichever is higher.

C1 = Current average price in rupees per M.T. of cement including all taxes, (Octroi, Excise, Sales Tax etc.) as circulated by City Engineers office, Pimpri Chinchwad Municipal Corporation during the month under consideration.

Basic rates of material used for preparing estimate for Technical Sanction including all taxes are as per below.

1) Cement (C0) = Rs. 6000.00/-per M.T.

2) HYSD/TOR Steel (S0) = Rs. 47300/-per M.T.

3) Mild Steel = Rs. 45700.00/-per M.T.

4) Bitumen 60/70 (B0) = Rs. 53665.00/-per M.T.

5) M.S= Plate = Rs. 49000/M.T.

6) Medium Setting Hincol Bitumen Emulson (HDPE) = Rs. 51092/ M.T.

The following conditions shall prevail:

(i) The Operative Period of the Contract shall mean the period commencing from the date of the work order issued to the Contractor and ending on the date on which the time allowed for the completion of the works specified in the contract for works expires, taking in to consideration the extension of time, if any, for completion of the work granted by the approving authority under the relevant clause of the conditions of contract in case other than those where such extension is necessitated on account of default of the contractor. The decision of the Engineer – in – charge as regards the operative period of the Contract shall be final and binding on the Contractor. Where any compensation for liquidated damages is levied on the contractor on account of delay in completion or inadequate progress under the relevant Contract provisions, the price adjustment amount for the balance work from the date of levy of such compensation shall be worked out by freezing of all the indices, and prices of material i.e. L1, M1, P1, B1, S1 and C1 to the month preceding the month from which such compensation is levied.

(ii) This Price Variation Clause shall be applicable to all contracts in B-1/B-2 and C form but shall not apply to piece works, The price variation shall be determined during period under consideration as per formula given above clause.

For V1, V2 & V3 and each month for V4, V5, V6.

(iii) The Price Variation under this clause shall not be payable for the extra items required to be executed during the completion of the work and also on the excess quantities of items payable under the provision of Clause 38/37 of the contract from B1/B2 respectively. Since the rate payable for extra items or the extra quantities under Clause 38/37 are to be fixed as per the current DSR or as mutually agreed to yearly revision till completion of such work. In other words, when the completion/execution of extra items as well as extra quantities under Clause 38/37, of the contract form B-1/B-2 extends beyond the operative date of the DSR then rates payable for the same beyond that date shall be revised with reference to the current DSR prevalent at that time on year to year basis or revised in accordance with mutual agreement thereon, as provided for in the contract, whichever is less.

(iv) This clause is operative both ways, i.e. if the Price Variation as calculated above is on the plus side, payment on account of the Price Variation shall be allowed to the Contractor and if it is on the negative side, the PCMC shall be entitled to recover the same from the Contractor and the amount shall be deductible from any amounts due and payable under the contract.

(v) To the extent that full compensation for any rise or fall in costs to the contractor is not entirely covered by the provisions of this or other clauses in the contract, the unit rate and the prices included in the contract shall be deemed to includes amounts to covered the contingency of such other actual rise or fall in costs.

Note: - When Basic rates of Bo, Co, and So for Bitumen, Cement, Steel respectively are adopted other than the rates adopted for working out value “P” then those rates shall be treated as revised Basic rate of Bo, Co, So and shall be communicated to the contractor at the time of issuing letter of intent by Engineer – in - charge and shall be binding on contractor.

Schedule 7: Performance Target and Measurement

A. Definitions

- i. **Water Loss** : Scope in Water Supply shall include, the operation, maintenance and repairs of all existing and new assets created for the water supply under this project and to be kept in operation to deliver but also to keep water losses in established DMA's with in contractual limits. Bulk water supply by employer shall be measured at Inlet supply point of Elevated Service Reservoir (ESR) as System Input Volume (SI) or Bulk water Export/ Import point measured as Certified Export Meter. Water supply quantum shall be measured as all consumption at consumer end and export point or at the end of transfer point as applicable. The waterloss is defined as difference between System Input volume & Certified Export point. However the bulk water import or export (if any) shall be adjusted through respective flow meters.
- ii. **Continuous (24 x 7) Pressurized Water Supply** means achieving and maintaining a continuous supply of water in respective DMA based on quantity of availability of bulk water (to be provided by PCMC at ESR Inlet point) at 8 m water column at consumer end, monitoring flow and pressure data including logging & data transfer with SCADA.
- iii. **Measurement Points** means the points on the project components at which the flow and or pressure measuring devices to measure and record one or multiple parameters with data logger would be installed which shall be mutually agreed by the Employer and the Contractor during the Design Construction period but should include all major and sub components and inlet and outlet points. The logger shall transfer the data to both Employers & Operators location through wireless communication without any human interface on 24/7 basis.
- iv. **Potable Water Quality** Operators obligations is limited to maintain the residual chlorine of 0.2 ppm at consumer end provided that PCMC shall supply Bulk Water at ESR outlet with minimum 0.5 ppm chlorine.

B. Performance Targets

The Operator must meet following Performance Targets on monthly basis:

- i.) Continuous Pressured Water Supply must be provided to the ESR's or Transfer Points
- ii.) Water Loss
- iii.) Water Quality.
- iv.) Consumer Complaints

C. Methodology for Measurement of Performance:

The Contractor shall develop a robust methodology and framework for measurement and monitoring of Performance Standards stipulated under this clause and proposed as part of the Service Improvement Plan (SIP). The Employer shall review the same and upon agreement

between the Parties, the agreed methodology shall form the basis for monitoring the performance of the Contractor and apply the Performance Payment.

D. Parameter, Minimum Service Level, Measurement and Monitoring System of Performance Indicators/ Standards

S.No.	Description	Details
1.	Parameter	Continuous Pressurized Water Supply within DMA
	Minimum Service Level	80% of the pressure readings maintained at a minimum level as specified in 24 hours. To be achieved at the pressure measuring point from commissioning date and maintained throughout the contract period.
	Measured By	At least five continuous pressure measuring point with logger (CPMP) will be established in each DMA per approved Service Improvement Plan (SIP). Readings at the CPMPs will be taken on hourly basis during supply hours. Compliance on continuity of service = $100 \times \frac{\text{Total Number of readings of pressure equal to or more than Specified}}{\text{Total number of readings of pressure in the service area}}$. For illustration purpose, if an area of 5 CPMP in Project Area is in service. Total CPMPs in 1 DMA are 5. Hourly readings are 24 in a day at each CPMP and the month is of 30 days. Total readings in a month will be $5 \times 24 \times 30 = 3600$. If 2880 readings (which is more than 80% of 3600) is equal to or more than specified pressure at respective CPMPs, Contractor will be eligible for getting performance fees under this criteria. It may be noted that non function of CPMPs shall be considered as non performing readings
	Monitored By	An electronic registry maintained by the Contractor; the registry shall include detailed database and summary tables pressure logs at each of the CPMP The pressure log database shall include: Time and date CPMP identification number Pressure in meters
	Allowable Exclusions	1.Planned maintenance periods not exceeding 8 hours each 2.Interruption due to mains bursts not exceeding 12 hours 3.Shortage of Raw water supplied by source provider 4.Third party causes like power failure and fire fighting
2	Parameter	Water Loss /NRW (applicable for entire system/ DMA)
	Maximum level	Less than or equal to 20%
	Measured by	

		<p>NRW Performance based Fees payable in (Rs.)</p> <p>NRW FEES = (TF x 10%) – FD Where TF = Total O&M Fees for DMA (Ref para 4 of Sch 5) FD = Fees Deduction for Higher NRW The value of FD as Computed below</p> <table border="1"> <thead> <tr> <th>Sr. No.</th> <th>If, NRW / Water Loss Level</th> <th>Corresponding amount of 'FD'</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>More than 15% but less than or equal to 20%</td> <td>FD =0</td> </tr> <tr> <td>2</td> <td>More than 20% but less than or equal to 30%</td> <td>FD = TFx [(NRW%-20%) x 0.5]</td> </tr> <tr> <td>3</td> <td>More than 30% but less than or equal to 35%</td> <td>FD = TF x {[(NRW %-30%) x 1] +5%}</td> </tr> <tr> <td>4</td> <td>More than 35%</td> <td>FD = TFx{[(NRW %-35%) x 2] +10%}</td> </tr> </tbody> </table>	Sr. No.	If, NRW / Water Loss Level	Corresponding amount of 'FD'	1	More than 15% but less than or equal to 20%	FD =0	2	More than 20% but less than or equal to 30%	FD = TFx [(NRW%-20%) x 0.5]	3	More than 30% but less than or equal to 35%	FD = TF x {[(NRW %-30%) x 1] +5%}	4	More than 35%	FD = TFx{[(NRW %-35%) x 2] +10%}
Sr. No.	If, NRW / Water Loss Level	Corresponding amount of 'FD'															
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4	More than 35%	FD = TFx{[(NRW %-35%) x 2] +10%}															
	Monitored by	Electronic registry from bulk flow meter recorded at inlet points for System input volume and corresponding registry from bulk flow meter record at ESRs and certified Import Export points. Adjustment of Volume export or Import from or in the project battery limit respectively and all import or export points shall be installed with meters.															
	Monitored by	Electronic registry from bulk flow meter at DMA and consumer meter readings as per the billing records for the month under review															
	Allowable Exclusions	1. If bulk inlet and tapping of the ESR is not measured for volume. 2. If un-metered Export supply, detected by operator & not allowed to disconnect or metered by PCMC within 15 days.															
3	Parameter	Water Quality															
	Minimum Service Level	Contractors obligations is limited to maintain the residual chlorine of 0.2 ppm at consumer end provided that PCMC shall supply Bulk Water at ESR outlet with minimum 0.5 ppm chlorine.															
	Measured By	(% of failed sample with respect to desired level of performance for residual chlorine) x Operator fees for the month up to the full performance fees for Water Quality (5% of total fees)															
	Monitored By	An electronic registry maintained by the Contractor in CRM centre with 24/7 data logging and electronic log of inspection notes and on line Residual chlorine shall be installed at all import / export and ESR outlet .															
	Allowable Exclusions	If supply volume by PCMC at outlet of ESR is less than 0.5 ppm															
4	Parameter	Consumer Complaints															
	Minimum Service	95% of reported complaints resolved during the period under review															

	Level	
	Measured by	<p>Percentage of total number of complaints responded within 24 hours and resolved within 120 hours during the period under review over the total number of complaints received during the period under review.</p> <p>Resolution of complaints = $100 \times (\text{total number of complaints responded within 24 hours and resolved in 120 hours during the period under review} / \text{total number of complaints received during the period under review})$</p>
	Monitored By	<p>An electronic registry maintained by the Operator, the registry shall include detailed database and summary tables including:</p> <ul style="list-style-type: none"> Time and date Complaint number Consumer Name Consumer Identification Number DMA Number Nature of Complaint Time and Date at which consumer is provided with response Action Taken Report Time and Date of resolution of complaint
	Allowable Exclusions	<ol style="list-style-type: none"> 1. Commercial & billing related issues 2. poor quality of water , if bulk water supplied by PCMC is of poor quality 3. No water due to shortage of water supply.
	Monitored By	<p>An electronic registry maintained by the Operator; the registry shall include detailed database and summary tables for both routine water quality tests and tests necessitated due to Complaints from Customer on poor quality of water</p> <p>Water quality testing database shall include:</p> <ul style="list-style-type: none"> Time and Date Sample Location Sample Number Details of water quality tests conducted Details of Remedial Actions taken in case of water quality problem <p>Customer complaints database shall include:</p> <ul style="list-style-type: none"> Time and Date Complaint Identification Number Customer Identification Code Nature of Complaint on water quality Action Taken Report Time and Date of Resumption of Service Level

E. Performance Measurement Protocol (NRW)

During performance measurement period it is not possible to measure to have simultaneous measurement within a DMA or multiple DMA. Therefore, for normalizing the readings, following, protocols will be followed;

Performance measurement will always be taken 12 noon to 12 noon of start date to 12 Noon of end Date on a particular day of a month as decided by Engineer for a period under consideration.

Measurement time gap for consumption or supply flow meter with DMA performance period, if any, in terms of days/ hrs or any other period under consideration shall normalize as per following corrections;

- a. Performance measurement period (Tp) : is the duration in days / hrs. for which operator performance is assessed for performance measurement (Te-Ts)
- b. Initial Reading (R1): is the reading taken during start of time for performance period (Ts)
- c. Final reading (R2): is the reading taken during end of performance period (Te)
- d. Actual Performance period (Ta): is the duration / time of actual reading from Initial reading (R1)
- e. Normalizing Reading: is the correction of actual reading with respect to time gap if any, during performance period.
- f. Normalising Formula : = $(R2-R1) \times (Tp/Ta)$
= $(R2-R1) \times [(Te-Ts)/ Tm-Ts]$

Where,

“Start time (Ts)” is the time of Initial Reading for Performance Measurement period (Tp) of DMA

“End Time (Te)” is the time of Final Reading at the end of Performance Measurement period of DMA

“Actual Measurement Time (Tm)” is the time of actual measurement for respective consumption meter / or supply meter

“Actual Performance period (Ta)” means Tm-Ts in hrs./ day

Section-9
Contract Forms

Section 9 - Contract Forms

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

Table of Forms

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- Contract Agreement..... 3
- Performance Security..... 4
- Advance Payment Security..... 6
- Draft Format for Memorandum of Understanding for JOINT VENTURE 8

Letter of Acceptance
[on letterhead paper of the Employer]

..... **date**

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

Subject: **Notification of Award Contract No.**

This is to notify you that your Bid dated 08/11/2015. . . . **date** . . . consisting of the Technical Bid and the Price Bid for execution of the **Selection of Contractor for Implementation of Continuous (24x7) pressurized Water Supply in 40% area of Pimpri Chinchwad and Operation & Maintenance of of the system for Five years , and identification number, as given in the Bid Data Sheet** for the Accepted Contract Amount of the equivalent of **amount in figures and words and name of currency**, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by our Agency.

You are requested to furnish the Performance Security within 28 days in accordance with the Conditions of Contract, using for that purpose the Performance Security Form included in Section 9 (Contract Forms) of the Bidding Document.

Authorized Signature:

Name and Title of Signatory:

Name of Agency: **Pimpri Chinchwad Muncipal Corporation, Maharashtra**

Attachment: Contract Agreement

Contract Agreement

THIS AGREEMENT made theday of,, between . **Pimpri Chinchwad Municipal Corporation, Pimpri, Pune-18** (hereinafter “the Employer”), of the one part, and **name of the Contractor**.(hereinafter “the Contractor”), of the other part: WHEREAS the *Employer* desires that the Works known as **Selection of Contractor for Implementation of Continuous (24x7) pressurized Water Supply in 40% area of Pimpri Chinchwad Municipal and Operation & Maintenance of the System for the period of Five years** should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein,

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
 - (a) the Contract Agreement,
 - (b) the Letter of Acceptance
 - (c) the Letter of Technical Bid
 - (d) the Letter of Price Bid
 - (e) the Variation Nos insert variation numbers if any.
 - (f) the Particular Conditions of Contract – Part A
 - (g) the General Conditions of Contract;
 - (h) the Employers Requirement
 - (i) the completed Schedules
3. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

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

Signed by

Signed by

for and on behalf of the Employer
in the presence of

for and on behalf the Contractor
in the presence of

Witness, Name, Signature, Address, Date

Witness, Name, Signature, Address,
Date

Performance Security
(Bank Guarantee – Not Applicable here)
It is to be paid in FDR

To

Joint City Engineer,
Pimpri Chinchwad Municipal Corporation,
Pimpri
Maharashtra, India

In consideration of Pimpri Chinchwad Municipal Corporation (hereinafter referred as the "Client", which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) having awarded to M/s, having its office at (hereinafter referred as the "Contractor" which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), vide the Client's Letter of Intent no. dated and the agreement to be executed for Rs. (Rupees), (hereinafter referred to as the "Agreement") for (insert "Project Name") and the Contractor having agreed to furnish a Bank Guarantee amounting to Rs. (Rupees) to the Client for performance of the said Agreement. We, (hereinafter referred to as the "Bank") at the request of the Contractor do hereby undertake to pay to the Client an amount not exceeding Rs. (Rupees) against any loss or damage caused to or suffered or would be caused to or suffered by the Client by reason of any breach by the said Contractor of any of the terms or conditions contained in the said Agreement. We, (indicate the name of the Bank) do hereby undertake to pay the amounts due and payable under this Guarantee without any demur, merely on a demand from the Client stating that the amount/claimed is due by way of loss or damage caused to or would be caused to or suffered by the Client by reason of breach by the said Contractor of any of the terms or conditions contained in the said Agreement or by reason of the Contractor's failure to perform the said Agreement. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs. (Rupees).

We, (indicate the name of Bank) undertake to pay to the Client any money so demanded notwithstanding any dispute or disputes raised by the Contractor in any suit or proceeding pending before any court or tribunal relating thereto, our liability under this present being absolute and unequivocal. The payment so made by us under this guarantee shall be a valid discharge of our liability for payment thereunder and the Contractor shall have no claim against us for making such payment.

We, (indicate the name of Bank) further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Client under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till the Client certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor and accordingly discharges this Guarantee.

We, (indicate the name of Bank) further agree with the Client that the Client shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the Client against the said Contractor and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor or for any forbearance, act or omission on the part of the Client or any indulgence by the Client to the said Contractor or any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have the effect of so relieving us.

This Guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor (s). We, (indicate the name of Bank) lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the Client in writing.

For the avoidance of doubt, the Bank's liability under this Guarantee shall be restricted to Rs. *** * (Rupees *****) only. The Bank shall be liable to pay the said amount or any part thereof only if the Client serves a written claim on the Bank in accordance with paragraph 2 hereof, on or before [*** (indicate date falling 90 days after the date of this Guarantee)].

For
Name of Bank:
Seal of the Bank:
Dated, the day of, 2015

Advance Payment Security
(Bank Guarantee-)

Guarantor: _____ [insert Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: _____ [insert Name and Address of Client]

Date: _____ [insert date]_____

ADVANCE PAYMENT GUARANTEE No.: _____ [insert number]_____

We have been informed that _____ [name of Contractor or a name of the Joint Venture, same as appears on the signed Contract] (hereinafter called "the Contractor") has entered into Contract No. _____ [reference number of the contract] dated ___ [insert date]_____ with the Beneficiary, for the provision of _____ [Name of the Work] (hereinafter called "the Contract").

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

At the request of the Contractor, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ [amount in figures] () [amount in words]¹ upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's a written statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Contractor is in breach of their obligation under the Contract because the Contractor:

- (a) has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Contractor has failed to repay;
- (b) has used the advance payment for purposes other than toward providing the Services under the Contract.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Contractor on their account number _____ at _____ [name and address of bank].

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor as indicated in certified statements or invoices marked as "paid" by the Client which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of the payment certificate or paid invoice indicating that the Contractor has made full repayment of the amount of the advance payment, or on the __ day of _[month]_____, [year]__,² whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

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

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

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 revision, ICC Publication No. 758.

[signature(s)]

{Note: All italicized text is for indicative purposes only to assist in preparing this form and shall be deleted from the final product.}

Draft Format for Memorandum of Understanding for JOINT VENTURE

This Memorandum of Understanding (hereinafter referred to as "MOU") is made and entered into this ----- ("Effective Date").

BETWEEN

M/s. _____, a company incorporated, and having its registered office at _____.
(Hereinafter referred to as the "**First Party**"/"**One Partner**");

M/s. _____) a company incorporated, and having Registered office at _____.
(Hereinafter referred to as the "**Second Party**"/ "**Each Partner**");

M/s. _____) a company incorporated, and having Registered office at _____.
(Hereinafter referred to as the "**Third Party**"/ "**Each Partner**");

Hereinafter jointly referred to as the "**Parties**" and individually as "**Each Party**" or "**a Party**" as the case may be.

WHEREAS,

- A) The **Pimpri Chinchwad Municipal Corporation, Pimpri, Pune-18 Maharashtra** (hereinafter referred to as the **PCMC** or "**Employer**") invited bid for Selction of Contractor for Implementation of **Continuous (24x7) Pressurised Water Supply in 40% area of Pimpri Chinchwad and Operation and Maintenance of the system for the period of five years**
- (B) The **Parties** hereto formed a Joint Venture or will form a joint venture (hereinafter referred to as the "**JV**") to jointly execute the above project in all respect

NOW THEREFORE IT IS HEREBY AGREED as follows

ARTICLE 1: JOINT VENTURE:

- 1.1. The Parties hereto agree to form the Joint Venture with _____ designated as the **One Partner and First Partner**.
- 1.2. _____ **shall be the Second Member – or Second Partner**

ARTICLE 2: JOINT VENTURE NAME:

- 2. The JV shall do business in the name of “ _____ **Joint Venture**”.

ARTICLE 3: JOINT AND SEVERAL LIABILITY:

- 3 The **Parties** hereto shall, for the above-referred **Projects**, be jointly and severally liable to the **Employer** for the execution of the Projects in accordance with the

Contract till the actual completion of Contract including defect liability period and operation & maintenance as per bid conditions.

ARTICLE 4: PROPORTIONATE SHARE:

4.1 Each member of the Joint Venture agrees to place at the disposal of the Joint Venture, the benefit of all its experience, technical knowledge and skill, and shall in all respects bear its share of responsibility and burden of completing the contract. The parties herein shall be responsible for physical and financial distribution of work as under.

Lead Partner : Financial responsibility : -----

Physical responsibility : -----

Other Partners : Financial responsibility : -----

Physical responsibility : -----

4.2 All rights, interests, liabilities, obligations, risks, costs, expenses and pecuniary obligations and all net profits or net losses arising out of the **Contract** shall be shared or borne by the **Parties** in the above **Proportions**.

4.3 The members in the proportion as mention in article 4.1, shall contribute sufficient Initial fixed capital for timely execution of the project including commissioning & operating period as per the contract.

ARTICLE 5: JOINT EFFORT AND MANAGEMENT:

5.1 The **Parties** shall participate as a **JV** in the submission of bids and further negotiations with the **Employer** and shall co-operate and contribute their respective expertise and resources to secure and execute the **Projects**.

5.2 On award of **Projects**, the **First Partner** in consultation with the other members of JV will decide on the final management structure for the successful execution of the **Projects** as per the terms of **Contract**.

5.3 All the **Parties** hereby agree to pool in their financial, administrative, managerial, technical and material resources for execution of the **Projects**, including commissioning & operation for the period as stipulated in the contract. The share of interest of the **JV** shall be as per the mutual understanding for the successful completion of the project.

ARTICLE 6: EXCLUSIVITY:

6.1 The co-operation between the **Parties** hereto shall be mutually exclusive i.e. none of them shall without the other **Party's** consent & prior approval of **PCMC**, approach or cooperate with any other parties in respect of the Project.

6.2 In the course of working as associates, the parties to the JV will be sharing information with each other which may be proprietary /confidential information /knowledge acquired by each other. It is hereby agreed that the parties will maintain complete secrecy regarding such information / knowledge and will not divulge to any party for any other purpose except for the success of the joint execution of the contract. All parties will also indemnify each other against any claim that may arise out of using information, which are being claimed proprietary.

ARTICLE 7: Memorandum of Understanding:

- 7.1 This **Memorandum of Understanding** shall be terminated:-
- a. if the **Parties** mutually confirm that the **JV's** bid proposal has not been finally accepted by **Employer** and all rights and obligations of the **Parties** under or in connection with this **Memorandum of Understanding** have ceased, or
 - b. after successful completion of the project including commissioning & operation and defect liability period from the date of this **Memorandum of Understanding** unless extended for a further period on demand of **PCMC** & mutual consent of the Parties, or
- 7.2 The **Memorandum of Understanding** can be modified by mutual consent of the Parties to suit the efficient and expeditious execution of Projects including commissioning & operation of Plant or to make this agreement more meaningful to suit the requirements of Employer **after the consent of the Employer**.

ARTICLE 8: ARBITRATION:

- 8.1 Any dispute resulting from this Agreement shall be settled amicably by mutual Consultation by the Municipal Commissioner, PCMC _____ & _____. In the event that an amicable settlement is not reached within 60 days in any particular case, the dispute shall be referred to arbitration and shall be resolved in accordance with and subject to the provisions of the _____ and any statutory modifications and enactment hereof for the time being in force. The decision of the arbitrators shall be final and binding upon both parties. The venue of arbitration will be _____.

ARTICLE 9: GOVERNING LAWS:

- 9.1 This Agreement shall in all respects be governed by and interpreted in accordance with the _____ Laws.

ARTICLE 10: CONFIDENTIALITY:

- 10.1 No Party hereto shall disclose to any other party any information of a confidential nature including but not limited to trade secrets, know-how acquired from any Party in connection with the subject matter of this Agreement.

ARTICLE 11: ADDRESS OF CONSORTIUM:

- Any and all correspondence from the Employer to the **JV** shall be addressed to **(name of JV)** at the address stated herein below—(any one of the partners). The address of the Consortium office of the partner companies will be deemed to be the address for the purpose of communication.
- The notice, if any required to be served on the party by the other party, will be deemed to be served, if the said notice / communication is delivered by Registered Post at the respective address

(name of JV)

ARTICLE 12: Authorized Representative:

- the JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution.
- Authorized Representative of JV : _____

ARTICLE 13: ASSIGN ABILITY:

13.1 The interests and rights of a Party in the Contract and as a Party of the Joint Venture shall not be transferable or assignable without the written consent of the Employer & other party.

ARTICLE 14: INTERPRETATION OF HEADINGS:

14. The headings of each of the Articles herein contained are inserted merely for convenience of reference and shall be ignored in the interpretation and construction of any of the provisions herein contained.

ARTICLE 15: OTHERS

15.1 Any other matters not contained in this Agreement shall be discussed and amicably agreed upon by the Parties in the spirit of mutual trust and cooperation for timely completion of project including commissioning & operation of project. Notwithstanding anything above all the Parties are severally and jointly responsible to the Employer for execution of the Contract:

IN WITNESS WHEREOF the Parties hereto have caused this Agreement to be executed by each of the duly authorized representatives as appearing below:-

Signed by _____) For and on behalf of _____)	_____
in the presence of: _____) Name: _____) Designation: _____)	Name : Designation:
Signed by _____) For and on behalf of _____)	_____
in the presence of: _____) Name: _____) Designation: _____)	Name : Designation:

Pimpri Chinchwad Municipal Corporation

Section-6 Detailed Technical Specifications

Vol-2 (Part I) – Technical Bid

BIDDING DOCUMENT

for the

**Selection of Contractor for Implementation of
Continuous (24 x 7) Pressurised Water Supply in
40% area of Pimpri-Chinchwad and Operation and
Maintenance of the system for Five years**

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Section-6.23

CONSTRUCTION REQUIREMENTS : DETAILED TECHNICAL SPECIFICATION Pimpri-Chinchwad Continuous (24/7) Pressurized Water Supply Project for 40% Area)

Note:- The Detailed Technical Specifications provided in Volume 2 separately shall supplement the Standard Technical Specifications provided in section 6.21 & 6.22 of Employer's requirement above. Whenever there is a conflict, the provisions in Detailed Technical Specifications section 6.23 shall prevail over those in section 6.21 & 6.22

APPLICABLE CODES & SPECIFICATIONS

The following specifications, standards and codes are made a part of the specification. All standards, tentative specifications, specifications, codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions in hard copy in two sets while performing the work one copy should hand over to PCMC /PMC before starting the work.

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

The Contractor may propose, at no extra cost to the Employer, the use of any relevant authoritative internationally recognized Reference Standard and seek approval of the Engineer-in-charge before adopting the same.

All details, materials and equipment supplied and workmanship performed shall comply with the specified Standards. If Bidder offers equipment to other Standards, the equipment/material should be equal or superior to those specified and full details of the difference shall be supplied and approval is sought from the Engineer-in-charge.

Certain specifications issued by national or other widely recognized bodies are referred to in this specification. In referring to the Standard Specifications the following abbreviations are used:

- IS : Indian Standard
- ANSI : American National Standards Institute

- API : American Petroleum Institute
- ASME : American Society of Mechanical Engineers
- ASTM : American Society of Testing and Materials
- AWS : American Welding Society
- AWWA : American Water Works Association
- ISO : International Organisation for Standardisation
- DIN : Deutsche Institute fur Nuremburg
- BS : British Standard
- IEC : International Electro-technical Commission
- IEE : Institution of Electrical Engineers
- IEEE : Institute of Electrical and Electronic Engineers
- NEMA : National Electrical Manufacturers Association
- AGMA : American Gear Manufacturer's Association

In case of discrepancy between this specification and those referred to herein, this specification shall govern.

1. IS : 2062 Steel for general structural purposes.
2. IS : 808 Dimensions for hot rolled steel beam, column, channel and angle sections.
3. IS : 814 Covered Electrodes for manual Metal Arc Welding of carbon and C-Mn steel.
4. BS EN 499 Welding Consumables. Covered Electrodes for Manual Metal Arc Welding of Non Alloy and Fine Grain Steel. Classification
5. AWS : A-5.1 Specification for Mild Steel Covered Arc Welding Electrodes.
6. IS : 3613 Acceptance Tests for Wire Flux combinations for Submerged - Arc Welding.
7. AWS : A-5.17 Specification for Bare Mild Steel Electrodes and Fluxes for Submerged Arc Welding.
- IS : 1367 - Technical Supply Conditions for Threaded Fasteners
8. IS : 1367 Technical Supply Conditions for Threaded Fasteners (Parts 1 to 3).
9. IS : 2016 Plain Washers.
10. IS : 2074 Ready Mixed Paint, Red Oxide Zinc Chrome and Priming.
11. IS : 102 Ready Mixed Paint, Brushing, Red Lead, nonsetting, Priming.
12. IS : 1786 High Strength Deformed Steel Bars and Wires for Concrete Reinforcement

13. IS : 432 Specification for Mild Steel & (Part-I) Medium Tensile bars and hard drawn steel wire for concrete reinforcement : mild Steel & Medium tensile steel bars.
14. IS.432 Specification for mild steel & (Part-II) Medium Tensile steel bars and hard drawn steel wires for concrete reinforcement : Hard drawn steel wire
15. IS : 269 Specification for Ordinary and Low heat portland cement
16. IS : 8041 Specification for Rapid hardening Portland Cement
17. IS : 383 Specification for coarse and fine aggregate from natural source for concrete
18. IS :12330 Specification for Sulphate Resisting Portland Cement
19. IS : 456 Code of practice for plain and reinforced concrete
20. IS : 800 Code of practice for General Construction in Steel.
21. IS : 816 Code of practice for use of Metal Arc Welding for General Construction in mild steel.
22. IS : 4353 Submerged Arc Welding of Mild Steel & Low Alloy Steels – Recommendations.
23. IS : 817 Code of practice for Training and Testing of Metal Arc Welders.
24. IS : 1182 Recommended practice for Radiographic examination of Fusion - Welded Butt Joints in steel plants
25. IS : 2595 Code of Practice for Radiographic Testing.
26. IS : 3658 Code of Practice for Liquid Penetrant Flaw Detection
27. IS : 5334 Code of practice for Magnetic Particle Flaw Detection of welds.
28. ASTM E 94 Guide for Radiographic Testing
29. ASTM E 709 Guide for Magnetic Particle Examination.
30. ASTM E 165 Test Method for Liquid Penetrant Examination.
31. IS : 3600 Methods of Testing Fusion Welded Joints and weld metal in steel (Parts 1 to 9)
32. IS : 4853 Recommended Practice for Radiographic Inspection of Fusion Welded Butt Joints in Steel Pipes.
33. IS : 3589 Seamless or Electrically welded steel pipes for Water Gas and Sewage (168.3 to 2032 Outside Diameter)
34. IS : 6631 Steel pipes for Hydraulic Purposes
35. IS : 7343 Code of practice for ultrasonic Testing of Ferrous Welded Pipes and Tubular Products
36. IS : 2598 Safety Code for Industrial Radiographic Practice
37. IS : 5822 Code of Practice for Laying of Electrically Welded steel pipes for water supply
38. IS : 1608 Mechanical testing of Metals.
39. IS : 9595 Metal Arc welding of Carbon and Carbon-Manganese Steels.
40. IS : 2825 Code of unfired Pressure Vessels
41. IS:5504 & IS:3589 Code for SW PIPES (SAW)
42. IS:10748 Requirement for Weldable Hot Rolled Carbon Steel Strip in Coils.
43. IS 10234 : Recommendation for radiography for general pipeline welding.
44. API-1104 Welding of pipeline & related facilities
45. IS: 3370
46. IS:456 IS:10262 and SP:23 for design mix
47. Any other relevant code

GENERAL CIVIL ENGINEERING WORKS

MATERIALS

The term “materials” shall mean all materials, goods and articles of every kind whether raw, processed or manufactured and equipment and plant of every kind to be supplied by the Contractor for incorporation in the Works.

Except as may be otherwise specified for particular parts of the works the provision of clauses in “Materials and Workmanship” shall apply to materials and workmanship for any part of the works.

All materials shall be new and of the kinds and qualities described in the Contract and shall be at least equal to approved samples.

Materials and workmanship shall comply with the relevant Indian Standards (with amendments) current on the date of submission of the tender.

Where the relevant standard provides for the furnishing of a certificate to the Engineer-in-charge, at his request, stating that the materials supplied comply in all respects with the standard, the Contractor shall obtain the certificates and forward it to the Engineer-in-charge

SAMPLES AND TESTS OF MATERIALS

The Contractor shall submit samples of such materials as may be required by the Engineer-in-charge and shall carry out the specified tests directed by the Engineer-in-charge at the Site, at the supplier’s premises or at a laboratory approved by the Engineer-in- charge.

Samples shall be submitted and tests carried out sufficiently early to enable further samples to be submitted and tested if required by the Engineer-in-charge. Approval by the Engineer-in-charge as to the placing of orders for materials or as to samples or tests shall not prejudice any of the Employer’s powers under the Contract.

ITEM WISE TECHNICAL SPECIFICATION

6.23.1 ITEM NO.1 ESTABLISHMENT OF DISTRICT METER AREAS

Creation & Establishment of DMA's covering 54,000 connections:-

The scope of work to be executed as a part of this item are establishment of the DMA/ zones / subzones by measuring the inflow, outflow, pressure, water consumption, consumer meter replacement, water quality etc. with all necessary work to facilitate the work within the scheduled period as mentioned. The Contractor need to provide all the necessary manpower, materials, equipment's etc. for implementation of the services listed below. The detailed scope is as per section 6 of employer requirement for DMA establishment, hydraulic modeling consumer survey, etc.

- Validation of the Network like boundaries, pipeline network, valves, washout etc
- Customer awareness & Conservation programs for 54,000 connection consumers in the all DMA's (i.e 40% area of PCMC) .
- Consumer survey: number of current consumers: location of 54,000 connection consumers in the all DMA's (i.e 40% area of PCMC) .
- Flow and pressure measurements by installing flow and pressure measuring devices.
- Review of existing functioning of the area with valves, supply hours, and updating of map.
- Updating of the network map: GIS map of the network. The cost of tracing equipment's, all the trial pits required for validation of the network etc.
- Develop a Record Plan for each DMA zone which will include a schematic diagram of the feeder and distribution network including sizes and materials, inflow meters location, boundary valves, other valves, major consumers etc.
- Establishment of the consumption in each of the DMA's zones
- Establishment of baseline UFW levels using the flow data from the DMA meters and the consumption assessed
- Condition assessment of pipe & make repair, rehabilitation plan. .
- Assessment of the non-leakage components of the UFW.
- Assessment of the various baseline levels in the zones.

Cost under this item includes:-

1. Experts services
2. Design & SIP
3. Survey & investigation
4. Software & hardware's
5. Report generation
6. Water balance
7. Man power , equipment's

8. All item other than bills of quantity
9. Training

The scope of work to be executed as a part of this item is design and freezing of boundary of DMA's within operational zones using the existing assets of the Water Distribution System. With the isolation of DMA's if any area affected for water supply, Contractors shall need to make temporary arrangement of water supply for the affected area. It also includes the new proposal of the pipe line, valves etc. complete to establish the hydraulically discrete areas.

The detailed scope is as below:

- Development of the Hydraulic Model and Hydraulic Analysis by providing Water Gems /equivalent software of unlimited nodes and pipes.
- Hydraulic analysis shall be done through latest version of Water Gems/equivalent software. The cost of Water Gems /equivalent software need to be considered in the item. No separate payment shall be made.
- Formation of District Meter Areas
- Identification of Average Zonal Pressure (AZP) and Critical Pressure Points (CPP) for each of the Pilot zones and providing of data logger on the same.
- Procurement and installation of bulk / DMA meter on inlet and outlet: volume of production (Distribution input). The cost of bulk / DMA meters, valves, rehabilitation of network will be paid separately as per bill of quantities.
- Procurement of DMA meters, for flow measurement, and consumer meters, valves for assessing consumption need to be done during this phase of the contract. The cost of the same will be paid from price bid.
- Preparation & execution of rehabilitation & Development plan for achievement of the performance targets as set in the contract.
- Final out put of DMA establishment is development of water balance & carried out Zero pressure test in a hydraulic distribution area.

Cost under this item excluded:-

Cost to be paid separately under respective bills of quantity.

1. All items executed like house service connection, repairs, rehabilitation of network, pipe laying, valves, meters, water meters etc.

Water Loss (NRW) detection / reduction and management services :-

1. The Contractor has to take all necessary action, provide all required services and materials and equipment and carry out all works required to achieve the main objective of the Contract and

reduce water loss in selected DMA's of 40% area of PCMC. The following (non-exhaustive) list summarizes the activities the Contractor is normally expected to carry out (without limiting the Contractor's obligations and the scope of work):

Cost under this item includes

1. All leaks detection methods, technology & equipment's, manpower etc. No separate payments on account of leak detection in network.
2. All items , equipment's , services other than bills of quantity
 - a. leak detection surveys (using all kind of equipment and technologies, from simple sounding with a listening stick to leak noise correlators and leak noise loggers as appropriate, helium gas), note that all required leak detection equipment has to be provided by the Contractor (but will not revert to the Employer at the end of the Contract).
 - b. pressure management: stabilizing, managing and reducing average DMA pressure using PRVs and controllers and various techniques as appropriate; when doing pressure reduction, the Contractor has to ensure that all the volume of water supplied to consumers in the DMA is the same or better than the baseline levels at the start of the project. Level of minimum pressure will depend on the type of housing and the general availability of tanks. Pressure management has to be done in close co-operation with the consumers in the DMA to reduce the risk of complaints. All required customer information and education is part of the Contractor's duties and cost for these activities covered under scope of services envisaged in this contract.
 - c. leak detection surveys, repairs and pressure fine-tuning shall be repeated and/or shall continue until an acceptable level of leakage is achieved. The acceptable level of leakage might vary from one DMA to the other, it is up to the Contractor to decide at which point the effort for further leakage reduction becomes prohibitively high;
 - d. Detecting illegal connections: Should the Contractor find illegal connections he shall report them to the Employer.
2. The fixed and performance fee together cover all fixed cost, overheads, profit and all manpower, machinery, equipment, transport as well as all materials and works required to carry out all activities that might become necessary to achieve the objective of the Contract.

Cost under this item excludes:-

1. All repairs to be carried out for leak reduction as per bill of quantity.
2. Item covered under bills of quantity (item 3 to 69)

Achieving continuous (24 x 7) pressurized water supply in DMA :-

Achieving and maintaining continuous (24 x 7) pressurised water supply in respective DMA, maintain minimum positive 8 m of water column at consumer end of DMA, monitoring for flow and pressure data including logging and data transfer to the central server. Establishment of the Target NRW after completion of all water loss reduction activities in a DMA and continuous monitoring of inflow, pressure and minimum night flow to become aware of new leaks.

6.23.2 ITEM NO-2 CARRYING OUT INTERNAL WATER AUDIT LEAK TEST OF CONSUMER :-

1.0]After completing HSC, if Engineer-in-charge feels or after billing for one month found excessive billing from normal, in that case required internal water audit leak test of consumer premises for checking leakages in the existing piping system, leakages of u/g tank & overhead storage tank of consumer concealed water piping, leaking taps, defective float valves etc. shall be carried out by Contractor & if any leakages found it should be brought on notice of the consumer & give him the required suggestion to solve the problem in writing. Contractor shall maintain list of higher consumption consumer regularly conduct internal water audit/leak test for such consumer.

Process :-

Finding out visible leaks, with closing all known tabs and checking the consumption during supply hours of one hour and identifying the leakages & creating inspection check list report. And provide check list to the consumer for further repairing work. This item only includes identification of leakages.

The repairs cost will be borne by the consumer itself with its own arrangement.

2.0]All equipment's should be used to detect the leak etc. complete

6.23.3 ITEM NO.3:- EXCAVATION SOFT SOIL EXCAVATION IN TRENCHES FOR PIPES, CABLES ETC. AND REFILLING

The Contractor shall furnish all tools, plant instruments, qualified supervisory personnel, labour, materials, any temporary works, consumables, any and everything necessary, whether or not such items are specifically stated herein for completion of the work in accordance with the Department's Requirements.

The Contractor shall survey the site before excavation and set out all lines and establish levels for various works such as grading, basement, foundations, plinth filling, roads, drains, cable trenches, pipelines etc. Such survey shall be carried out by taking accurate cross sections of the area perpendicular to established reference/grid lines at 8 m in case of buildings and 30 m in case of roads and pipe lines works intervals or nearer, if necessary, based on ground profile and thereafter properly recorded.

The excavation shall be carried out to correct lines and levels. This shall also include, where required, proper shoring to maintain excavations and also the furnishing, erecting and maintaining of substantial barricades around excavated areas and warning lamps at night.

Excavated material shall be dumped in regular heaps, bunds, riprap with regular slopes and levelling the same so as to provide natural drainage. Rock/soil excavated shall be stacked properly as approved by the Engineer-in-charge. As a rule, all softer material shall be laid along the centre of heaps, the harder and more weather resisting materials forming the casing on the sides and the top. Topsoil shall be stock piled separately for later re-use.

Drainage and Dewatering :-

No distinction shall be made as to whether the material condition strata is being excavated in dry, moist or wet. Diversion of all storm water and pumping out of all storm and seepage water shall be undertaken to keep the trenches pit reasonably dry for lowering, laying, jointing and testing of the pipes i.e. till the completion of the work.

Shoring and Strutting:-

The items include all shoring and strutting that may be required. On no account the width of trenches more than these mentioned hereinafter shall be measured. If excavation, more than the specified, is required for the purposes of keeping pumping machinery, stepping due to loose fill materials or for any other reasons, the same will be at the contractor's cost.

Lighting, Barricading and Guarding :-

These items also include necessary lighting at night at site of work and at intervals of 150 meters along the excavated trenches, and at all crossings and barricading the same by fencing so as to avoid any accident. A Chowkidar must be employed at site of work and places where the trenches, cross over any traffic roads to caution the vehicles and pedestrians etc. These arrangements shall be maintained till the completion of work and at the cost of the contractor.

Alignment and Levels :-

Before the trench excavation is commenced, sight rails shall be erected at every 30 m. and at all points of changes of direction, gradient, and at ends. The excavation work shall be preceded by a joint survey along the alignment of the mains to obtain ground levels at every 30 m or less distance. Temporary bench marks shall be constructed at every 300 m. distance along the alignment and shall be maintained till the completion of the work. All labour and materials required for the survey work, and fixing bench marks etc. shall be provided by the contractor at his own cost.

Depth and Grades of Trenches :-

The trenches shall be excavated to the grade and depth and on the line as shown on the approved

drawings. The depth of excavation and the level of the pipes inverts shall be checked by means of boning rods of suitable lengths. The final measurements of the depth of excavation shall be taken as the difference between the levels of the pipe top and the corresponding ground level added by the total out diameter of the pipe. Depth of murum bedding sand bedding wherever provided will be added to the above measurement for arriving at the total depth of excavation. Thus the depth of excavation to be paid for shall be finalized only after the pipes are laid and jointed. Additional depths required to be excavated at sockets, collars, specials, joints and for any other working facilities shall not be measured nor paid for. The depths to be considered shall be average depth in every 30 M length.

Width of Trench

- (a) Upto one metre depth the authorized width of trench for excavation shall be arrived at by adding 25 cm to the external diameter of pipe (not socket/ collar) cable, conduit etc. Where a pipe is laid on concrete bed/ cushioning layer, the authorized width shall be the external diameter of pipe (not socket/ collar) plus 25 cm or the width of concrete bed/ cushioning layer whichever is more.
- (b) For depths exceeding one metre, an allowance of 5 cm per metre of depth for each side of the trench shall be added to the authorized width (that is external diameter of pipe plus 25 cm) for excavation. This allowance shall apply to the entire depth of the trench. In firm soils the sides of the trenches shall be kept vertical upto depth of 2 meters from the bottom. For depths greater than 2 meters, the excavation profiles shall be widened by allowing steps of 50 cm on either side after every two metres from bottom.
- (c) Where more than one pipe, cable, conduit etc, are laid, the diameter shall be reckoned as the horizontal distance from outside to outside of the outermost pipes, cable, conduit etc.
- (d) Where the soil is soft, loose or slushy, width of trench shall be suitably increased or side sloped or the soil shored up as directed by the Engineer-in-Charge. It shall be the responsibility of the contractor to take complete instructions in writing from the Engineer-in- Charge regarding increase in the width of trench. Sloping or shoring to be done for excavation in soft, loose or slushy soils.

The maximum permissible width as specified below or the actual width excavated whichever is less shall be recorded and paid for. Extra width at collors, joints and also at specials for working facility shall neither be measured nor paid for:

Sr. No.	Diameter of Pipe	Permissible Width of Trenches
1.	1000 mm	1.70 M
2.	900 mm	1.60 M
3.	800 mm	1.60 M
4.	700 mm	1.30 M

5.	600 mm	1.20 M
6.	500 mm	1.10 M
7.	450 mm	1.10 M
8.	400 mm	1.00 M
9.	350 mm	0.95 M
10.	300 mm	0.90 M
11.	250 mm	0.85 M
12.	200 mm	0.85 M
13.	150 mm	0.75 M
14.	100 mm	0.75 M

Dressing and Consolidation of the Trenches :-

The bed of the trenches shall be well rammed before laying the pipe. Hollows if any shall be filled with murrum duly rammed without extra cost. The whole bed of the trenches shall be so dressed in grade and line that the pipes are given continuous bearing for their whole lengths except at sockets, or the collars and specials joints etc. Necessary pits for socket collar and specials joints etc. shall be provided in approved manner without any extra cost and as directed by Engineer.

Filling in Excess Depths :-

Depths of pit / trenches excavated in excess of requirements shall be refilled by selected hard murum well rammed and watered for trenches to the required level and grade at the cost of the contractor.

Classification of Excavation :-

For pipe line trenches all the materials and strata encountered in the excavation shall mainly be classified in three categories as specified in BOQ.

EXCAVATION (soft soil , hard murum and boulders)

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-in- Charge. It shall be the responsibility of the contractor to take complete instructions in writing from the Engineer-in-Charge 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-in-Charge. Only the excavation shown on the drawings with additional allowances for centering and shuttering or as required by the Engineer-in-Charge 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-in-Charge, 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 the foundations shall be dug out and filled with concrete (to be paid separately) as directed by the Engineer-in-Charge.

While carrying out the excavation for drain work care shall be taken to cut the side and bottom to the required shape, slope and gradient. The surface shall then be properly dressed. If the excavation is done to a depth greater than that shown on the drawing or as required by the Engineer-in-Charge, the excess depth shall be made good by the contractor at his own cost with stiff clay puddle at places where the drains are required to be pitched and with ordinary earth, properly watered and rammed, where the drains are not required to be pitched. In case the drain is required to be pitched, the back filling with clay puddle, if required, shall be done simultaneously as the pitching work proceeds. The brick pitched storm water drains should be avoided as far as possible in filled-up areas and loose soils.

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 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-in-Charge, 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-in-charge 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 will any extra payment be made on this account.

6.23.4 ITEM No.4:- EXCAVATION IN HARD MURUM

Detailed specification as above 6.23.3

6.23.5 ITEM No.5:- EXCAVATION IN Soft 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 blasting operations are prohibited or are not practicable, excavation in hard rock shall be done by chiseling.

In ordinary rock excavation shall be carried out by crowbars, pick axes or pneumatic drills and blasting operation shall not be generally adopted.

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-in-Charge. 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-Charge.

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 with 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-in-Charge, 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-in-Charge 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-in-Charge 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-in-Charge 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 will any extra payment be made on this account.

6.23.6 ITEM No.6:- EXCAVATION IN HARD ROCK

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 equipments may be further classified as excavators and tractor based equipments.

Excavators:- Excavators generally used at site are as follows:

- (i) **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.
- (ii) **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.
- (iii) **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.
- (iv) **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.
- (v) **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.

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 :

- (i) **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.

- (ii) **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.
- (iii) **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.
- (iv) **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 cut, 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.
- (v) **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.
- (vi) Angledozer is capable of both tilting and angling

Transporting Equipment

This implies horizontal movement primarily but it can involve some vertical movement too.

- (i) **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.
- (ii) **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 sheep's foot Roller consists of a shallow 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.

Providing, Temporary crossing over the Trenches :-

Where the trenches are excavated across roads or along roads in a village or town area, suitable and safe temporary crossing, duly approved by the Engineer shall be provided. Such crossings shall be maintained in proper conditions till the completion of the work. As far as possible trenches along/across roads, shall be excavated in such a way that at least 5.0 M. clear width of the road is available for the traffic. In case this is not possible, adequate diversion shall be provided by the

contractor at his cost, such costs being deemed as included in the unit rates for these item of excavation. All crossings and diversions shall be suitably barricaded with railing on either side of the road and lighted at night.

BACKFILLING of Trenches of Pipeline: -

All fill material shall be subject to the Engineer-in-charge's approval. If any material is rejected by Engineer-in-charge, the Contractor shall remove the same forthwith from the site. Surplus fill material shall be deposited / disposed off as directed by Engineer-in-charge after the fill work is completed.

No earth fill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with to the approval of the Engineer-in-charge. All the trenches will be refilled and compacted in layers as specified in Standard Specifications. Contractor will take regular photographs of refilling in layers and compaction of each layer to required density and will provide with the running payments.

Filling Trenches with Stone Dust: -

The stone dust shall be filled 100% in across road crossing until the road restoration completed. So also the work shall be carried out as per the directives of the Engineer-in-charge. No extra lead or lift shall be payable. For supplying stone dust or laying in the trench where the road crossing is done.

Crossing of pipe lines, cables and underground obstructions etc. :-

Since the alignment passes through township, there is every possibility of coming across pipelines of water supply, drainage lines and cables of telephones and M.S.E.B. This item includes the risk and restoring cost of damaged cables for rejoining as well as for carefulness and awareness during excavation, to avoid breakage of water pipe lines of small and larger diameter and also drainage pipe lines, cables etc. The item covers the cost of renovation of any damaged cables / pipelines during excavation. The contractor is therefore requested to go through all the details of existing lines / cables etc. along the alignment of distribution mains before submission of tender. No extra claim on any account shall be entertained afterwards. No claim on account of change in alignment shall be entertained.

6.23.7 ITEMNo.7- PROVIDING MS PIPE

Providing M.S. Pipe :-

Providing, fabricating, testing, painting, supplying and installation of M.S. Pipes & Specials of specified ID / OD & specified wall thickness conforming to IS 3589-2001. Pipes shall be flanged with slip-on-boss flanged available open conforming to IS 6392-1971.

Pipes shall be made from steel plates conforming to relevant IS 2062 grade Fe410 or strips by butt welding longitudinally or spirally. The weld shall be continuous. Prior to welding, edges of plates or strips may be prepared suitably where required by the process of manufacture. Thickness of pipe shall be minimum 8 mm below 500 mm dia and above 300 mm dia. as per given in BOQ.

All pipes and specials shall be manufactured out of new mild steel plates/steel strips/coils, which shall be free from any cracks, surface flaws, laminations, excessive pitting or any other defects. The pipes shall be mill manufactured of either plate welded or spiral welded variety with longitudinal or spiral welds conforming to respective standards from a mill which can establish with authenticity having supplied similar pipes in the last 3 years which shall be truly cylindrical, and straight in axis. The process of manufacture shall be as per clause 7.3 of IS: 3589. The ends shall be accurately cut and prepared for welding. No site-fabricated pipes are allowed.

The external circumference of the pipe pieces, which are to be fixed adjacent to flange adopter with fixed outer diameter shall not deviate from theoretical by more than 1 mm. The pipe shall be rolled to the extent it is truly cylindrical. The external longitudinal/spiral welding of the pipe shall be ground smooth flush with surface to the satisfaction of the Employer or his Representative. Nothing extra cost shall be charged by the Contractor for grinding work. The approved vendors for supply of M.S. plate sheets / HR coils for fabrication of pipes shall be **SAIL, TISCO, ESSAR, JINDAL & ISPAT Industries Ltd.**

TOLERANCE

The tolerance on the pipe body shall be + 0.75 % for all sizes of pipes. The tolerance on specified wall thickness shall be - 2% / + 10% Straightness - Finished pipe shall not deviate from straightness by more than 0.2% of the total length. Checking shall be carried out using a taut string or wire from end to end along the side of the pipe to measure the greatest deviation.

Length - Straight pipe shall not vary from the specified overall length by +10 mm or -10 mm for length up to and including 6 m.

INSIDE / OUTSIDE COATINGS of Pipelines

The Contractor shall select scheme for lining and coating of pipes on the basis of soil & water reports and his own supporting investigations such as soil resistivity and other supplementary data.

Acceptable linings are:

Cement mortar (shop applied, confirming to Annex – A – IS:3589 : 2001

Cement mortar (in-situ) Conforming to IS:11906 limited to joints only.

Food grade 100% solid Liquid – Epoxy system conforming to Annex – B – IS : 3589 : 2001

Acceptable External coatings for buried pipes are but preferred coating shall be Fusion bonded Epoxy coating: (for trenchless laid pipe only.)

For above ground pipes only:

Liquid – Epoxy system conforming to Annex – B – IS : 3589 : 2001

Fusion bonded Epoxy conforming to Annex – C – IS 3589 : 2001

For buried pipes:

Coal tar wrapping/Tape coating system conforming to Annex – D – IS : 3589 : 2001 and IS:10221

External coatings for above ground pipes shall be resin epoxy.

The contractor shall supply the required dia of pipe at his cost. **The pipes shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC**, the charges for the same shall be **borne** by the contractor

6.23.8 ITEM No.8 - PROVIDING DUCTILE IRON PIPE

Ductile Iron Pipes :-

General :-The specification pertains to ductile iron spigot and socket spun pipes (suitable for jointing with rubber gaskets) with ISI make and in standard length and of classes mentioned in the bill of quantities confirming to IS -8329/ISO 2531 with all upto date amendments and revision inclusive of all taxes, transportation loading, unloading from the railway wagons, carting to site of work, stacking at site of work (F.O.R.) site of work including all the taxes and duties. Ductile Iron pipe manufacturer must have ISI licence for the entire range of DI pipes required for this tender as on date of submission of tender.

Material :-The material shall confirm IS 1387 of 1993 (second revision) for General requirements for supply of metallurgical materials.

Manufacture :-The Ductile iron pipes shall be manufactured disconfirming the procedure laid down in clause 7 of IS 8329-2000.

Mechanical test :-Shall confirm clause 10 J IS: 8329-2000

Hydraulic test :-Shall confirm clause 10 J IS: 8329-2000

Cement motor lining :-Shall confirm Annex B of IS: 8329-2000

Rubber gasket :-Rubber gasket used for jointing shall be of EPDM Rubber gasket and physical properties of gasket material shall confirmed to IS: 5382-1985.

Test Reports :-The contractor shall have to produce the original copy of manufacturer's test certificate & third party inspection certificate from organisation such as SGS, RITES or any other agency authorized by PCMC for quality and strength of D.I pipes.

Stacking Pipes:-All pipes shall be stacked as per manufacturer's recommendations unless otherwise directed by the Engineer.

The maximum number of layers in any stack of pipes shall be as follows:

Nominal Diameter	No. of Layers in Stack	Nominal Diameter	No. of Layers in Stack
200	12	600	4

250	10	700	3
300	8	800 & 900	2

Transportation of Pipes at Site:-After pipes, fittings and valves will be delivered to and off-loaded at temporary stores/ go-down, the Contractor shall make all arrangements for subsequent transport and handling on or about the site to the point of installation, including where necessary any movement into and out of temporary storage.

The Contractor has to transport the pipes and other materials from manufacturers to the site of lying as indicated by the Engineer. Pipes should be handled with care to avoid damage to the surface and the socket and spigot ends, deformation or bending. Pipes shall not be dragged along the ground or the loading bed of a vehicle. Pipes shall be transported on flat bed vehicles/trailers. The bed shall be smooth and free from any sharp objects.

The transportation and handling of pipes shall be made as per IS: 12288. Handling instructions of the manufacturers of the pipes shall be followed. All precautions set out shall be taken to prevent damage to the protective coating, damage of the jointing surfaces or the ends of the pipes.

Loading & Unloading: -Pipes shall be loaded and un-loaded manually or by suitable mechanical means without causing any damage to the stacked pipes.

Cranes or chain pulley block or other suitable handling and lifting equipment shall be used for loading and un-loading of heavy pipes. Where using crane hooks at sockets and spigot ends hooks shall be broad and protected by rubber or similar material, in order to avoid damage to pipe ends and lining. Damage to lining must be repaired before pipe laying according to the instructions of the pipe manufacturer. Pipes shall not be thrown directly on the ground or inside the trench.

When using mechanical handling equipment, it is necessary to employ sufficient personnel to carry out the operation efficiently ensuring safety. The pipes should be lifted smoothly without any jerking motion and pipe movement should be controlled by the use of guide ropes in order to prevent damage caused by pipes bumping together or against surrounding objects.

Rolling or dragging pipes along the ground or over other pipes already stacked shall be avoided.

Support of Pipe on Transit & Storage: -The pipe should be given adequate support at all times. The pipes shall rests uniformly on the vehicle bed in their entire length during transportation. Whatever method and means of transportation is used, it is essential that the pipes are carefully placed and firmly secured against uncontrolled movement during transportation to the satisfaction of Engineer.

Stocking of Materials: -The Contractor shall remain responsible for the safe custody of all kinds of materials received by him till consumption of the same in the works. The materials must be stored in a protected temporary store near the site of work and shall not be removed without specific permission of the Engineer. Temporary stores shall be built by the Contractor at location as directed by the Engineer at the Contractor's cost.

A stock register shall be maintained by the Contractor and the day to day receipt, consumed and balance of such materials shall be recorded therein. This register shall be produced by the Contractor to the Engineer or his representative whenever required for verification of stock. The Engineer shall have free access to the temporary stores/go-down of the Contractor at any time and without any prior intimation.

Materials supplied for a particular work or part thereof shall not be used elsewhere without permission from the Engineer.

Temporary Storage: -The Contractor shall take into temporary protective storage all pipes and valves not required for immediate installation in the works. The Contractor shall provide proper and adequate storage facilities to protect all the materials and equipments against damage from any cause whatsoever and in case of any such damage/theft, the Contractor shall be held responsible.

Pipe should be stored on a reasonably flat surface free from stones and sharp projections so that the pipe is supported throughout its length. In storage, pipe racks should provide continuous support and sharp corners of metal racks should be avoided. Pipes should not be stacked in large piles. Socket and Spigot pipes should be stacked in layer with sockets placed in alternate ends of the stack to avoid lop sided stacks.

Pipes should not be stored inside another pipe. On no account the pipes should be stored in stressed or bent condition or near the sources of heat. Pipes should not be stacked more than 2 m high and pipes of different sizes and classes should be stacked separately. The ends of the pipes should be protected from abrasion. The pipes should be protected from excessive heat at all times. Their storage facility should be well ventilated.

Valves shall be stored under cover until they are required for installation and particular care shall be taken for the protection of any associated mechanical equipment.

The period between taking delivery of pipe and the completion of its installation shall be kept to a minimum and generally, the pipes shall be laid within four weeks from the date of their dispatch from the manufacturer / store.

Any period during which the pipes are strung out along the pipeline or placed alongside the works awaiting installation shall also be kept to a minimum and if this period exceeds one month pipes shall be raised at least 75 mm from the ground on timber bearers. Jointing parts and materials shall in any case be stored under cover as for valves.

The contractor shall supply the required dia. of pipe at his cost. **The pipes shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC**, the charges for the same shall be borne by the contractor

6.23.9 ITEM No.9 - PROVIDING M.S SPECIAL

Specials – Fabrication

Generals

Specials, such as tees, Y-pieces, bends (single or composite), tapers, tees, blank flanges and gap pieces, collars etc. shall necessarily be in steel and shall be manufactured as per IS : 7322 standards and applicable codes and tested in the same manner as the pipes. Small branches, single piece bends etc. may be fabricated at the site. Care shall be taken to ensure that the fabricated fittings have at least the same strength as the pipeline to which they are to be joined and tested.

a. Bends

- i. Bends shall be fabricated taking into account the vertical and horizontal angles for each case as per the IS code.
- ii. The bends shall have welded joints and the upstream and downstream ends of each bend shall have a straight piece of variable lengths as required at site.

iii. Bends shall be designed with deflection angle of maximum 10 deg between segments.

STEEL FLANGES

The flanges and their dimensions of drilling, wherever not specified, shall be in accordance with IS:6392 – 1971 or its latest revision. The flanges shall be slip on boss type NP 1N/mm². Prior to welding flange, the contractor shall have to obtain approval of Engineer for all sizes and types of flange drawings.

6.23.10 ITEM NO-10 PROVIDING AND LAYING D.I. SPECIALS

Item includes:-

1. Providing DI I Mechanical Specials.
2. Providing DI Conventional , Specials
3. Providing DI Flanged Specials.
4. Carting the specials to site of work.

Specifications:-

The DI specials shall be manufactured and tested in accordance with IS 9523 or BS 4772. The mechanical test and hydrostatic test shall confirm to clause 9 and clause 10 respectively of IS 9523. The tolerances on dimensions shall be as per IS 9523.

The manufacturer of the pipes shall supply the fittings. D.I. Specials shall confirm to relevant IS codes of latest edition. Material should be procured from approved manufacturer with manufacturers test certificate. At least 50% of the D.I. specials should be inspected by S.G.S., RITES or any other agency approved by the PCMC. Inspection charges shall be borne by the contractor.

All the DI fittings shall be supplied with rubber rings for each socket. The rubber ring shall conform to IS 12820 and IS 5382. Flanged fittings shall be supplied with one rubber gasket per flange and the required number of nuts and bolts. Rubber Gaskets shall be as per IS specifications mentioned in the schedule.

Synthetic rubber ring dimension should be as per IS 12820 / 89 and quality should be as per I.S. 5382/1985 and suitable for jointing of D.I. pipes as per I.S. 8329-2000 or C.I. pipes as per I.S. 1536-2001. Mechanical joint Bends, Tees, Reducer, Adopter etc. shall be of exact size, dia degree and as per standard specifications.

The special shall be coated or protected from rusting and shall be suitable for D.I. pipes (as per IS 8329/2000) or C.I. pipes (as per IS 1536-2001).

Mechanical compression sealing flanged socket tail piece (Jiffy flange adopter) shall be of exact size and dia. to match D.I. pipes (IS 8329-2000). Mechanical Joint double socket reducer shall be as per IS 13382-1992 and suitable to D.I. pipes (IS 8329-2000) sealing gaskets of S.B.R. shall be as per IS 12820-1989.

This item includes providing of special, transporting the special to site and testing. It also includes cost of entire jointing material, cost of specials, and nut-bolts etc. Only labour charges required for jointing shall be paid separately under relevant items of this tender.

The contractor shall supply the required dia of special at his cost. **The Special shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC**, the charges for the same shall be borne by the contractor

6.23.11 ITEM NO-11 PROVIDING D.I BUTTERFLY VALVE

Manufacturing, supply and delivery DI D/F Resilient Seated Vacuum tight Butterfly Valve suitable for bidirectional flow with Body and disc made of DI GGG40. Disk shall conform to double eccentric with specially designed (Dove tail Shape) pressure supported sealing system made of EPDM approved by DVGW Clause W270. The Body seat shall be fusion bonded nickel chromium weld overlay and micro finished. Closed Disk Eye with dry shaft design made of Stainless steel with 13% chromium of grade 1.4021 connected with Medium free bearing of Bronze with double O-ring sealing of EPDM. The shaft shall be connected to the disc by riveted pin or taper pin with lock. The Valve shall be compatible for Buried application without chamber. The Coating and the rubber parts shall comply with DVGW and KTW standards. The gearbox shall be with self-locking, fully enclosed, maintenance-free lubricated for life, worm gear including mechanical position indicator. The Valve shall be according to EN593/IS 5163, the face-to-face length shall be EN 588-1, basic series 14/BS 5155(Long Body)/ IS13095 (Long Body) and drilling according to EN 1092-2/IS 6418. Epoxy Powder or liquid Epoxy coating with minimum thickness of 250 micron applied inside and outside of both body and disc. it is a resi-coat powder approved for drinking water application, applied through fusion bonding technology process by dipping the shot-blasted casted components heated up to 200 deg C).

1.4.4.1 Material of Construction:

Body	Ductile iron to EN-JS 1030 (GGG-40)
Disc, Retainer Ring	Ductile iron to EN-JS 1030 (GGG-40)
Shaft	Stainless Steel 420 with 13% chromium (1.4021)
Shaft Bearing Bushes	Bronze
Seat	Integral Ni-Cr weld overlay, (Ni > 67% Cr = 19.5 %) microfinished
Disc Sealing& 'O' rings	EPDM Rubber [W 270 Clause]
Surface Protection	Epoxy powder coating or epoxy liquid lacquer min. 250 microns thickness, colour RAL 5005 Blue

Note:

- 1) For sizes above DN1200 the coating minimum thickness will be 150 microns applied inside and outside of the body and disc.

valve shall be supplied from the approved list of the manufacturer by PCMC after third party inspection authorized by PCMC. Inspection charges shall be borne by the contractor.

Electric Actuator

Actuators shall be suitable for the medium, climatic, environmental and pressure conditions of the system in which they are to be fitted. Actuators shall be provided with:

- (a) AC Electric Motor.
- (b) Reduction gear unit.
- (c) Torque switch mechanism.
- (d) Limit switch mechanism complete with set of limit switches and additional two spare sets for suitable position.
- (e) Hand wheel, for manual operation.
- (f) Valve position indicator.
- (g) Hand-auto lever with suitable locking arrangement.
- (h) 10 W single phase space heater in the switch compartment.
- (i) Blinking light throughout the valve operation.
- (j) Junction box for terminating power and control cables.
- (k) With additional accessories for integrating with PLC system.

The actuator shall be suitable for operation on 415V, 3 phase, 50 Hz power supply. The motor winding insulation shall conform to class B as per relevant BS and motor shall be protected by suitable thermal overload relays. The actuator shall be capable of producing not less than 1 1/2 times the required operator torque at the required time cycle of valve operation. The transmission shaft connecting the actuator to the valve shall be provided with 2 bearings one at actuator end and one at valve end with universal couplings at suitable places. The required numbers of switch/contacts meet requirements for PLC system. The electric motor shall be of the squirrel cage type as per IS 325 with insulation to IS 1271 Class B. The windings shall be impregnated to render them non-hygroscopic and oil resistant. All internal metal parts shall be painted. The motor shall be rated for 15 minutes. They shall also be suitable for operating on the specified electric supply and shall satisfactorily open and close the valve under variations of electric supply specified.

Motor shall be protected by suitable overload protection device. The reversing contactor starter and local controls shall be integral with the valve actuator. The starter shall comprise mechanically and electrically interlocked reversing contactors of appropriate rating fed from a 110 Volt control transformer. The common connection of the contactor coils at the transformer shall be grounded. HRC cartridge type primary and secondary fuses shall be provided.

Local control shall comprise pushbuttons for open, close and stop operations and a Lockable Local/Remote/off selector switch. The control schematics shall be subject to approval. Internal wiring shall be of 650/1100 volt grade PVC insulated stranded copper conductor of minimum 1.5 sq. mm for control circuits and of minimum 4 sqmm copper for the power circuit. Each wire shall be number identified at each end. The terminals shall be of stud type.

Cable entries shall be suitable for PVC insulated/ sheathed, armoured cables. A separate terminal box shall be provided for the heater. A separate terminal box shall be provided for cabling to control circuits.

The actuator enclosure shall be fully weatherproof and hose proof to IP 67 and shall be fitted with an anti-condensation heater, which shall be switched off when the motor is running. The torque switch mechanism shall function as follows to stop the motor on closing or opening of the valve, or upon actuation by the torque when the valve disc is restricted in its attempt to open or close.

The torque switch in the closing direction shall interrupt the control circuit if mechanical overload occurs during the closing cycle or when the valve is fully closed.

The torque switch in the opening direction shall interrupt the control circuit if mechanical overload occurs during the opening cycle or when the valve is fully open.

The mechanism shall facilitate adjustment of the torque at which the switches are required to operate. Non-adjustable limit switches shall stop the motor and give indication when the disc has attained the fully open or closed position.

The adjustable limit switches shall have control rated 2A, 48 V DC for specified system interlock, at the desired value position in both the opening and closing directions.

Motor Operator shall be provided with clearly visible local valve position indicators mounted on the operator assembly to give an indication whether the valve is fully open, fully closed or in an intermediate position.

Settings and emergency operation shall be possible with the use of a hand wheel. The Hand wheel shall be of stainless steel and the drive mechanically independent of the motor drive and any gearing should limit the operating torque at the hand wheel to less than 15 kg and be such as to permit emergency manual operation in a reasonable time. During electric operation the hand wheel shall not rotate.

Actuators shall be adjusted at the manufacturer's works to ensure that they provide the correct, fully, open position and fully closed position. Mechanical adjustable stops shall be provided to prevent over-travel of the valve in the open and closed positions.

The contractor shall supply the required dia of valves at his cost. **The valves shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC**, the charges for the same shall be **borne** by the contractor

6.23.12 ITEM NO-12 LOWERING , LAYING JOINTING VALVES

General :- Items pertains to lowering, laying and fixing D.I. sluice valves/Butterfly valve of different diameters with pair of tail pieces as per site condition, including cost of all jointing material and labor testing etc.

Water tightness of the valve joints shall be tested in the same manner as described for mains. These tests may be carried out along with the tests of the pipe mains and separate tests are not essential.

Before fixing the valves, the base of the valves chamber shall be completed, though these chambers are covered under separate items.

Fixing :- The valves shall be fixed at the locations as decided by the Engineer-in-charge during the execution. The item includes all jointing material and labour including taxes etc. The size of nuts and bolts and packing etc. shall be as per I.S. specification (I.S.).

The flanges of the sluice valve shall be cleaned from all dirt, oil etc. A pair of tall piece shall be fixed with the flanges of valve without bolts of required sizes and ply rubber. The valves shall be fixed at the positions shown by the Engineer irrespective of what has been shown on drawings.

6.23.13 ITEM NO-13 LAYING OF PIPELINE

General

After having carried out excavation of trenches as is explained in these specifications elsewhere the loose materials from the sides or the edges of the trench shall be prevented from falling inside the trench. Properly designed bedding as per site conditions for resting of the pipes shall then be provided before starting with the laying. The excavation of trenches for laying of M.S. pipe shall be as per Clause 4.2.1 of IS: 5822. Design of bedding with respect to installation condition shall be submitted by the Contractor for approval by the Employer Unless specified otherwise, the M.S. pipeline shall be buried with minimum cover of 1.0 meter above socket top as shown on drawings to be submitted by

the Contractor and approved by the Employer. No material shall be erected unless it has been previously passed by the employer or his Representative.

Lowering and Jointing

Before pipes are lowered the trenches shall be examined as per Clause 4.2 & 4.2.1 of IS:5822. Also pipe handling and inspection shall be done as per Clause 5.1 to 5.2.5. Pipe laying below ground shall be as per Clauses 8.1.1 to 8.1.2.1 and pipe laying above ground shall be as per Clause 8.3.1 of IS:5822. Jointing of pipes shall be beveled but joint as per 17. (a) of IS 3589.

Welding

Unless specified otherwise all M.S. pipes and specials shall have butt-welded joint. Where shown on drawings, flanged joints or collar sleeve collar. Collar sleeve joints shall be provided.

The welding of pipes in the field should comply with IS: 816. Electrodes for welding should comply with IS:814. The welded joints shall be tested in accordance with IS: 3600 (Part-1) and other relevant Codes. One test specimen taken from at least one field joint out of 10 shall be subjected to test as per Clause 6.2, 6.2.1, 6.2.2 and 6.3 of IS:5822 i.e. the Contractor shall carry out all test for welding as are described under Clause 6 of IS:5822.

Saddle Supports

Unless otherwise specified pipeline shall be laid underground. However in certain reaches it shall be on steel saddle supports, over the proposed bridge, spaced at suitable intervals. The material and construction of Steel structures such as saddles, anchor blocks, crossings etc. associated with the work of pipeline shall conform with the relevant I.S. Codes, good engineering practice and as directed by the Employer or his Representative. The pipes to be laid at saddle supports shall be erected at mean temperature. Saddle supports shall either be sliding type or fixed type, detailed design and drawings including fabrication drawing for which shall be supplied by the Contractor. In case of sliding support, the pipe shall be allowed to slide freely over the plate embedded in the saddle. Alternatively to achieve fixity, the pipe shall be anchored by providing suitable anchor bases with steel clamps. The rate for laying the pipe on saddle support shall be included in laying, aligning, welding, provision of rigging screws with screw eyes etc. all complete in the Contract of Contractor.

Below the pipes in the above alignment, the Contractor shall provide necessary bedding/ saddle supports at his own cost required as per structural designs, which shall be got approved from the Employer or his Representative.

Hydraulic Test of MS Pipeline :-

1. MS pipes and Fittings:
2. All the Pipes, specials and fitting of DI shall be supplied and tested as per relevant IS codes and specifications
 - a. Factory Test Pressure: as per IS 3589
 - b. Site Test Pressure: as per IS 5822

Suitable section as directed by the Engineer in charge shall be taken for such testing from time to time during progress of the work and satisfactory test given for that section. All testing apparatus, gauges, connections, etc. and water required for testing shall be arranged by the contractor at his cost. The PCMC does not undertake any responsibility to supply water for testing which the contractor

has to arrange by paying the required charges directly. The PCMC shall have the right to recover such charges from his bills if complaints are received that contractor has not paid the charges thereof. If there is delay in testing, the contractor shall refill the trenches for the time being and reopen them at time of testing at his own cost failure of which shall entitle the PCMC to do the refilling and reopening of trenches at the risk and cost to the contractor. If the trenches are filled due to any reason whatsoever before testing, the contractor shall have to open them for testing at no extra cost.

1.1] The field test pressure to be imposed should be not less than the maximum of following.

- a) 1.5 times the maximum sustained operating pressure in the pipeline.
- b) 1.5 times the maximum static pressure (with minimum design pressure as 6.0 kg/sqcm) in the pipeline in the pipe line
- c) Sum of maximum sustained operating pressure and maximum surge pressure.
- d) Sum of maximum pipe line static pressure and maximum surge pressure,

The testing conditions for the pipelines are summarized as follows:

- Pre test and saturation period with addition of make-up water
Pressure : Test pressure
Duration : 24 hrs for M.S pipes
- Pressure test with addition of make-up water
Pressure : Test pressure
Duration : 3 hrs

After filling, the pipeline shall be pressurised to the specified operating pressure and left for a period of time to achieve stable conditions. The pipeline shall then be pressurized upto the full test pressure and the section under test completely closed off. Care shall be taken to ensure that the pipeline is free of air. For this if required or if asked by the Engineer, water release test shall be carried out..

If the test is not satisfactory, the fault shall be found and rectified. In case fault cannot be identified easily, the section under test shall be sub-divided and each part tested separately.

If it is required to test a section of a pipe line with a free end, it is necessary to provide temporary support against the considerable end thrust development by the application of the test pressure. The end support can be provided by inserting a wooden beam or similar strong material in a short trench excavated at right angle to the main trench and inserting suitable packing between the support and pipe end.

Leakage Test for MS Pipeline

Test criteria for permissible losses in M.S pipes shall be as under

$Q = 1$ litre per km per length per 10mm diameter of pipe per 30mtr test pressure per 24 hrs. All pressure testing at site should be carried out hydrostatically. The pipes shall be accepted to have passed the pressure test satisfactorily, if the quantity of water required to restore the test pressure does not exceed the amount 'Q', calculated by the above formula.

If it is required to test a section of a pipeline with a free end, it is necessary to provide temporary support against the considerable end thrust developed by the application of the test pressure. The end support can be provided by inserting a wooden beam or similar strong material in a

short trench excavated at right angle to the main trench and inserting suitable packing between the support and the pipe end.

No section of the pipe work shall be accepted by the Engineer until all requirements of the test have been obtained.

On completion of a satisfactory test any temporary anchor blocks shall be broken out and stop ends removed. Backfilling of the pipeline shall be completed.

During testing if any joints are found leaking they shall be repaired and / or redone by the contractor at his cost till the test is found satisfactory. Similarly, any pipes collars, specials, show hair cracks, leaks etc. during testing the contractor shall replace them with sound pipes and specials etc. free of cost. The hydraulic test shall be given in presence of the Engineer in Charge.

Cleaning Out after Testing

On completion of a satisfactory test any temporary anchor blocks shall be broken out and stop ends removed. Backfilling of the pipeline shall be completed.

All pipes or joints which are proved to be in any way defective shall be replaced or remade and re-tested as often as may be necessary until a satisfactory test shall have been obtained. Any work which fails or is proved by test to be unsatisfactory in any way shall be redone by the contractor.

After the completed pipeline is tested, approved, backfilled and the Contractor has removed all temporary works and has reconnected any parts temporarily removed from the pipeline, the Contractor shall finally clean out the whole pipeline and flush it through with water.

Disinfection

After cleaning out, disinfection shall be performed in the following manner: after flushing the pipes the system shall be drained completely, all valves shall be closed carefully and the system filled with a strong chlorine solution of about 50 ppm free chlorine. This solution shall remain in the system for a period as directed but not exceeding 24 hours uninterruptedly. Chlorine residual tests shall be done at various points by an orthotolidine reagent with a colour scale. The disinfection process shall be repeated until the chlorine residual is not less than 10 ppm at all sampling points. After disinfection the entire pipeline shall be rinsed with potable water till the chlorine residual is less than 4 ppm at various points of testing. Contractor will not paid separately for this activity.

After completion of disinfection and rinsing the results shall be reported by the Contractor in writing and signed by the Contractor and the Engineer.

The Contractor shall provide at his own expense such sampling points as the Engineer may direct if permanent points are not available or suitably located.

Water for Testing and Cleaning

The Contractor shall provide all water required for testing, cleaning and disinfection of the pipeline at his own cost and shall use only potable water. Contractor shall also bear the cost of chemical required for disinfection.

Disposal of water after testing, disinfection and cleaning shall be arranged by the Contractor with prior approval from the Engineer. The disposal shall be done in such a manner as will not cause any harm to any standing crop, cultivated land, damage to roads or structures, cause submergence and/or

nuisance to any public or vehicular traffic.

6.23.14 ITEM NO-14 LOWERING, LAYING, JOINTING D.I. PIPES

The DI pipes will be transported to the site of work where actually they are to be laid and jointed. All necessary steps shall be taken to prevent damage to pipes during transport, loading, unloading, operations etc. Only approved method for conveyance loading and unloading, stacking operations etc. Only approved method for conveyance loading unloading, stacking operations such as winch and chain pulley block tripod, etc. may be adopted. The DI / C.I. pipe should be laid as per IS 12288 and as given below.

Laying of Pipes Under Ground :-

The pipes should be lowered into the trench with tackle suitable for weight of pipe. Either a well designed set of shear legs or mobile crane shall be used for lowering of pipe into the trench. When lifting gear is used the positioning of the sling to ensure proper balance should be checked when the pipe is just clear of the ground. The pipe should be clearly cleaned of any debris inside the pipe either before or just after joint is made. When the laying is not in progress the temporary end closure should be securely fitted to the open end of pipe line.

On gradient of 1:15 or steeper, precautions should be taken to ensure that the spigot of the pipe being laid does not move into or out of socket of the laid pipe during jointing operation. As soon as the joint assembly is completed. The pipe should be held in position while the trench is back filled over the barrel of pipe.

The designed anchorage shall be provided to resist the thrust developed by internal pressure at bends, tees and other specials etc. The cement concrete block should be casted in situ to resist the thrust designed taking into account the maximum pressure the main is to carry in service or on test and the safe bearing pressure of the surrounding soil.

Cutting and Chamfering to D.I. Pipes :-

This item shall be executed for use of cut pipes in required length only when directed by Engineer in charge and after obtaining the permission from him. The burn left after cutting should be trimmed off by light grinding or by filing method. The chamfering of pipes shall conform to IS 12288 — 1987.

The chamfering shall be suitable for push on joints / mechanical joint without damaging the rubber gasket. The pipe after chamfering should be so smooth that enables to push in gasket for push on jointing. This item includes cost of all labour and tools required for executing the complete item.

Jointing of Pipes :-

The DI pipes should be jointed either with flexible joints / SBR rubber gasket joints or by rigid flanged joints. The pipes shall be joined by the rubber gaskets (SBR) except where there are specials / valves to be jointed to the pipeline. The SBR rubber gasket of suitable size required for laying of CI pipes shall have to be procured by the contractor at his own cost. The SBR ring should conform to IS 12820/1989.

Before assembling the joint the spigot of one pipe and the interior of the socket of the adjacent pipe should be thoroughly cleaned. The insertion of the gasket can be facilitated by the prior application of a thin film of lubricant to the bulb seating the inside the socket.

The rubber gasket should be wiped clean, flexed and then placed in the socket with the bulb towards the back of the socket. The groove in the gasket must be located in the retaining heel in the socket and

the retaining heel of the gasket firmly embedded in its seating:

It is necessary to ensure that the SBR gasket fits evenly around the whole circumference removing any bulges which prevent the proper entry of the spigot end. In the larger diameter this operation may be assisted by forming a second loop in the gasket opposite the first then pressing the loop flat one after the other.

A thin film of lubricant should be applied to the inside surface of the gasket which will be in contact with the entering spigot. In addition a thin film of lubricant may be applied to the outside surface of the entering spigot for a distance of 25 cms from the spigot end.

The pipe to be jointed should be supported centrally by the tackle used for laying and balance just clear of the trench bottom. The spigot of the pipe must be aligned and entered carefully into the adjacent socket until it makes contact with the gasket. Finally assembly of the joint is completed from this position.

Joint assembly is completed by forcing the spigot end of the entering pipe through the gasket, which is thus compressed until the spigot end reached the total depth of the socket, if the assembly is not completed with the application of reasonable force, the spigot should be removed and the position of the gasket examined.

For joints 200 mm and above rack and level tackle may be used for completing assembly wherever found necessary at the cost of contractor.

The rack is placed on the socket with the hooked end of the rack extending over the spigot of the entering pipe. The tumble on the end of the 3.2 meters long socket rope is placed over the hook bolt on the rack, which should be in its lowest position, with nut of the top of the thread. The plain end of the rope is passed round the body of the pipe looped through the rope adjuster on the side of the rack housing, wedge inserted and the rope draw tight, this pulls the wedge home thus securing the rope. The tackle is then tamped firmly to the pipe by tightening the nut on the work bolt once the length of the rope is correctly set, it is not necessary to loosen the wedge adjuster for subsequent joints unless the diameter of pipes being jointed in change. The thimble secured to one end of 6.1 m. wire rope is not loosed over the hook at the end of rack and the free end carried to the socket end of the pipe to be jointed.

A special hook and rope adjuster is then fitted on to this rope and securely located in convenient position by means of the wedge. Once the position of the hook and rope adjuster has been thus set subsequent assembly of pipe of similar length should be subsequently jointed.

Backfilling

Pipe trenches shall be backfilled after completion and acceptance of field hydraulic tests and repair of coating as required and/or as directed. The work shall be done in accordance with IS: 12288.

Backfilling of trenches shall be done as specified below with watering and compacting in layers under "Optimum Moisture Content" conditions to achieve required density of refilling and strength after compaction. For the purpose of backfilling, the depth of the trench shall be considered as divided into the following three zones from the bottom of the trench to its top:

<p>Zone A: From the bottom of the trench to the level of the centre line of the pipe</p>	<p>Backfilling by hand with sand, fine gravel or other approved material placed in layers of 150 mm and compacted by tamping. The back-filling material shall be deposited in the trench for its full width of each side of the pipe, specials and appurtenances simultaneously. Special care shall be taken to avoid damage of the pipe and the coating or movement of the pipe.</p>
<p>Zone B: From the level of the centre line of the pipe to a level 300 mm above the top of the pipe</p>	<p>Backfilling and compaction shall be done by hand or approved mechanical methods in layers of 150 mm, special coating or moving or moving of the pipe.</p>
<p>Zone C: From a level 300 mm above the pipe to the top of the trench.</p>	<p>Back-filling shall be done by hand or approved mechanical methods in 150 mm layers after compacting and carried to the level necessary to allow for the temporary restoration of road and path surfaces, and also for hard core (if and where ordered) on roads or to such level as will leave the requisite space for the top soil, road surface etc. to be reinstated as directed by the Engineer.</p>

Where the excavation is made through permanent pavements, curbs, paved footpaths, or where such structures are undercut by the excavation, the entire back-fill to the sub-grade of the structures shall be made with sand in accordance with IS:12288.

The excavated material may be used for back-fill in the following cases, provided it complies with IS: 12288 Clause 4.11.1:

- a) In Zone C: In cases where settlement is unimportant the back-fill shall be neatly rounded over the trench to a sufficient height to allow for settlement to the required level.
- b) In any zone, when the type of back-fill material is not indicated or specified. Provided that such material consists of loam, clay, sand, fine gravel of other materials which are suitable for back-filling in the opinion of the Engineer.

All excavations shall be backfilled to the level of the original ground surfaces unless otherwise shown on the drawings or ordered by the Engineer, and in accordance with the requirements of the specification. The material used for backfill, the amount thereof and the manner of depositing and compacting shall be subject to the approval of the Engineer, but the Contractor will be held responsible for any displacement of pipe or other structures, any damage to their surfaces, or any instability of pipes and structures caused by improper depositing of backfill materials.

Trenches shall be backfilled with selected material placed in layers not exceeding 150 mm in thickness after compacting, wetted and compacted to a density of not less than 90 percent of the maximum dry density at optimum moisture content for zones A, B and C of the surrounding material. Any deficiency in the quantity of material for backfilling the trenches shall be supplied by the contractor at his expense. Water for compaction shall be arranged by the contractor at his cost.

The contractor shall at his expense make good any settlement of the trench backfill occurring after backfilling and until the expiry of the defects liability period.

On completion of pressure and leakage tests exposed joints shall be covered with approved selected backfill placed above the top of the pipe and joints in accordance with the requirements of the above specifications. The contractor shall not use backfilling for disposal of refuse or unsuitable soil.

Laying to Curves

Where flexible jointed pipes are to be laid to curves, the deflection at each joint shall not exceed 75% of the maximum allowable values as per the recommendations of the pipe manufacturer. For sharper curves made bevel pipes, bevel adapters and standard bends shall be provided.

Anchor/Thrust Blocks

The contractor shall provide anchor/thrust blocks at all bends, at dead ends and at all other places both below and above ground as directed by the Engineer. Anchor blocks shall be in cement concrete as per dimensions given in the approved drawings. The grade of concrete as specified in the relevant sections of the specification shall be strictly followed. Shuttering shall be as required and to the satisfaction of the Engineer.

The thrust faces of all blocks shall be placed directly against the undisturbed faces of excavations and the shape and size of the blocks shall be as shown on the drawings or as otherwise determined by the Engineer having regard to the nature of the ground and the load or thrust to be encountered. The concrete shall be placed around the fitting in such a way that the coupling are not covered or fixed by it to allow for flexibility and to provide access to the collars for replacing when necessary.

Before casting concrete, bituminous felt shall be wrapped around the fitting at the interface between concrete and fitting. Where required, anchor clamps shall be cast into the anchor blocks.

Hydraulic testing

1. DI pipes and Fittings:
2. All the Pipes, specials and fitting of DI shall be supplied and tested as per relevant IS codes and specifications. The Following code shall be used for
 - a. Factory Test Pressure: as per IS 8329
 - b. Site Test Pressure: as per IS 8329

Suitable section as directed by the Engineer in charge shall be taken for such testing from time to time during progress of the work and satisfactory test given for that section. All testing apparatus, gauges, connections, etc. and water required for testing shall be arranged by the contractor at his cost. The PCMC does not undertake any responsibility to supply water for testing which the contractor has to arrange by paying the required charges directly. The PCMC shall have the right to recover such charges from his bills if complaints are received that contractor has not paid the charges thereof. If there is delay in testing, the contractor shall refill the trenches for the time being and reopen them at time of testing at his own cost failure of which shall entitle the PCMC to do the refilling and reopening of trenches at the risk and cost to the contractor. If the trenches are filled due to any reason whatsoever before testing, the contractor shall have to open them for testing at no extra cost.

- 1.0] Satisfactory hydraulic test shall be recorded when the section under test shall withstand the pressure as specified by the Engineer in charge for about 15 minutes without operating the test pump. The test pressure being maintained at the specified figures during that 15 minutes interval.

- 1.2] The field test pressure to be imposed should be not less than the maximum of following.
- a) 1.5 times the maximum sustained operating pressure (with minimum design pressure as 6.0 kg/sqcm) in the pipeline.
 - b) 1.5 times the maximum static pressure (with minimum design pressure as 6.0 kg/sqcm) in the pipeline in the pipe line
 - c) Sum of maximum sustained operating pressure and maximum surge pressure.
 - d) Sum of maximum pipe line static pressure and maximum surge pressure,

The testing conditions for the pipelines are summarized as follows:

- Pre test and saturation period with addition of make-up water
Pressure : Test pressure
Duration : 24 hrs for DI pipes with cement mortar lining
- Pressure test with addition of make-up water
Pressure : Test pressure
Duration : 3 hrs

The pipeline shall be filled slowly from the lowest point in such a manner as to allow expulsion of air through air release valves at highest points. The following filling rates are recommended:

Size (mm)	100	150	200	250	300	400	500	600
Filling rate (l/sec)	0.3	0.7	1.5	2.0	3.0	6.0	9.0	14.0

After filling, the pipeline shall be pressurised to the specified operating pressure and left for a period of time to achieve stable conditions. The pipeline shall then be pressurized upto the full test pressure and the section under test completely closed off. Care shall be taken to ensure that the pipeline is free of air. For this if required or if asked by the Engineer, water release test shall be carried out. The hydraulic test shall be maintained for a period of not less than 10 minutes to reveal any defect in the pipes, joints and anchorages.

If the test is not satisfactory, the fault shall be found and rectified. In case fault cannot be identified easily, the section under test shall be sub-divided and each part tested separately.

If it is required to test a section of a pipe line with a free end, it is necessary to provide temporary support against the considerable end thrust development by the application of the test pressure. The end support can be provided by inserting a wooden beam or similar strong material in a short trench excavated at right angle to the main trench and inserting suitable packing between the support and pipe end.

Leakage Test for DI/MS Pipeline

Test criteria for permissible losses in DI pipes shall be as under

Q = 1 litre per km per length per 10mm diameter of pipe per 30mtr test pressure per 24 hrs. All

pressure testing at site should be carried out hydrostatically. The pipes shall be accepted to have passed the pressure test satisfactorily, if the quantity of water required to restore the test pressure does not exceed the amount 'Q' , calculated by the above formula.

If it is required to test a section of a pipeline with a free end, it is necessary to provide temporary support against the considerable end thrust developed by the application of the test pressure. The end support can be provided by inserting a wooden beam or similar strong material in a short trench excavated at right angle to the main trench and inserting suitable packing between the support and the pipe end.

No section of the pipe work shall be accepted by the Engineer until all requirements of the test have been obtained.

On completion of a satisfactory test any temporary anchor blocks shall be broken out and stop ends removed. Backfilling of the pipeline shall be completed.

During testing if any joints are found leaking they shall be repaired and / or redone by the contractor at his cost till the test is found satisfactory. Similarly, any pipes collars, specials, show hair cracks, leaks etc. during testing the contractor shall replace them with sound pipes and specials etc. free of cost. The hydraulic test shall be given in presence of the Engineer in Charge.

Cleaning Out after Testing

On completion of a satisfactory test any temporary anchor blocks shall be broken out and stop ends removed. Backfilling of the pipeline shall be completed.

All pipes or joints which are proved to be in any way defective shall be replaced or remade and re-tested as often as may be necessary until a satisfactory test shall have been obtained. Any work which fails or is proved by test to be unsatisfactory in any way shall be redone by the contractor.

After the completed pipeline is tested, approved, backfilled and the Contractor has removed all temporary works and has reconnected any parts temporarily removed from the pipeline, the Contractor shall finally clean out the whole pipeline and flush it through with water.

Disinfection

After cleaning out, disinfection shall be performed in the following manner: after flushing the pipes the system shall be drained completely, all valves shall be closed carefully and the system filled with a strong chlorine solution of about 50 ppm free chlorine. This solution shall remain in the system for a period as directed but not exceeding 24 hours uninterruptedly. Chlorine residual tests shall be done at various points by an orthotolidine reagent with a colour scale. The disinfection process shall be repeated until the chlorine residual is not less than 10 ppm at all sampling points. After disinfection the entire pipeline shall be rinsed with potable water till the chlorine residual is less than 4 ppm at various points of testing. Contractor will not paid separately for this activity.

After completion of disinfection and rinsing the results shall be reported by the Contractor in writing and signed by the Contractor and the Engineer.

The Contractor shall provide at his own expense such sampling points as the Engineer may direct if

permanent points are not available or suitably located.

Water for Testing and Cleaning

The Contractor shall provide all water required for testing, cleaning and disinfection of the pipeline at his own cost and shall use only potable water. Contractor shall also bear the cost of chemical required for disinfection.

Disposal of water after testing, disinfection and cleaning shall be arranged by the Contractor with prior approval from the Engineer. The disposal shall be done in such a manner as will not cause any harm to any standing crop, cultivated land, damage to roads or structures, cause submergence and/or nuisance to any public or vehicular traffic.

6.23.15 ITEM NO-15 PROVIDING AND CONSTRUCTING B.B. MASONRY VALVE CHAMBER

The work which shall be carried out as per Construction Specification contained in this section, involves construction of masonry Chamber at site as instruction of site in charge.

Manholes:

masonry Chambers will be provided at where it necessary. However if required the same has to be provided in the road. The walls will be built up of solid masonry blocks. The top will be covered with heavy duty removable RCC slabs. This type of Chamber will be used when manholes are provided in footpath. The roof will also be heavy duty RCC slab with two openings.

Specification for masonry chamber:

- a) chambers, due to constraints of the location, may have to be constructed on the road. The wall, roof and floor thickness will be 20 cm. The Manhole chamber with above said measurement should be constructed with solid masonry structure. The top of the manhole should be covered with SFRC covers slabs. The RCC slabs so covered should be flush with the level of the adjacent ground; footpath etc., the drawing for manhole may be referred.
- b) All chambers / manholes shall be made water proof using water proofing compound. Necessary care shall be taken at construction joints to make the jointing chamber water proof. Whenever required, special water proofing treatment like gunting chemical water proofing treatment, cement based water proofing treatment, polythene sheet water proofing treatment etc., may be resorted as per direction of Engineer-in-charge.
- c) The Manhole chamber with the said measurement should be constructed using with 75 class designation brick work in cement mortar 1:4 (1 cement : 4 coarse sand). The top of the manhole should be covered with RCC slabs of size 15cm (thick) × 40 cm (width).

- d) Curing of concrete: After the concrete hardens, it shall be protected from quick drying with moist gunny bags, sand or any other materials approved by Site Engineer. The curing shall be done for a minimum period of 5 days or as determined by the Site Engineer.
- e) Finishing chambers / pedestal: The internal faces of roof, walls and neck of chamber and exposed areas of pedestals shall be finished smooth with cement mortar 1:3 (1 cement: 3 coarse sand), finished smooth with a floating coat of neat cement.
- f) Finishing of outer surface of chambers: Finishing of outer face of the chamber shall be done with 12 mm thick cement plaster 1:3 (1 Cement: 3 fine sand).
- g) Finishing of floor of chambers: The floor of manhole shall be finished with 40 mm thick (av) cement concrete flooring by providing adequate slope.
- h) Vertical Racking: Regarding Vertical Racking arrangement:-Vertical Racking arrangement has been changed. Ladder in minimum three steps may be provided for going inside & coming outside from the manhole using 12mm dia M.S. rod on shorter walls and on opposite side and fixing it in masonry (as per drawing given).

The arrangement for pipe openings shall be done

Frame and cover assembly: The frame for the cover shall be fixed as per standard drawings. The top level of frame shall be flush with road level or footpath level as the case may be.

Cover Lifting arrangement:

Cover lifting arrangement may be as per drawing given. dia is to be provided so that the cover may be lifted easily.

- i) Loading : The manhole cover and frame shall be able to withstand heavy duty grade of loading conforming to relevant IS Code, square type and shall be galvanized according to ISO : 1460 R & R 1461 or IS 4736.
- j) Marking: Each manhole cover and frame shall have a permanent marking sunk cast on them providing following information. Year of manufacture. Figure of PCMC emblem.

Stores to be procured by the Contractor

All materials for use shall be new and duly tested as per approved standards and shall comply the material specifications. Where no spec. is specified, it shall conform to BIS/ISI/PWD standards.

Construction of chambers (manhole) should be done as per the specification at places as instructed by the Site Engineer. The cost shall be paid at, with count on basic unit. In case dimensional variation is required due to site condition, the payment will be proportional to the volume of chamber.

Specification for stone aggregates, coarse sand, fine sand

Stone aggregate : Stone aggregate to be used in the work shall be hard broken stone and shall be conform to PWD specification.

Coarse Sand: Coarse sand to be used shall conform to PWD specifications.

Fine Sand: Fine sand for finishing to be used in the work shall conform to PWD specifications Note : Where only one variety of sand is available, the sand will be sieved for use in finishing work as directed by the Engineer-in-charge in order to obtain smooth surface and nothing extra will be paid on this account.

Testing of Material : To have the quality control on the material used for construction OF manhole; Contractor will prepare Cubes of a size as desired by site in charge using the same material which is used for construction of manhole. These cubes will be sent for testing by an authorized testing laboratory for verifying the quality of material.

Final Inspection :- No work shall be treated as complete until acceptance testing and quality control checks are completed and found satisfactory.

All the defects pointed out by Engineer-in-charge shall be rectified and got re-tested by the contractor at his own cost before the work is treated as completed. The responsibility of non-clearing the defects and thus non-completion of work shall always rest with the contractor.

The rejection of the work shall be intimated to all concerned to ensure prompt action.

Engineering Instruction:

A. Safety Precaution while constructing Chamber

General :

Where a road or footpath is to be kept opened up in the course of work, special care shall be taken to see that proper protection is provided to prevent any accidents from occurring. Work shall be done in such a manner that it will not unduly inconvenience pedestrians or occupants of buildings or obstruct road traffic.

Danger from falling Material:

Care shall be taken to see that apparatus, tools or other excavating implements are not left in a dangerous or insecure position as to fall or be knocked into the trench thereby injuring any workmen who may be working inside the trench.

Danger of Cave in :

When working in deep trenches in loose soil, timbering up the side will prevent soil subsidence. The excavated material shall be kept far enough from the edge of the trench or pit. Vehicles or heavy equipment must not be permitted to approach too close to the construction site.

Precaution while working on Road:

The flags and the lamps shall be placed in conspicuous position so as to indicate the pedestrians and drivers of vehicles the full extent, i.e. both width and length of the obstruction. The distance between lamps or between flags shall not generally exceed 1.25 meters along the width and 6 meters along length of the obstruction in non-congested areas, but 4 meters along the length in congested areas. If the excavation is extensive, sufficient notices to give adequate warning of the danger shall be displayed conspicuously not less than 1.25 meters above the ground and close to the excavation.

Where any excavation is not clearly visible for a distance of 25 meters to traffic approaching from any direction or any part of the carriage way of the road in which the excavation is not clearly visible for a distance of 25 mtrs. to traffic approaching from any direction or any part of the carriage way of the road in which the excavation exists, a warning notice shall be placed on the kerb or edge of all such roads from which the excavation is not visible. Such warning shall be placed at a distance of 25 meters from the excavation or as near the distance as is practicable but not less than 10 meters from the junction of an entering or intersecting road with in the road in which the excavation exists.

All warnings, in these cases shall have a red background and shall be clearly visible and legible. All warning lamps shall exhibit a red light, but white lights may be used in addition to facilitate working at night. Wherever required a passage for pedestrians with foot bridge shall be provided. At excavations tools and all materials likely to offer obstruction shall be properly folded round and protected.

While permission for manhole work will be taken by PCMC but the manhole should be properly covered while no work is going on to avoid any accident. Contractor shall be solely responsible in case of laxity on his part.

Contractor shall provide the caution board of appropriate size at his own cost on all the sides of the manhole stating "Caution, PCMC manhole work is progress."

Damage to Utilities:

The damage to the exposed utilities shall be contractor's responsibility. Round the clock safety of utilities shall be sole responsibility of the contractor and the damage cost shall be deducted from the contractor. While constructing manholes the utilities should be properly accommodated in manholes.

The work is to be done in workman like manner as per type designs of the PCMC and as directed. The Cost of extra excavation in all strata which in addition to the pipe trench excavation is included in this item, Size of chamber mentioned in tender item are the internal dimensions of the chamber. The size of chamber shall be selected to accommodate sluice valve or air valve and facilitate replacement / repairs any time without breaking the chamber.

The brickwork & other items required to be executed for construction shall confirm to the standard specifications detailed in the RED book of Govt. PWD dept. and cover slab 20 cm thick in M-200 mix. The finished top of the chamber shall be flush with road surface and shall not cause any inconvenience to the traffic.

6.23.16 ITEM NO-16 PROVIDING AND LAYING PLAIN CEMENT CONCRETE

This specification covers the requirements of ordinary cement concrete of the specified proportions for use in various concrete works.

Material for Construction :-

Aggregate and sand

The aggregate and sand should conform to IS-383 and 1542 respectively.

Cement

The cement shall be brought by the contractor. The contractor shall use fresh cement conforming to IS 8112-1989.

On arrival at the site, cement shall be stored in weather proof store designed for the purpose or in dry weather-tight and properly ventilated structures with floors raised 15 to 20 cms above ground level and 30 cms. away from walls and with adequate provision to prevent absorption of moisture & flooding. All storage facilities shall be subject to approval by the Engineer in charge and shall be such as to permit

easy access for inspection and identification. Each consignment of cement shall be kept separately and the contractor shall use the consignment in the order in which they are received. Not more than 15 bags shall be stacked vertically in one pile. Cement shall be stored in double locking arrangement so that cement transactions can be with the knowledge of supervisory staff. Daily account of cement shall be made available to inspecting authorities for store verification.

The contractor shall provide from each consignment of cement delivered to the site such sample as the Engineer may require for testing. If the Engineer-in-charge thinks it necessary he may ask the contractor to pass it through 16 mesh screen before use and the contractor shall do the needful without any extra cost to the PCMC. Any cement which is, in the opinion of the Engineer, lumpy or partially set shall be rejected and contractor shall promptly remove such cement from the site.

The cement used for the work shall be fresh. Cement which has been stored on the site for more than sixty (60) days and cement which, in the opinion of the Engineer is of doubtful quality shall not be used in the works until it has been retested and test sheets showing that it complies in all respects with the relevant standard.

Water

The water is to be arranged by the contractor. Water shall not be salty or brackish and shall be clean and reasonably clear from objectionable quantities of salt, traces of oil, acid alkali organic matter and other deteriorious material. The water for curing shall be within pH range 6 to 8.5. Generally potable water is fit for mixing and curing.

General Specification for Grade and Use of Concrete

1. Specified grade concrete shall be used for encasing of pipes in nallaha section bridge foundation, Deck slab concreting etc.
2. General specifications of this work (concreting) shall be as per standard specifications of P.W.D. manual latest edition section B-6 BR-27, BR-29 BR-38.
3. Whenever concrete is to be laid in trenches the trench shall be cleaned and watered before placing. The subsoil water met with shall be removed manually and the trench shall be kept dry during and after 2 hrs. of placing of concrete.
4. Pedestal shall be perpendicular to center line of pipe.
5. Proper seat shall be provided on the top of pedestal / pier to construct Saddle, Seat shall be done strictly within 24 hrs. Failing which department will not accept it for payment and the contractor shall have recast the seat.

Testing of Concrete Cube

In respect of concrete to be carried in M-150 or richer mix the contractor shall have to carry out the testing of cubes for every occasion of concreting done for more than 4 hrs. duration only. If more than 4 hours of concrete done then 3 Nos. of concrete cubes of 15 x 15 x 15 cm shall be filled each day and shall be tested for crushing strength at 7 days & 28 days of age. Cube be got tested by Approved lab of PCMC from time to time. The minimum cube strength shall be as under.

Compressive strength of 15 cm cubes, at 28 days after mixing, conducted shall be in accordance with IS 516-1959.

Work test for M-150 concrete after 28 days shall be 150 kg/sqcm and for M-200 grade concrete shall be 200 kg/sqcm.

6.23.17 ITEM NO-17 PROVIDING & APPLYING CEMENT SAND GUNITINE

All MS pipes laid below ground and provided with soil cover shall be coated with cement concrete in accordance with IS 1916.

Material

All cage reinforcement used in the pipe shall conform to IS 432 (Part I) and IS 432 (Part-2) cement shall be high strength ordinary Portland cement in accordance with IS 8112.

Sand used shall be tested with standard sieve as per IS 960.

The aggregate used shall conform to IS 383. The maximum size of aggregate shall be one third of the thickness of concrete.

Reinforcement :-

The reinforcement of the coating of pipe sections may be spiral wire, wire fabric, or wire mesh (ribbon mesh). Reinforcement shall be free of oil, grease, and other contaminants that might reduce the adherence between the coating and reinforcement.

Steel wire shall be of a minimum size of 3 mm. The wire shall conform to the requirements of IS:432 (Pt. 1) and IS 432 (Part-2). Reinforcement shall be 50 X 100 mm welded wire fabric. The wire shall conform to the requirements of IS:1566. Unless otherwise specified by the purchaser, wire fabric reinforcement may be either crimped or non-crimped.

Cement mortar applied by mechanical placement or by the steam pneumatic process shall consist of not more than 3 parts sand to 1 part cement, by weight. The water in the mixture shall be carefully controlled so that the mortar will not run, sag, or segregate.

The soluble chloride-ion content of the cement mortar mix shall not exceed 0.15 percent, expressed as a percentage of cement weight.

Spiral wire :- Attachment of ends and splices in the wire shall be by welding or other suitable means acceptable to the purchaser. Maximum spacing of the wire shall be 35 mm. The wires on 50 mm spacing on the 50 mm x 100 mm fabric shall extend circumferentially around the pipe.

Wire mesh :- Attachment of ends and splices in the wire shall be by means approved by the purchaser. When 25 mm x 25 mm 8 mm the spiral lap shall be 35 mm and the applied lay 110 mm minimum.

Thickness :-Cement mortar coating shall be uniform in thickness except in joints or other discontinuities in the pipe. Coating shall be 20 mm minimum thickness for all sizes of pipe up to unless otherwise specified by the purchaser.

Application of Mortar Coating :-

Mortar coating shall be applied by mechanical or pneumatic placement to the specified thickness in one or more continuous applications. Allowance shall be made for splices of reinforcing wire. If applied in more than one course, the interval between the first and last course shall be not more than 2 hours. The mortar shall be projected at high velocity against the exterior surfaces of the pipe or shall be applied by an equivalent method to produce a hard, tight adhering coating of the specified thickness.

Defective Coating :-

- i. **Sand Pockets and Porous Spots** :- If any sand pockets or porous spots occur, they shall be completely cut out and replaced by pneumatic placement or hand application of mortar in the proportion of 2 parts sand to 1 part cement, by weight.

- ii. **Coating Cracks** :- Care shall be exercised to minimize the occurrence of cracks in the mortar coating. However, hairline cracks need not be repaired. Repair procedures shall include the brushing or wiping of neat cement into the cracks, autogenous healing of the cracks by additional moist curing, the painting of the cracks with an epoxy coating, or a combination of these methods.
- iii. **Curing of Coating** :-The mortar coating shall be cured by the moist or accelerated curing methods. A membrane material may be applied immediately following the coating application. The coating shall be kept continually moist by intermittent or continuous spraying for a period of at least four days. Moist curing may be used only if the minimum ambient temperature exceeds 50C continuously during the minimum required curing period.
- iv. **Accelerated Curing** :- Accelerated curing of the pipe or special may begin immediately after completion of the coating operation or within 6 hours thereafter. The temperature of the pipe or special shall not exceed 300C until the cement mortar coating has taken its initial set or until a period of 3 hours has elapsed, whichever occurs first. The relative humidity shall be not less than 85 percent at a temperature between 450C – 650C for at least 18 hours.
- v. **Membrane Curing** :- Membrane curing shall consist of the complete encapsulation of the coating by application of material that will retain the moisture of the applied cement mortar coating.

6.23.18 ITEM NO-18 PROVIDING AND MAKING INNER CEMENT MORTAR LINING TO M.S. PIPES CEMENT MORTAR LINING – INSITU :-

General

Pipes and fittings to be internally lined with cement mortar shall be in accordance with IS: 11906 /AWWA C602. Cement mortar in lining shall be applied in-situ after pipe laying and after sectional hydraulic testing.

The Contractor shall select scheme for lining and coating of pipes on the basis of soil & water reports and his own supporting investigations such as soil resistivity and other supplementary data.

Acceptable linings are:

- Cement mortar (shop applied, confirming to Annex – A – IS:3589 : 2001
- Cement mortar (in-situ) Conforming to IS:11906 limited to joints only.

Method of Application

All lining work shall be done by machine in factory through centrifugal process. However, for joints In Situ smooth lining shall be acceptable.

Materials of Construction

- a) **Cement**:- Cement required for mortar lining shall be “Ordinary Portland Cement” conforming to IS: 8112 – grade 43/53 cement.
- b) **Admixture**:- To improve workability, density and strength of the mortar, admixtures as approved by the Employer or his Representative may be used by the Contractor at his own cost. No admixtures shall be used that would have a deleterious effect on water flowing in the pipe, which is required for drinking purposes. Bidder should indicate in his bid the details of admixture he proposes to use.
- c) **Sand**

- I. The quality of sand used shall be as per Clause 2, Para 2.2.1 and Table 1 under the above Clauses of IS: 11906.
 - II. Organic impurities – “Test for Organic Impurities in Sand for Concrete / Cement mortar for linings shall be checked as per IS: 2386 (Part – 2)
- d) **Water**
Water used for mixing the mortar shall meet the requirement of IS : 456.

Lining

A]Thickness of Lining :-

Cement mortar lining shall be uniform in thickness, except of joints or other discontinuities in the pipe wall. Lining thickness shall be as listed in below or as specified by the purchaser. Ends of lining shall be left square and uniform with regard to the longitudinal axis of the pipe, and the lining holdback shall be as specified by the purchaser for the type of joints required.

Thickness of Cement Mortar Lining

Outside dia of Steel Pipe (mm)	Minimum Thickness of lining	Tolerance
168.3 to 323.9	6 mm	+ 2,-0
355.6 to 610	7 mm	+ 2,-0
660 to 1219	9 mm	+ 2,-0
1321 to 2540	12 mm	+ 3,-0

Ref. :- IS:3589-2001, Clause A-6, Table-8

Lining Procedure

The lining shall be placed by centrifugal method in one course by a machine traveling through the pipe and discharging the mortar at a high velocity over all pipe sections and long radius bends. The discharge shall be from the rear of the machine so that the freshly applied mortar will not be marked. The rate of travel of the machine and the rate of mortar discharge shall be mechanically regulated so as to produce uniform thickness throughout. The mortar must be densely packed and shall adhere to the pipe wherever applied.

Curing:-Curing shall commence immediately after completion of the mortar lining and hand finishing of a section of pipeline. This shall, however, not be later than 8-hours after mixing of mortar. The lining shall be kept continuously in moist condition for a period of 14 days. During the operation of lining, finishing and curing, exterior surface of the pipe exposed to sunlight shall be sprinkled with enough water to keep the pipe cool. Open ends of pipes shall be suitably closed so as to maintain a moist atmosphere and prevent draught. Curing of mortar lining and simultaneous cooling of the pipeline exterior shall be continued even beyond the period of 14 days if so directed by the Engineer.

Defective Lining:-Defects in the cement mortar lining include, but are not limited to, sand pockets, voids, over sanded areas, excessively cracked and dummy areas and areas of unsatisfactorily surface finish.

Repair of Defective Lining: Defective or damaged areas of linings may be patched by cutting out the defective or damaged lining to the metal so that edges of the lining not removed are perpendicular or slightly undercut. A stiff mortar shall be prepared. The cut-out area and the adjoining lining shall be thoroughly wetted and the mortar shall be applied and trowel led smooth with the adjoining lining. After any surface water has evaporated, but while the patch is still moist, it shall be cured as specified.

Protection of Lining:- The lined pipe and fittings shall be protected from extreme heat due to direct rays of the sun, from impact of rainfall and from freezing temperatures until the linings have cured sufficiently to withstand these conditions. Every precaution shall be taken to prevent any damage to the lining. If lining is damaged through the fault of the Contractor, such damages shall be repaired conforming to the specifications at the Contractor's expenses.

Tests -Test blocks of the same material as used for the lining shall be made in 100 mm cube moulds and subjected to cube crushing tests. Each block shall be removed from its mould as soon as practicable and cured under the conditions of temperature and humidity identical with those in which the lining of the pipe is cured. The number of tests shall be at least 4 cubes for each age and each water cement ratio for each days work. The works cube strength of the test cube shall not be less than 170 kg/cm² after 7 days of curing or 300 kg/cm² after 28 days of curing. The density of the test cube shall not be less than 2300 kg/m³.

Lining Quality

The surface of the lining shall be uniformly smooth and shall be free from voids. The lining shall not have any flaky areas. It shall not be crumbly and have not any waves or grooves.

6.23.19 ITEM NO-19 WELDING

All welding shall be done by submerged electric arc process. All welding work in shop shall be done by specifically qualified welders. The work of each welder shall be tested thoroughly by individual identification mark. Welders whose work is found defective shall not be allowed to work on the job. If the test pieces are found unsatisfactory; the welders concerned shall not be permitted to weld any more pipes.

The defects, if any, shall be set right to the satisfaction of the Engineer-in-charge. All such check tests and rectifications of defects shall be entirely at the cost of contractor.

All welding shall be done by a method which will exclude the atmosphere from the molten metal. The surface to be welded shall be clean and free from paint, scales, rust and other foreign matter.

Each layer of the weld metal shall be thoroughly cleaned, and if necessary shall be peeled before the succeeding layer is laid. Any portion or joint found defective shall be cut out, re-welded and tested again. Only those shells whose joints are found to be perfect shall be accepted.

All welding work shall be generally in accordance with the I.S.I. The longitudinal joints in continuous plates or pipes shall be staggered.

Welding rods shall be selected with due regard to the quality of steel plates. The selection of these rods shall be the sole responsibility of the contractor to ensure that the welds satisfy all the tests prescribed in these specifications. All welds shall be ground smooth so as to be substantially flush with the plate surface at the junction of the weld.

The finished pipes shall be loaded safely transported and unloaded at the site of laying.

Welding rods shall be selected with due regard to the quality of steel plates. The selection of these rods shall be the sole responsibility of the contractor to ensure that the welds satisfy all the tests prescribed

in these specifications. All welds shall be ground smooth so as to be substantially flush with the plate surface at the junction of the weld.

The finished pipes shall be loaded safely transported and unloaded at the site of laying.

FIELD WELDING :-

In all positions with required number of runs etc.

General :-

Before aligning, assembling and welding, the special's, faces shall be cleaned by scrapping with wire brushes or by any other method approved by the Engineer-in-charge.

Welding on field shall conform to IS:816 (Code of practice for use of metal arc welding for general construction hereunder shall have precedence).

Welders shall be experienced and approved to do the welding at all locations. Welding shall not be done by helpers, contractors shall remove such welders from the job whose work is not found to be satisfactory. The Engineer-in charge may ask them to do test welding before approving their employment on the job.

Gouging :- M.S. Pipes of 400mm & above & specials of diameter larger than 400 mm shall be welded with required number of runs from inside and a sealing run from outside. External sealing run shall be done only after internal welding is completed. Before starting the external welding the weld material in the joint shall be cleaned by gouging with gas flame. Gouging shall be done before rectification of any defective welding wherever necessary and as directed by the Engineer-in-charge.

Gouging shall not be paid for separately and the rate for welding includes the cost of gouging.

Electrodes :- Welding electrodes to be used for welding in this contract shall conform to the Indian Standard Specifications IS:814 (Part-II) latest (Specifications for covered electrodes for metal arc welding of mild steel)

The contractor shall use standard electrodes depending on the thickness of the plates to be welded and the type of joint. The contractor shall also use standard current and A.C. voltage required for the machine as per manufacturer directions.

Types of Welded Joints :-

The circumferential joints of the pipes shall be butt welded with required number of runs externally and internally. Pipes below 500 mm dia shall be welded only externally. All fillet welds shall have a throat thickness not less than 0.7 times the thickness of the pipes to be welded.

Welding Procedure :-

All parts of pipes, specials shall be free from all loose scale, slag, rust, paint and any other foreign materials,, it shall be removed with wire brush and left clean and dry. All scale and slag shall be removed from each run of weld when that run is completed

6.23.20 ITEM NO-20 GAS CUTTING

In course of work the contractor may be required to carry out gas cutting of pipes, sections of various thicknesses. The cut shall be 'V' or square as directed by Engineer-in-charge. After cutting the edges shall be made smooth (Even by use of grinders, pneumatic / electrical) during cutting it shall be ensured that shape of the material cut is not deformed.

6.23.21 ITEM NO-21 STEEL BAR REINFORCEMENT

Steel for reinforcement shall be high yield strength deformed bars having corrosion resistant characteristics. The steel shall be either Tisco - CRS of grade Fe 415/ Fe 500 or SAIL's HCR - Rebars Gr M of grade Fe 415 / Fe 500 or Vizag Steel's AI - Rebars of grade Fe 415 / Fe 500 or equivalent having similar compositions and shall have mechanical properties as per IS 1786 . The reinforcement supplied shall have the following Chemical Properties:

Carbon %max : 0.200

Sulphur %max : 0.055

Phosphorus %max : 0.120

S + P %max : 0.175

Silicon %max : 0.450

Manganese %max : 1200

Corrosion Resistance Elements %max : 1.500

Quality of Steel :-The steel used for reinforcement shall be thermo-mechanically treated (TMT) bars.

Thermo Mechanically treated bars :-

- a) There is no BIS code for TMT bars. The available code BIS 1786 pertains to HSD bars. Therefore there should be no stipulation that TMT bars should conform to relevant BIS code
- b) The TMT bars are being produced under valid licence from either of the firms namely Tempcore, Thermex Evcon Turbo & Turbo Quench. These firms have acquired patents and are giving licences to various producers to produce TMT Bars.
- c) The TM bars shall conform to IS 1786 pertaining to Fe 415 D or Fe 500 D or Fe grade of steel specified.

Item includes cutting, bending, hooking the bars, and binding with wires or tack welding

6.23.22 ITEM NO-22 PUSHING OF M.S. PIPE

The work shall be carried out as per the direction of Engineer-in-charge. The M.S. pipes shall be push through method in all types of strata by using hydraulic jack and drilling machine of required diameter minimum 3.00 m below the surface. The pipes shall be water tight for the designed water pressure. Necessary precautions shall be taken to avoid any damage to the public utility services. No damage on carriageway, to IRDP, cement concrete, railway and major road is allowed one size bigger M.S. pipe shall be used as casing pipe.

The cost involved for machineries, tools, tackles etc. fuels, lubricants, transportation and dewatering all labour charges and running expenses of machineries are included in the rate of the item in BOQ. The rate is for the completion of item in all respect but excluding cost of M.S. pipes and nothing shall be payable extra.

6.23.23 ITEM NO-23 REINSTATING THE ROAD SURFACES

Specification:-

Reinstating the road surfaces with excavation, by providing & laying , spreading graded course aggregate conforming with table 400-13 to wet mix macadam specification including premixing the material with water at OMC in mechanical plant carriage of mixed material by tipper to site laying in uniform layers with paver finisher in sub-base/base course on well prepared surface and compacting with vibratory roller , 25 mm thick premixed bitumen carpet with hot mixed seal coat including compacting etc. complete.

Tarring :-

Road cuts shall be reinstated by with 25 mm thick premix bitumen carpet with hot mixed seal coat including all material and labour, required for tar / Asphalt roads as per standard specification for the item of work.

Wet mix macadam:

Wet mix macadam construction is an improvement over the conventional water bound macadam providing speedy and more durable construction. It differs from the water bound macadam in that graded aggregates (conforming to requirements indicated in Table 3.11) and granular materials are mixed with predetermined quantity of water in accordance with the specifications to form dense mass which is spread and wiled to approved lines, grades and cross-section to serve as pavement course(s).

Table 3.11. Physical requirements of coarse aggregates for wet mix macadam for sub-base/base courses

S.No.	Test	Test Method	Requirements
1.	* Los Angeles Abrasion Value	IS:2386 (part IV)	40 per cent (Max)
2.	* Aggregate Impact Value	IS:2386 (part IV) or IS:5640	30 per cent (Max)
3.	Combined Flakiness and Elongation Indices (Total)	IS:2386 (part I)	30 per cent (Max)

* Aggregate may satisfy requirements of either of the two tests

The specified grading for the aggregates as per Table 3.12 and granular materials should be used for mixing. Quantity of water should not vary from OMC determined as per IS: 2720 (Pt. VIII), by more than agreed limit.

Table 3.12. Grading requirements to aggregates for wet mix macadam

S.No.	IS sieve designation	Per cent by weight passing the IS sieve
1.	53 mm	100
2.	45 mm	95 - 100
3.	26.5 mm	-
4.	22.4 mm	60 - 80
5.	11.2 mm	40 - 60
6.	4.75 mm	25 - 40
7.	2.36 mm	15 - 30
8.	600 micron	8 - 22
9.	75 micron	0 - 8

General guideline and Procedure for Wet mix macadam

- 1) P.I. value of Materials finer than the 425 micron sieve should be less than 6.
- 2) The mix should be prepared in approved mixing plant at site in project area of suitable capacity having provision for controlled addition of water and forced/positive mixing arrangement, like, pug mill or pan type mixes of concrete batch/plant
- 3) The mixed material should be uniformly wet and no segregation should be permitted.
- 4) The mix should be spread uniformly and evenly in required quantities on the prepared sub grade/sub-base either by a self-propelled paver finisher or a motor grader fitted with blades having hydraulic control suitable for initial adjustment and maintaining the same. In no case should the mix be dumped in heaps on the area.
- 5) The thickness of single compacted wet mix macadam layer should not be less than 75 mm nor more than 100 mm. However, the compacted thickness of single layer of the sub-base may be increased up to 200 mm provided vibratory roller of approved type is used for compaction. The roller speed should not exceed 5 Km / hour.
- 6) Rolling should continue till density achieved is at least 98 per cent maximum dry density as per IS: 2720 (Part VIII).
- 7) When surface irregularity of wet mix macadam exceeds permissible tolerance or where the course is otherwise defective (like, sub grade soil getting mixed with the aggregates), the full thickness of the layer should be scarified over the affected area, reshaped with added premixed material as applicable and re-compacted. The area treated in this manner should not be less than 5 m long and 2 m wide.
- 8) It is not advisable to lay the wet mix macadam during rains and the tempo of work suffers during rains.
- 9) After construction of the top WMM layer will need immediate sealing with bituminous surfacing.
- 10) Provision of adequate drainage for the foundation area for the construction courses assumes greater importance in this method of construction.

Bitumen Bound Bases and Surfacing

General requirement: General requirement on materials, mixing, transporting, laying, compaction, joints and construction of bituminous pavement layers are laid down in Clause 501 of his Ministry's Specifications.

Prime Coat

General guideline for Prime Coat

- 1) Prime coat consists of application a single coat of low viscosity liquid bituminous material to a pours granular surface preparatory to the superimposition of bituminous treatment or mix. The choice of printer shall depend upon the porosity of the surface to be printed. Details are available in Clauses 501.2 of this Ministry's Specifications.
- 2) Bituminous Printer should not be applied on a wet or dusty surface. At the time of application temperature in the shade should not be less than 100C.
- 3) The primer distributor should be self propelled or towed bitumen pressure sprayer capable of spaying the material uniform ally at the specified rate and temperature. Hand spraying should be resorted to only in small areas and areas inaccessible to the pressure sprayer.
- 4) After application of cut back, the surface should be allowed to cure for at least 24

- hours.
- 5) The quantity viscosity and temperature of lying should be as specified in table 3.13

Table 3.13. Viscosity requirement and quantity of bituminous primer

Type of surface	Kinematic Viscosity of Primer at 60°C	Quantity per 10sq.m (kg)
Low porosity	30-60	6 to 9
Medium porosity	70-140	9 to 12
High porosity	250-500	12 to 15

Tack-Coat:

General guideline for Tack-Coat

- 1) The binder for tack coat should be a bituminous emulsion complying with IS: 8887 or cut-back as per IS: 217, to be used restrictively for site at sub-zero temperature or for emergency application.
- 2) The quantity of binder should be as per Table 3.14.
- 3) The binder should be applied uniformly with bitumen pressure sprayer capable of spraying bitumen at specified rate and temperature to provide a uniform unbroken spread of bitumen.
- 4) No more than the necessary tack coat for the day's operation should be placed.
- 5) The succeeding construction should be made only after curing of the tack coat

Table 3.14. Rate of application of tack coat

S.No.	Type Surface	Quantity of liquid bituminous material in kg per 10 sq.m.
i)	Normal bituminous surfaces	2.0 to 2.5
ii)	Dry and hungry bituminous surfaces	2.5 to 3.0
iii)	Granular surfaces treated with primer	2.5 to 3.0
iv)	Non bituminous surfaces	
	a) Granular base (not primed)	3.5 to 4.0
	b) Cement Concrete pavement	3.0 to 3.5

Note: Where the material to receive an overlay is a freshly laid bituminous layer that has not been subjected to traffic or contaminated by dust, a tack coat is not mandatory where the overlay is completed within two days.

Bituminous Macadam and Dense Graded Bituminous Macadam

General guideline for Bituminous macadam and dense graded bituminous Macadam

- 1) The work consists of construction of a single layer of compacted crushed aggregates premixed with bituminous binder. Bituminous Macadam is more open graded than the

- Dense Graded Bituminous Macadam.
- 2) Physical requirements of aggregate for BM and Dense Graded Bituminous Macadam are given in Table 3.15.
 - 3) The filler shall be graded within the limit in table 3.16.
 - 4) For Bituminous Macadam, the bitumen content for premix should be 3 to 3.5 per cent by weight of total mix except otherwise directed. The composition of Bituminous Macadam should conform to Table 3.17. The manufacturing and rolling temperature are given in Table 3.18. For dense graded bituminous macadam aggregate gradation and requirement of mix are indicated in Table Nos. 3.19 and Marshall Properties should be according table 3.20 .
 - 5) The requirements for minimum per cent voids in mineral aggregate (VMA) are set out in Table 3.21.
 - 6) Job mix formula for Dense Graded Bituminous shall comply with Clause 507.3 of the Ministry's Specifications and should be design in lab or other agency and should get approval from PMU before implementation.
 - 7) The construction operation for Dense Graded Bituminous Macadam including lying of and stress absorbing layer should be in accordance with Clause 507.4 of the Ministry's Specifications.
 - 8) For more detail refer Ministry's specification clause no. 504 for Bituminous Macadam & clause no. 507 for Dense Graded Bituminous Macadam.

Table3.15. Physical requirements for coarse aggregate for Bituminous Macadam and Dense graded bituminous macadam

S.No.	Property	Test	Specification
1.	Cleanliness (dust)	Grain size analysis ¹	Max 5% passing 0.075mm sieve
2.	Particle shape	Flakiness and Elongation Index (Combined) ²	Max 30%
3.	Strength *	Los Angeles Abrasion Value)	Max 35%
		Aggregate Impact Value ⁴ Soundness: ^{5 n}	Max 27%
4.	Durability	Soundness: ⁵ Sodium Sulphate Magnesium Sulphate	Max 12% Max 18%
5.	Water Absorption	Water absorption ⁶	Max 2%
6.	Stripping	Coating and Stripping of Bitumen Aggregate Mixtures ⁷	Minimum retained coating 95%
7.	Water Sensitivity**	Retained Tensile Strength ⁸	Min 80%

Notes: 1. IS:2386 Part I

5. IS:2386 Part 5

2. IS:2386 Part I

6. IS:2386 Part 3

(the elongation test to be done only on non-flaky aggregates in the sample)

3. IS:2386 Part 4*

7. IS:6241

4. IS:2386 Part 4*

8. AASHTO T283**

* Aggregate may satisfy requirements of either of these two tests.

** The water sensitivity test is only required if the minimum retained coating in the stripping test is less than 95%.

Table 3.16. Grading requirements for mineral filler

S.No.	IS Sieve (mm)	Cumulative per cent passing by weight of total aggregate
1.	0.6	100
2.	0.3	95 - 100
3.	0.075	85 - 100

Table 3.17. Composition of bituminous macadam

S.No.	Mix designation	Grading I	Grading 2
	Nominal aggregate size	40 mm	19 mm
	Layer thickness	80-100 mm	50-75 mm
	IS Sieve <mm	Cumulative % by weight of total aggregate passing	
1.	45 mm	100	-
2.	37.5 mm	90 - 100	-
3.	26.5 mm	75 -100	100
4.	19 mm	-	90 - 100
5.	13.3 mm	35 - 61	56 - 68
6.	4.75 mm	13 - 22	16 - 36
7.	2.36 mm	4 - 19	4 - 19
8.	0.3 mm	2 - 10	2 - 10
9.	0.075 mm	0 - 8	0 - 8
Bitumen content, % by weight of total mixture ¹		3.1 -3.4 %	3.3 -3.5 %
Bitumen grade		35 to 90	35 to 90

Note : Appropriate bitumen contents for conditions in cooler areas of India may be up to 0.5% higher subject to the approval of the Engineer.

Table 3.18. Manufacturing and Rolling Temperatures of BM / DBM

Bitumen Penetration Grade	Bitumen Mixing Temp. (°C)	Aggregate Temp. (°C)	Mixing Temp. (°C) of Mixed	Rolling (°C)	Laying (°C)
35	160-170	160-175	170 Max.	100 Min.	130 Min.
65	150-165	150-170	165 Max.	90 Min.	125 Min.
90	140-160	140-165	155 Max.	80 Min	115 Min.

Table 3.19. Composition of dense graded bituminous macadam pavement layers

	Grade of Mix	Grading I	Grading 2
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S.No.	Nominal aggregate size	40 mm	19 mm
	Layer thickness	80-100 mm	50-75 mm
	IS Sieve <mm	Cumulative % by weight of total aggregate	
1.	45 mm	100	-
2.	37.5	90 - 100	100
3.	26.5	63 - 93	90 - 100
4.	19 mm	-	71 - 95
5.	13.3	55 - 75	56 - 80
6.	4.75	38 - 54	38 - 54
7.	2.36	28 - 42	28 - 42
8.	0.3 mm	7 - 21	7 - 21
9.	0.075 mm	2 - 8	2 - 8
Bitumen content, % by weight of total mixture ¹		Min. 4.0 %	Min. 4.50 %
Bitumen grade		65 or 90	65 or 90

Note : 1. The combined aggregate grading shall not vary from the low limit on one sieve to the high limit on the adjacent sieve.

2. Determined by the Marshall method.

Table 3.20. Marshall Properties Requirements for dense graded bituminous macadam layers

S.No.	Requirement of property of mix from	Standard
1.	Minimum stability (kN at 60°C)	9.0
2.	Minimum flow (mm)	2
3.	Maximum flow (mm)	4
4.	Compaction level (Number of blows)	75 blows on each of the two faces of the specimen
5.	Per cent air voids	3 -6
6.	Per cent voids in mineral aggregate (VMA)	See table 9.28 below
7.	Per cent voids filled with bitumen (VFB)	65 -75

Table 3.21. Minimum per cent voids in mineral aggregate (VMA)

S.No.	Nominal Maximum Particle	Minimum VMA, per cent Related to Design Air Voids, per		
		3.0	4.0	5.0
1.	9.5 mm	14.0	15.0	16.0
2.	12.5 mm	13.0	14.0	15.0
3.	19.0 mm	12.0	13.0	14.0
4.	25.0 mm	11.0	12.0	13.0
5.	37.5 mm	10.0	11.0	12.0

Note : 1. The nominal maximum particle size is one size large than the first sieve to retain more than 10 per cent.

2. Interpolate minimum voids in the mineral aggregate (VMA) for design air voids values between those listed

Bituminous Concrete and Semi Dense Bituminous Concrete

General guideline for Semi Dense Bituminous Concrete and Bituminous Concrete

- 1) The work consists of construction, in a single or multiple layers of bituminous concrete prepared as per specified job mixed formula, on previously prepared bituminous base. A single layer shall be 25 mm to 100 mm in thickness.
- 2) The coarse aggregate for semi-dense bitumen concrete should satisfy the criteria laid in Table 3.22. Aggregate gradation is indicated in table 3.23 and SDBC should satisfy the Marshall requirement indicated in table 3.24.
- 3) The Job mix formula for SDBC should be in accordance with clause 511.3 of Ministry's specifications and should be design in lab or other agency and should get approval from PMU before implementation.
- 4) The coarse aggregate for bituminous concrete mix should satisfy the requirement mentioned in table 3.25. Composition of bituminous concrete pavement layers and Marshall Properties Requirements for bituminous pavement layers is indicated in table 3.26 and 3.27 respectively.
- 5) The mix design and construction operations of BC should be confirm to clause 512.3 of Ministry's specifications and should be design in lab or other agency and should get approval from PMU before implementation.
- 6) For more detail refer road specification clause no. 511 for Semi Dense Bituminous Concrete and clause no. 512 for Bituminous Concrete.

Fine Aggregate for Semi Dense Bituminous Concrete and Bituminous Concrete

- 1) The fine aggregate shall be the fraction passing the 2.36 mm and retained on the 0.075 mm sieve consisting of crusher run screening, natural sand or mixture of both. These shall be clean, hard, durable, uncoated, dry and free from soft or flaky pieces and organic or other deleterious substances.
- 2) The grading of the fine aggregates inclusive of filler shall be as given in table 3.12.

Table 3.22. Physical requirements for coarse aggregate for Semi-dense graded bituminous macadam

S.No.	Property	Test	Specification
1.	Cleanliness (dust)	Grain size analysis ¹	Max 5% passing 0.075mm sieve
2.	Particle shape	Flakiness and Elongation Index (Combined) ²	Max 30%
3.	Strength*	Los Angeles Abrasion Value)	Max 35%
		Aggregate Impact Value ⁴	Max 27%
4.	Polishing	Polish stone Value ⁵	Min 55
5.	Durability	Soundness: ⁶ Sodium Sulphate Magnesium Sulphate	Max 12% Max 18%
6.	Water Absorption	Water absorption ⁷	Max 2%
7.	Stripping	Coating and Stripping of Bitumen Aggregate Mixtures ⁹	Minimum retained coating 95%
8.	Water	Retained Tensile Strength ⁸	Min 80%

Notes: 1. IS:2386 Part I

6. IS:2386 Part 5

2. IS:2386 Part I
 (the elongation test to be done only on non-flaky aggregates in the sample)
3. IS:2386 Part 4*
 4. IS:2386 Part 4*
 5. BS:812 Part114
7. IS:2386 Part 3
 8. AASHTO T283**
 9. IS:6241

* Aggregate may satisfy requirements of either of these two tests.

** The water sensitivity test is only required if the minimum retained coating in the stripping test is less than 95%.

Table 3.23. Composition of Semi- dense bituminous concrete pavement layers

S.No.	Grade of Mix	Grading 1	Grading 2
	Nominal aggregate size	13 mm	10 mm
	Layer thickness	35- 40 mm	25- 30 mm
	IS Sieve <mm	Cumulative % by weight of total aggregate	
1.	19 mm	100	
2.	13.2	90 - 100	100
3.	4.75	70 - 100	90 - 100
4.	2.36	35 - 51	35 - 51
5.	1.18	24 - 39	24 - 39
6.	0.60	15 - 30	15 - 30
7.	0.3 mm	9 - 19	9 - 19
9.	0.075 mm	3 - 8	3 - 8
Bitumen content, % by weight of total mixture ¹		Min. 4.50 %	Min. 5.00 %
Bitumen grade		65	65

Note : 1. The combined aggregate grading shall not vary from the low limit on one sieve to the high limit on the adjacent sieve.

3. Determined by the Marshall method.

* Only exceptional circumstances, 80/100 penetration grade bitumen may be used, as approved by the engineer.

Table 3.24. Marshall Properties Requirements for Semi-dense bituminous concrete layers

S.No.	Requirement of property of mix from	Standard
1.	Minimum stability (kN at 60°C)	8.20
2.	Minimum flow (mm)	2
3.	Maximum flow (mm)	4
4.	Compaction level (Number of blows)	75 blows on each of the two faces of the specimen
5.	Per cent air voids	3 -5
6.	Per cent voids in mineral aggregate (VMA)	See table 9.28 below
7.	Per cent voids filled with bitumen (VFB)	65 -78

Marshall sample Table 3.25. Physical requirements for coarse aggregate for bituminous concrete

S.No.	Property	Test	Specification
1.	Cleanliness (dust)	Grain size analysis ¹	Max 5% passing 0.075mm sieve
2.	Particle shape	Flakiness and Elongation Index (Combined) ²	Max 30%
3.	Strength	Los Angeles Abrasion Value)	Max 30%
		Aggregate Impact Value ⁴	Max 24%
4.	Polishing	Polish stone Value ³	Min 55
5.	Durability	Soundness: ⁵ Sodium Sulphate Magnesium Sulphate	Max 12% Max 18%
6.	Water Absorption	Water absorption ⁷	Max 2%
7.	Stripping	Coating and Stripping of Bitumen Aggregate Mixtures ⁹	Minimum retained coating 95%
8.	Water Sensitivity**	Retained Tensile Strength ⁸	Min 80%

Table3.26. Composition of bituminous concrete pavement layers

S.No.	Grade of Mix	Grading 1	Grading 2
	Nominal aggregate size	19 mm	13 mm
	Layer thickness	50- 65 mm	30 – 45 mm
	IS Sieve <mm	Cumulative % by weight of total aggregate	
1.	26.5 mm	100	
2.	19 mm	79 -100	100
3.	13.2 mm	59 - 79	79 -100
4.	9.5 mm	52 - 72	70 - 88
5.	4.75 mm	35 - 55	53 - 71
6.	2.36 mm	28 - 44	42 - 58
7.	1.18 mm	20 - 34	34 - 48
8.	0.60 mm	15 - 27	26 - 38
9.	0.3 mm	10 - 20	18 - 28
10.	0.15 mm	5 - 13	12 - 20
11.	0.075 mm	2 - 8	4 - 10
Bitumen content, % by weight of total mixture ¹		Min. 5.0 – 6.00 %	Min. 5.00 – 7.00 %
Bitumen grade		65	65

- Note : 1. The combined aggregate grading shall not vary from the low limit on one sieve to the high limit on the adjacent sieve.
 2. Determined by the Marshall method.

Table 3.27. Marshall Properties Requirements for bituminous concrete layers

S.No.	Requirement of property of mix from Marshall sample	Standard
1.	Minimum stability (kN at 60°C)	9.00
2.	Minimum flow (mm)	2
3.	Maximum flow (mm)	4
4.	Compaction level (Number of blows)	75 blows on each of the two faces of the specimen
5.	Per cent air voids	3 -6
6.	Per cent voids in mineral aggregate (VMA)	See table 9.28 below
7.	Per cent voids filled with bitumen (VFB)	65 -75
8.	Loss of stability on immersion in water at 60 C (ASTM-D-1075)	Min. 75 % retained strength

6.23.24 ITEM NO-24 REFILLING THE TRENCHES

Backfilling should be placed in layers not exceeding 15cm thickness per layer, and should be compacted to a minimum of 95% maximum dry density. The refilling should be done on both sides of pipe together & height difference in earth fill on each side should not be more to cause lateral movement of pipe. Most of the coarse grained soil comprising of gravel or sand are acceptable. However silty sand, clayey sand, silty and clayey gravel shall not be used unless proposed to be used in conjunction with gravel or clean sand. It is very important that the pipe zone backfill material does not wash away or migrate in to the native soil. Likewise, potential migration of the native soil in to the pipe zone backfill must also be prevented.

Heavy earth moving equipment used for backfilling should not be brought until the minimum cover over the pipe is 90 cm in the case of wide tracked bulldozers or 120 cm in the case of wheeled roaders or roller compactors.

Compaction

Vibratory methods should be used for compaction. Compaction within distances of 15 cm to 45 cm from the pipe should be usually done with hand tempers. The backfill material should be compacted not less than 95% of maximum dry density.

6.23.25 ITEM NO-25 DISPOSING OFF THE SURPLUS EXCAVATED STUFF

After completion of work the surplus excavated material shall be disposed off by the contractor from the site as directed by the Engineer-in-charge by truck upto 5 Km including loading, unloading and stacking as directed by Engineer- in- charge.

The contractor shall ensure that no excavated material which is suitable for and required to be re-use in the work, transport unless ordered by The Engineer-in-charge.

The material not useful for work to be disposed of to any tipping location designated by the Engineer-in-charge, at a distance up to 20 km by most direct practicable route. Material disposed of at Engineer's tip at a distance greater than 20 km shall qualify for additional payment at rate entered in current schedule of rates. The material so deposited shall be shaped up or spreaded and leveled as directed by Engineer-in-charge.

6.23.26 ITEM NO-26 MAKING INTERCONNECTION

This item, includes cost of all labour required for excavation for this job work in all strata including dewatering (Also dewatering by Pump if necessary) cutting of existing M.S./C.I./D.I. pipe jointing to the existing distribution mains of M.S./C.I. by welding method or by any other method i.e. Flanged joint lead joint or mechanical joint etc. This item also includes labour cost for lowering laying carting of materials required and refilling the trenches for this job work.

The item includes cost of jointing material i.e. welding or nut bolts rubber packing or pig lead etc. However the cost of specials required for connection is not included in this item. The same shall be procured by the contractor and it will be paid under the respective items of Price bid.

The permission required from PCMC for cutting of existing pipe line and making cross connection to existing one shall be the responsibility of the Contractor.

6.23.27 ITEM NO-27 DISMANTLING JOINT

D.I./M.S Dismantling joints shall be installed in such a manner that valves can be dismantled without stress to the joints. Dismantling joints shall be suitable for installation with all valves of different diameters.

The dismantling joint shall be designed for a hydrostatic pressure of 10 kg/sq.cm. The sliding flange shall be machined smooth and shall slide at least 30 mm to disengage fully mating flange. All the fasteners for the dismantling joint shall be of SS 304. These shall be completely leak proof with proper gasket arrangement. Flange dimensions shall conform to latest relevant IS code. Flanged specials shall be supplied with required nuts, bolts and rubber gaskets. The dismantling joint shall be internally and externally coated with hot applied (dip) bituminous paint.

6.23.28 ITEM NO-28 LOWERING, LAYING AND JOINTING HDPE PIPE

Welding Procedure

Jointing between HDPE pipes and specials shall be done as per the latest IS: 7634 part II. Method of jointing between the pipes to pipes and pipes to specials shall be with fusion welding using automatic or semi automatic, hydraulically operated, superior quality fusion machines which will ensure good quality fusion welding of HDPE pipes. Electrofusion coupler fittings will be carried out for smaller diameters of PE pipes (up to 110mm). & above 110 mm dia. Welding procedure need to be follow.

METHOD OF FUSION

Method of jointing between the pipes to pipes and pipes to specials shall be with fusion welding using automatic or semi automatic, hydraulically operated, superior quality heat fusion machines which will ensure good quality heat fusion welding of HDPE pipes The most widely used method for joining individual lengths of large diameter polyethylene pipe (>75mm) is by heat fusion of the pipe ends This technique produces a permanent, economical and flow-efficient joint. Field-site heat-welding may be

made readily by trained operators using specially developed heat fusion machines. The Fusion Jointing between HDPE pipes and specials shall be done as per the latest IS: 7634 part- II

GENERAL GUIDELINES FOR FUSION-WELDING:

The welding area has to be protected from unfavorable welding conditions such as moisture, wind, dirt, excessive surface temperature and low temperatures < 5 degree C and intensive UV radiation. If the pipe is exposed to such UV radiation, the pipe ends are to be thoroughly scrapped (by planning tool) before the welding procedure is adopted.

Heating Pressure 0.15 N/sq. mm

Welding Temperature 200-220 deg. C

The seven steps involved in making a heat fusion joint are:

- a) Securely fasten the components to be joined
- b) Square cut the surface of the pipe end
- c) Face the pipe ends
- d) Align the pipe profile
- e) Melt the pipe interfaces
- f) Join the two profiles together
- g) Hold under pressure and release

Heat fusion cycle and parameters are given in Annex A in ISO 11414 – the contractors are requested to follow this guideline for a good weld.

Caution: An additional 10 to 60 minutes cooling time may be required (depending on pipe size) after removing the pipe from the fusion equipment before subjecting the pipe for bending, burying, pressure testing or similar handling.

BEAD REMOVAL:

In some pipe system usage, the bead from the heat fusion process may be undesirable. Inside beads may create minor flow turbulence of liquids or may become an obstacle on which solids in the fluids may become lodged. Furthermore, outside beads may be a hindrance to relining operations. Equipments are available to remove the bead. The bead removal shall not affect the performance of the pipe and the weld. However, it must be noted that the friction factor ('c' value; 'k' value) as given elsewhere in the manual takes cognizance of the inside bead. Hence the bead does not effect the design parameters for flow rates in PE pipes.

FUSION EQUIPMENT

The Contractor should have automatic superior quality fusion welding machines with hydraulic jacks, surface cleaning planner, and digitally controlled heating mirror and hydraulic power pack for doing the installation.

The contractor is cautioned for the proper procurement of the welding equipment and the Inspection agencies shall necessarily be assured that the welding contracting company has the proper machine for a good field weld.

The heat fusion equipment shall incorporate a facility for supporting the heating plate and planning tool (necessary to square cut the pipe end) when in use. The machine shall be robust enough to stand normal field use.

The design of the heat fusion machine shall allow the heating plate to be removed and the pipe ends closed after heating, without damaging the heating surfaces, within a time frame of maximum of 6 secs upto d<250mm and 12 secs for d>250mm.

The clamp alignment system shall be such that there shall be perfect axial alignment of the pipe surface – during heating and during pressurizing the pipe ends after heating, is assured.

The guide elements of the machine shall be such that the gap between the pipe ends shall not exceed 0.25mm for $d < 250\text{mm}$ and 0.5mm $d > 250\text{mm}$. Heat-welding machines shall have a locking system to hold the fusion force is to be ensured in all the systems.

All the systems shall be protected against over pressure. It shall be capable of maintaining the required interface force on the pipe or fittings end as long as necessary. There shall be a display of the pressure applied.

TRAINED MANPOWER FOR FUSION WELDING:

Only trained and technically qualified for the welding method are to be employed for the welding operation. It is necessary that the manufacturer certified person need only be authorized for heat welding.

These persons shall carry at all the time in the field during site work, a valid and authentic certificate that the person performing welding has been so trained.

LAYING HDPE pipe

- a) After trench is excavated to the specified depth the bottom of the trench has to be cleared of all stones or pieces of rock & leveled up properly. A layer of ordinary soil of not less than 5 cm. is to be used for leveling the trench to ensure that cable when laid will follow a straight alignment
- b) When trenches are excavated up to specified depth, properly dressed and leveled, joint measurement of trench shall be taken by representative of Contractor and Site Engineer. Measurement shall be recorded in measurement book with their signature. Trenches for which measurements are recorded in measurement book shall be considered as approved trenches.
- c) HDPE Pipe shall be laid only in approved trenches. The contractor shall exercise due care to ensure that the HDPE Pipe/ is not subjected to any damage or strain.
- d) The HDPE Pipe shall be laid in RCC spun pipes as casing pipes, at road crossings and through G.I. Pipes on culverts and bridges and also in exceptional cases where the depth of the trench is less than specified depth as per direction of Engineer-In-Charge..
- e) Water present in the trench at the time of laying the HDPE Pipe shall be pumped out by the contractor before lowering in the pipes to ensure that no mud or water gets into the pipes.
- f) At road crossings, one extra HDPE Pipe of same diameter with NP3 RCC spun pipe as casing pipe as per direction of Site Engineer.
- g) In case of nallahs, which are dry for nine months in a year, the HDPE Pipe shall be laid within the RCC pipe The RCC pipes shall be extended 2 mtrs. Beyond the bed of nallah on either side.
- h) The following construction practices are applicable in general:
 - i) Wherever GI pipes are used, rubber bushes shall be used at the two ends of the GI pipes to protect the damages of HDPE Pipe.
 - ii) Wherever RCC pipes are used, two ends must be properly sealed to bar entry of rodents.
 - iii) On Rail bridges and crossings, the HDPE Pipe shall be encased in suitable cast iron/RC pipes as prescribed by the Railway Authorities.
 - iv) Unloading of PLB HDPE Coil from truck should be done with help of Wooden / Metallic planks and coil can also be dropped from floor of truck on sand or soft soil bed.

Field Hydraulic Test

- a. The Sectional Hydraulic Test shall be carried out after the pipeline section to be tested has been laid jointed and backfilled to a depth sufficient to prevent floatation, but leaving the joints exposed which are to be tested. The sections to be tested shall be to the approval of the PMC and shall not be longer than 2000 m or 500 m when either the pipeline is laid adjacent to or underneath the carriageway or when section includes an air valve chamber. The joints between each tested section shall be left exposed until the pipeline has passed the test on completion.
- b. Each length of the pipeline to be tested shall be capped or blanked off at each end and securely strutted or restrained to withstand the forces which will be exerted when the test pressure is applied. Air valves already fitted shall be permitted to function during the test
- c. Proposals for testing where thrusts on structures are involved, even where thrust flanges on the piping are installed, shall be with the prior approval of the PMC.
- d. The length under test shall be filled making certain that all air is displaced through an air valve or any other appropriate mechanism. The test length shall then remain under constant moderate pressure, 10 to 20m head of water, for a period of several hours until the pressure can be maintained without additional pumping.
- e. The pressure shall then be slowly increased at a maximum rate of 1 bar per minute to the full test pressure and pumping discontinued for 3 hours or until the pressure has dropped by 10m, whichever occurs earlier. Thereafter pumping shall be resumed and continued until the test pressure has been restored. The quantity of water pumped to restore the pressure, which is called make up water, shall be the measure of thermal expansion or leakage from discontinuation of pumping until its resumption. The makeup water shall be as below:

OD of pipeline (mm)	Litres per 1000 m of the pipe length tested		
	One hour test	Two hour test	Three hour test
63	9	14	24
110	16	31	50
160	37	74	112
200	50	87	124
315	136	285	422
400	174	347	521

- f. The maximum allowable test pressure shall be 1.5 times the system design pressure or pipe rating whichever is higher
- g. Notwithstanding the satisfactory completion of the hydraulic test, if there is any discernible leakage of water from any pipe or joint, the Contractor shall, at his own cost, replace the pipe, repair the pipe or re-make the joint and repeat the hydraulic test with cost including the cost of water. Water used for hydrostatic test shall be clean

and potable.

- h. Pipelines shall be tested as above except where the PMC issues such instructions as are necessary for testing parts of the Works that have been designed for stresses limited by considerations other than those applying to the pipeline systems.
- i. Test pressures are to be measured in kg/cm² at the centre of the blank flange situated at the lowest end of the pipeline under test. Unless otherwise specified the test pressure shall be as stated below.

6.23.29 ITEM NO-29 CI FLANGED S&S SPECIALS

C.I. Specials shall confirm to relevant IS codes of latest edition. Material should be procured from approved manufacturer with manufacturers test certificate. At least 50% of the C.I. specials should be inspected by S.G.S., RITES or any other agency approved by the PCMC Inspection charges shall be borne by the contractor. The transportation of specials by truck is acceptable, without any extra cost.

6.23.30 ITEM NO-30 PROVIDING HDPE PIPE

Providing and supplying in standard length ISI mark High **Density Polyethylene(HDPE) anti rodent pipes suitable for (HDD) – horizontal direction drilling work** & suitable for potable water as per IS specification 4984/1995 including all local and central taxes, insurance, transportation, freight charges, octroi, inspection charges, loading& unloading, conveyance to departmental stores or site of work and including cost of jointing material etc., complete.

The item shall be covering manufacturing, supplying and delivery of HDPE pipes having material grade PE100 bearing IS4984/1995 and its latest version or amendments. The HDPE pipes shall be supplied in standard length or as per PCMC requirements.

Raw material

Raw material used to manufacture the HDPE pipes shall be virgin compounded or Natural black PE 100 resin confirming to ISO4427:2007 .The carbon black content in the material shall be within 2.5± 0.5% and the dispersion of carbon black shall be satisfactory when tested as per ISO2530.

The pipe shall generally meet the specification as per latest revisions and amendment of IS:4984 and IS:7328 unless otherwise mentioned. The PE100 black compound proposed to be used for manufacturing of the pipes should also comply with the following norms certified by the raw material manufacturer from an independent third party laboratory like Exova (formerly Bodycote), KIWA etc which should be submitted by the pipe supplier.

- a) The raw material should have certification as per ISO 9080:2003 and ISO 12162 by an independent international testing laboratory for having passed 10,000 hour long term hydrostatic strength (LTHS) test extrapolated to 50 years to show that the resin has a minimum MRS of over 10 MPa. Certification as per ISO 13477:2008- Determination of resistance to rapid crack propagation (RCP)- small –scale steady state test (S4 test)

The resin should have been certified by the an independent laboratory of international repute for having passed 10,000 hour long term hydrostatic strength (LTHS) test extrapolated to 50 years to show that the resin has a minimum MRS of over 10MPa. Internal certificate of any resin manufacturer will not be acceptable.

- b) a) Certificate for having passed the full scale rapid crack propagation test as per ISO 13478.

Quality assurance certificate

Quality assurance certificate, for the raw material proposed to be used for the project (HDPE / MDPE, electro fusion fitting, compression fitting), from one of the certifying agencies such as Bodycoat or Slevan or Advantica or any other internationally reputed organization shall be submitted along with the bid.

The pipe supplier should have adequate manufacturing / test facilities for all the HDPE pipes being supplied. The manufacturing system of the supplier also should have been certified under ISO 9000/ISO 14001. The manufacturing / test facilities should preferably include oxidation induction test equipment, Environmental Stress crack resistance test equipment and thickness/ weight control through wall thickness monitoring or feeder control systems. Adequate facilities for checking of critical raw materials specifications should also be available at the premises of the pipe manufacturer.

The bidder should submit the above raw material certificates along with his bid in the first cover. Bids without these certificates will be treated as non-responsive.

Pressure Rating

The pressure rating of HDPE pipes and specials shall be of PN 10 confirming to clause 3.3 of IS 4984.

Density and MFR

The specified density shall be between 940.0 kg/m³ and 958.4 kg/m³ (both inclusive) when determined at 27 degree C according to procedure prescribed in IS 7328 the value of the density shall also not differ from the nominal value by more than 3 kg/m³ as per 5.2.1.1 of IS 7328. The MFR of the material shall be between 0.2g/10 min to 1.10 g/10 min (both inclusive) when tested at 190 degree C with nominal load of 5 kg as determined by method prescribed in IS 2530. The MFR of the material shall also be within ±20% of the value declared by the manufacturer.

Colour of pipes

The Colour of the HDPE pipe shall be confirming to clause 4 of IS4984:1995 or clause 3.1.2, 3.1.3 and 3.2.

Reworked material

As per the provision of clause 5.4 of IS4984:1995, addition of not more than 10 percent of the manufacturer's own reworked material resulting from the manufacture of pipes is permissible. No other reworked or recycled material shall be used. The material to be used shall be clean and should be derived from the same resin as used for the relevant production.

Dimensions

The pipe dimensions shall be as per latest revisions and amendment of Clause 6 of IS4984:1995. The pipes up to diameters 125mm shall be supplied in coils of 50/100m length. The coils shall be as per the provisions of clause 6.5 of IS4984:1995. Pipe beyond 125mm shall be supplied in straight lengths of minimum 6/12m as per Engineers instructions.

The internal diameter, wall thickness, length and other dimensions of pipes shall be as per relevant tables of IS: 4984 for different class of pipes. Each pipe shall be of uniform thickness throughout its length.

The wall thickness of the PE100, PN 6 pipes shall be as per the table given below:

Nominal Dia of HDPE	Wall Thickness (mm)
---------------------	---------------------

Pipe (mm)	Minimum	Maximum
63	4.7	5.4
75	5.6	6.4
110	8.1	9.2
160	11.8	13.2
200	14.8	16.5

The dimension tolerances shall be as per IS: 4984.

Performance requirements

The pipe supplied should have passed the acceptance tests as per clause 9.2 of IS4984:1995. The manufacturer should provide the test certificates for the tests conducted, as required in clause 9.2 of IS4984:1995 along with the supply of pipes. These tests can be performed in the in-house laboratory of the pipe manufacturer or at an approved laboratory.

Marking

As per the provisions of IS4984:1995, each straight length of the pipe shall be clearly marked in indelible ink/ paint on either end and for coils at every 5m the following information:

- a. The manufacturer's name and/ trade mark
- b. Designation of the pipe as per IS (PE 100 & PN10)
- c. Lot number/ Batch number

The words "PCMC WATER Project

BIS License

The pipe manufacturer who is going to supply the pipe for the project has to have a valid BIS license to do so for the kind of pipes required for this project. The bidders shall include this valid license along with their bid. Bid without these licenses may be treated as non-responsive.

Third Party Inspection

The pipes shall be accepted successful after the third party inspection by SGS, RITES or any other agency authorized by PCMC, the charges for the same shall be borne by the contractor.

6.23.31 ITEM NO-31 ELECTRO FUSION FITTINGS FOR HDPE PIPES

All the electrofusion fittings included in this document should be designed for use in water distribution systems and be manufactured/supplied by manufacturers having ISO 9001: 2000 certification for their quality systems. The products should comply with the following specific requirements.

1. The products shall comply with the requirements of BS EN 12201-3: 2003, BS EN 1555-3 or ISO 8085-3.
2. All the fittings shall be of SDR 11 rating.
The product group used for drinking water applications should have undergone type test by WRc-NSF, U.K according to BS 6920 in any of their Certified Laboratories like WRc – NSF/DVGW/KIWA/SPGN and certificate of Compliance to be produced for the following parameters:

- a. Odour & Flavour of Water
 - b. Appearance of Water
 - c. Growth of Micro Organism
 - d. Extraction of substances that may be of concern to Public Health (Cyto Toxicity)
 - e. Extraction of Metals
3. All the products shall be manufactured by injection moulding using virgin compounded PE 80 (MDPE) polymer having a melt flow rate between 0.5 – 1.1 grams/10 minutes and shall be compatible for fusing on either PE 80 or PE 100 distribution mains manufactured according to the relevant national or international standards. The polymer used should comply with the requirements of BS 3412 and/or BS EN12201-1.
 4. The fittings intended for water distribution applications shall be coloured blue for the clear identification of the services.
 5. All the electrofusion products should be individually packed so that they can be used instantaneously at site without additional cleaning process. The protective packing should be transparent to allow easy identification of the fittings without opening the bags.
 6. The electro fusion products should be with only a single heating coil to fully electrofuse the fitting to the adjoining pipe or pipe component as applicable. The heating coils shall be terminated at terminal pins of 4.0 or 4.7 millimetre diameter, protected with terminal shrouds. Each terminal shroud should be additionally protected with polyethylene shroud caps.
 7. No heating element shall be exposed and all coils are to be integral part of the body of the fitting. The insertion of the heating element in the fitting should be part of the injection moulding process and coils inserted after the injection moulding process or attached to the body of the fitting as a separate embedded pad etc. are strictly not acceptable.
 8. The pipe fixation shall be achieved by external clamping devices and integral fixation devices are not acceptable.
 9. The brand name, size, raw material grade, SDR rating and batch identification are to be embedded as part of the injection moulding process. Each fitting should also be supplied with a barcode sticker for fusion parameters attached to the body for setting the fusion parameters on an automatic fusion control box. The barcode sticker should also include the fusion and cooling time applicable for the fitting for the manual setting of a manual fusion control box.
 10. The fittings should be V-regulated type designed to fuse at a fusion voltage of 40 volts AC.
 11. The heating elements should be designed for fusion at any ambient temperatures between -5 to +40 degree centigrade at a constant fusion time i.e. without any compensation of fusion time for different ambient temperatures.
 12. A limited path style fusion indicator acting for each fusion zone as visual recognition of completed fusion cycle should be incorporated into the body of each fitting near the terminals. The fusion indicators should not allow the escape of the molten polymer through them during or after the fusion process.
 13. All the sockets in the electrofusion fittings should include a method of tapping controlling the pipe penetration (pipe positioner/stopper).

The contractor shall supply the required dia of special at his cost. **The Electrofusion fittings special shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC, the charges for the same shall be borne by the contractor.**

6.23.32 ITEM NO-32 D.I SLUICE VALVE

Manufacturing, supply and delivery of DI D/F non-rising spindle soft seated glandless Gate Valves with body and bonnet of Ductile cast iron of grade GGG-40, wedge with fully encapsulated EPDM rubber W-

270 (approved for drinking water) and seals of NBR. The valves should be with replaceable stem nut and replaceable sliding shoes. Valve stems shall be of single piece thread rolled. Valve shall have 3 “O” rings of NBR for stem sealing. Gate valve shall be compatible for buried applications without valve chamber. Face-to-face dimensions as per BS 5163-89/IS 14846-PD/EN 558F4 and flange connections as per IS 1538, Maximum Valve operating torque should be at least 40% less than the torque as stated in the standard EN 1074. Electrostatic epoxy powder/liquid coating (EP-P) inside and outside color blue RAL 5005 with minimum coating thickness of 250 microns. The EPDM rubber & Epoxy Powder should be approved by W 270. (EP-P is a resi-coat powder approved for drinking water application, applied through fusion bonding technology process by dipping the shot-blasted casted components heated up to 200 deg C).

Body, Bonnet	Ductile Iron GGG 40 (EN-JS- 1030) / Spheroidal Graphite Iron
IS: 1865 Gr 400/12	IS: 1865 Gr 400/12
Wedge (fully rubber encapsulated)	Ductile Iron GGG 40 (EN-JS- 1030) / Spheroidal Graphite Iron IS: 1865 Gr 400/12 encapsulated with EPDM rubber - W270 approved grade.
Spindle/Stem	SS: IS: 6603 12Cr13/22Cr 13;AISI 410/AISI 420
Stem Nut	Brass
Bonnet Gasket	EPDM rubber - W270 approved grade
Internal Fasteners	Stainless Steel SS316/304
Stem Sealing	Toroidal NBR sealing rings (Min 03 ‘O’ Rings)
Coating	Inside & Outside epoxy powder coated; DFT minimum 250 micron, shade RAL 5005 (BLUE)

The contractor shall supply the required dia of valves at his cost. **The valves shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC**, the charges for the same shall be borne by the contractor

6.23.33 ITEM NO-33 D.I TAMPER PROOF AIR VALVE

Providing and supplying, lowering laying & jointing at site ductile iron/spheroidal Graphite (S.G) iron single/ double chamber tamper proof air valve without isolating sluice vlave . Valves in accordance with BSEN 1074-4 of PN 10/16 rated with body and bonnet of ductile iron confirming to EN 1563/IS 1865 Gr. 500/7 or Gr 400/15 floats, Float guide , seat ring of stainless steel 1.4436/1.4306, seat ring gasket of WRAS approved EPDM rubber (suitable for drinking water), internal fasteners of stainless steel A2 body and bonnet coated inside and outside with electrostatically applied epoxy powder coated blue colour (suitable for drinking water) as per DIN 30677-2 & GSK guidlines with a coating thickness of min. 250 microns. Flange connections as per IS 1538 raised face & pressure testing at manufactures works shall be done as per IS 14845. Including all taxes and transportation charges etc. complete

The contractor shall supply the required dia of valves at his cost. **The valves shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC**, the charges for the same shall be borne by the contractor

6.23.34 ITEM NO-34 SLIP ON FLANGE WITH HDPE STUB END

HDPE Stub ends shall be square ended conforming to IS: 8008 Part I & VI Specifications. Stub ends will be welded on the pipe. Flange will be of slip on flange type as described below:

Slip-on flanges shall be metallic flanges covered by epoxy coating or plastic powder coating.

Slip-on-flanges shall be conforming to standard mating relevant flange of valves, pipes etc.

Nominal pressure rating of flanges will be PN10.

6.23.35 ITEM NO-35 GRP/ HDPE METER BOX

The item includes

1.0] Excavation in all types of soils including dewatering required.

2.0] Providing & fixing of water meter box of suitable size in concrete at bottom.

Suitable for accommodation water meter and gate valve as per approved drawing

Should have proper locking arrangement.

Capable to bear a live load of 150 kg.

Indicative size should be 500 mm X 250mm X 250mm

Capable to tolerate temperature variation from 5 to 50 degree celsius in exposed conditions.

The contractor shall supply the required meter box at his cost. **The valves shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC**, the charges for the same shall be **borne** by the contractor

6.23.36 ITEM NO-36 PROVIDING AND MAKING MDPE PIPE CONSUMER SERVICE CONNECTION ON CI/DI PIPES.

On Existing D.I/C.I pipe :-

Item includes:- Providing and making MDPE pipe consumer service connection on CI/DI pipes with the help of Ratchet and dye drill including all labour, MDPE pipe 10 m length, MDPE specials like electro fusion tee, double compression elbow, female threaded adopter with metal insert, UPVC/metal lockable ball valve (as approved by Engineer-in-charge, GI casing pipe of 40/50 mm for road crossing. The rate to include labour required, excavation, fitting, refilling, closing water supply in that area, dewatering and restarting the water supply, transportation etc complete as directed by Engineer-in-Charge.

CONNECTION TO CONSUMERS:

i. All service pipes and fittings from the connection on the water main to any premises shall be laid by the Contractor as per specifications and the approved drawings The connection pipe shall be laid in the ground and shall not be less than 75 cm below the surface . All pipes shall be laid or fixed in such a manner as not to be exposed to the heat and not to cause any damage to any consumer's pipes and fitting and there should not be any risk of mixing waste water or cause contamination of water. The material of the pipes and fittings shall be got approved from the Engineer-in-charge before use. The position of the stopcock on the connection pipe shall be as per approved drawing. All cocks and taps fitted to the service pipes in any premises shall be of a screw down lockable pattern and of quality approved.

ii. No pipe used for the conveyance of water shall be laid or fixed which shall run through any drain or any place where water through such pipes is liable to become polluted or contaminated or where the

pipe is likely to get damaged. However, in unavoidable cases such consumer's pipe may pass through an exterior air tight and water tight pipe or jacket of G.I pipe or other material approved by the Executive Engineer of sufficient length and strength and of such construction as would provide adequate protection to the inner pipes.

- iii. Every premises supplied with water shall have its own specific connection pipe and no connection pipe shall be used to supply water to more than one premises.
- iv. The position of stop cock on the connection pipe shall be decided as per approved HSC drawing who shall have exclusive control over this stop cock and its operation.
- v. The leakages upto the stop cock or up to the meter without stopcock shall be removed by contractor at his cost.
- vi. At every road crossing the contractor need to lay MDPE pipe under the casing pipe G.I of 40 mm Dia. no extra cost will be paid for this.

MAKING HOUSE SERVICE CONNECTIONS

One Service connection means one tapping from a distribution main / sub- main including one tapping saddles, double compression elbow, female threaded adopter with metal insert, MDPE to metal pipe connector, UPVC/metal lockable ball valve, GI casing pipe of 40/50 mm for road crossing, and service pipe 10 mtr from tapping point to the chamber near property boundary or inside the property as per the direction with U-ball valve.

Providing required size of HSC brass ferrule with union confirming to relevant IS make hole by drilling on top of distribution mains, fixing the ferrule on saddle making the connection water tight etc., as shown in the drawing include labour required for excavation, fitting, refilling, closing water supply in that area, dewatering and restarting the water supply, transportation etc complete as directed by Engineer-in-Charge and as directed by the Engineer including cost of required specials. Drilling charger, hydraulic testing, maintaining the same for the period under O&M.

MATERIAL of pipe

Medium Density Polyethylene pipe (MDPE) below ground level and GI pipe above Ground level shall be used for house service property connection.

MATERIAL of Ball Valve

The UPVC/metal lockable ball valve (as approved by Engineer-in-charge) shall withstand a temperature of 50o C for out door installation with both ends having female threaded joints. These ball valves shall be suitable for installation in cold potable water supply system for human consumption. The head loss in the ball valve shall be minimum and the initial design of the ball valve shall be such that it causes least obstruction to the flow of water. With locking arrangement such that if any consumer found defaulter for nonpayment using the ball valve we can disconnect the supply of such consumer.

The UPVC/metal lockable ball valve (as approved by Engineer-in-charge) should be easy to operate with minimum torque being applied and it should be easy to dis-assemble the same and replace the damaged part and re-assemble easily.

The dimension of the UPVC/metal lockable ball valve shall be conforming to the best national/ISO/DIN/EEC standards and should not pose any problem for easy installation, maintenance and removal. All the parts of the UPVC/metal lockable ball valve shall be interchangeable for a given diameter.

The UPVC/metal lockable ball valve shall be designed, manufactured and tested for carrying cold potable water for human consumption and they shall be in black or in any approved colour which will be installed outdoor and shall one side with BSP parallel threads and the other side shall a compression fitting suitable for jointing MDPE pipe directly into UPVC/metal lockable ball valve. The BSP parallel threaded ends shall be with female fittings to suit the BSP threaded male adopters. The UPVC/metal lockable ball valve shall meet all the relevant standards of the country's Health Ministry Regulations for carrying cold potable water for human consumption.

The materials of UPVC/metal lockable ball Valves shall be impact resistant and all housing components shall be made of Ultra Violet radiation protected Polyvinyl Chloride (UPVC), Poly Propylene (PP), Poly Vinyleiden Fluoride (PVDF) and the ball seat shall be of Poly Tetra Flour Ethylene (PTFE) and the seal ring shall be of Ethylene Propylene di Methyl (EPDM) or Fluor –Caoutchouc (FPM). The materials of the Ball Valves shall be subjected to long term thermal testing for determination of reaction time, specific gravity, Carbon mono Oxide (CO) content, ash content, column strength, resistance to extension, flexural strength and abrasion resistance. To determine the chemical resistance of thermoplastic materials, immersion tests to find the suitability for using the UPVC/metal lockable ball for carrying potable water for human consumption should be carried out.

The base materials used for making Ball Valves shall be certified by the Health Ministry of the country of origin of UPVC/metal lockable ball as fit for use in carrying potable water for human consumption. The bore shall be smooth with minimum friction and it should be strong to any chemical reaction and more particularly to free chlorine available in water. The material shall be non-toxic and free from metallic stabilizers, corrosion resistant and maintenance free. It should be resistant to heat and ultra-violet radiation and should be easy to handle, install and remove with high durability.

The UPVC/metal lockable ball shall have the following components like Union Nut, Ball, Body Stem, Handle, Hose Adopter Nut, Packing Pressure Bush, Quick Joint Nut all of Ultra Violet radiation Protected Polyvinyl Chloride (U PVC) and Clipping Ring of Poly Acetyl and Hose Adopter 'O' ring support, Ball Seal, O ring stem, Quick Joint O ring of either PP/POM/NBR/PE+PTFE material. All the materials used either internally or externally in the manufacture of Ball Valves shall be Ultra Violet (UV) stabilized, and shall conform to reputed national standards or ISO/DIN/EEC standards.

The MDPE pipes, lockable ball valve, G.I pipe , shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC, the charges for the same shall be borne by the contractor

6.23.37 ITEM NO-37 PROVIDING AND MAKING MDPE PIPE CONSUMER SERVICE CONNECTION ON HDPE PIPES.

On HDPE pipe :-

Item includes :- Providing and making MDPE pipe consumer service connection on HDPE pipes with the help of electro fusion machine or Ratchet and dye drill including all labour, MDPE pipe 10 m length, MDPE specials like electro fusion tee, coupler, double compression elbow, female threaded adopter with metal insert, UPVC/metal lockable ball, GI casing pipe of 40/50 mm for road crossing. The rate to include labour required, excavation, fitting, refilling, closing water supply in that area, dewatering and restarting the water supply, transportation etc complete as directed by Engineer-in-Charge.

CONNECTION TO CONSUMERS:

- i. All service pipes and fittings from the connection on the water main to any premises shall be laid by the Contractor as per specifications and the approved drawings the connection pipe shall be laid in the ground and shall not be less than 75 cm below the surface. All pipes shall be laid or fixed in such a manner as not to be exposed to the heat and not to cause any damage to any consumer's pipes and fitting and there should not be any risk of mixing waste water or cause contamination of water. The material of the pipes and fittings shall be got approved from the Engineer-in-charge before use. The position of the stopcock on the connection pipe shall be as per approved drawing. All cocks and taps fitted to the service pipes in any premises shall be of a screw down lockable pattern and of quality approved.
- ii. No pipe used for the conveyance of water shall be laid or fixed which shall run through any drain or any place where water through such pipes is liable to become polluted or contaminated or where the pipe is likely to get damaged. However, in unavoidable cases such consumer's pipe may pass through an exterior air tight and water tight pipe or jacket of G.I pipe or other material approved by the Executive Engineer of sufficient length and strength and of such construction as would provide adequate protection to the inner pipes.
- iii. Every premises supplied with water shall have its own specific connection pipe and no connection pipe shall be used to supply water to more than one premises.
- iv. The position of stop cock on the connection pipe shall be decided as per approved HSC drawing who shall have exclusive control over this stop cock and its operation.
- v. The leakages upto the stop cock or up to the meter without stopcock shall be removed by contractor at his cost.
- vi. At every road crossing the contractor need to lay MDPE pipe under the casing pipe G.I of 40 mm Dia. no extra cost will be paid for this.

MAKING HOUSE SERVICE CONNECTIONS

One Service connection means one tapping from a distribution main / sub- main including one Electrofusion saddles, coupler, double compression elbow, female threaded adopter with metal insert, MDPE to metal pipe connector, UPVC/metal lockable ball valve, GI casing pipe of 40/50 mm for road crossing, and service pipe 10 mtr from tapping point to the chamber near property boundary or inside the property as per the direction with U-ball valve.

Providing required size of HSC electrofusion tapping saddle confirming to relevant IS make hole by using tapping tee cutter provided on the top of tapping saddle on top of distribution mains, fixing the electrofusion saddle making the connection water tight etc., as shown in the drawing include labour required for excavation, fitting, refilling, closing water supply in that area, dewatering and restarting the water supply, transportation etc complete as directed by Engineer-in-Charge and as directed by the Engineer including cost of required specials, Electrofusion machine, power/generator required for electro fusion, hydraulic testing, maintaining the same for the period under O&M.

MATERIAL of pipe

Medium Density Polyethylene pipe (MDPE) below ground level and GI pipe above Ground level shall be used for house service property connection.

MATERIAL of Ball Valve

The UPVC/metal lockable ball valve (as approved by Engineer-in-charge) shall withstand a temperature of 50o C for out door installation with both ends having female threaded joints. These ball valves shall be suitable for installation in cold potable water supply system for human consumption. The head loss in the ball valve shall be minimum and the initial design of the ball valve shall be such that it causes

least obstruction to the flow of water. With locking arrangement such that if any consumer found defaulter for nonpayment using the ball valve we can disconnect the supply of such consumer.

The UPVC/metal lockable ball valve (as approved by Engineer-in-charge) should be easy to operate with minimum torque being applied and it should be easy to dis-assemble the same and replace the damaged part and re-assemble easily.

The dimension of the UPVC/metal lockable ball valve shall be conforming to the best national/ISO/DIN/EEC standards and should not pose any problem for easy installation, maintenance and removal. All the parts of the UPVC/metal lockable ball valve shall be interchangeable for a given diameter.

The UPVC/metal lockable ball valve shall be designed, manufactured and tested for carrying cold potable water for human consumption and they shall be in black or in any approved colour which will be installed outdoor and shall one side with BSP parallel threads and the other side shall a compression fitting suitable for jointing MDPE pipe directly into UPVC/metal lockable ball valve. The BSP parallel threaded ends shall be with female fittings to suit the BSP threaded male adopters. The UPVC/metal lockable ball valve shall meet all the relevant standards of the country's Health Ministry Regulations for carrying cold potable water for human consumption.

The materials of UPVC/metal lockable ball Valves shall be impact resistant and all housing components shall be made of Ultra Violet radiation protected Polyvinyl Chloride (UPVC), Poly Propylene (PP), Poly Vinyleiden Fluoride (PVDF) and the ball seat shall be of Poly Tetra Flour Ethylene (PTFE) and the seal ring shall be of Ethylene Propylene di Methyl (EPDM) or Fluor –Caoutchouc (FPM). The materials of the Ball Valves shall be subjected to long term thermal testing for determination of reaction time, specific gravity, Carbon mono Oxide (CO) content, ash content, column strength, resistance to extension, flexural strength and abrasion resistance. To determine the chemical resistance of thermoplastic materials, immersion tests to find the suitability for using the UPVC/metal lockable ball for carrying potable water for human consumption should be carried out.

The base materials used for making Ball Valves shall be certified by the Health Ministry of the country of origin of UPVC/metal lockable ball as fit for use in carrying potable water for human consumption. The bore shall be smooth with minimum friction and it should be strong to any chemical reaction and more particularly to free chlorine available in water. The material shall be non-toxic and free from metallic stabilizers, corrosion resistant and maintenance free. It should be resistant to heat and ultra-violet radiation and should be easy to handle, install and remove with high durability.

The UPVC/metal lockable ball shall have the following components like Union Nut, Ball, Body Stem, Handle, Hose Adopter Nut, Packing Pressure Bush, Quick Joint Nut all of Ultra Violet radiation Protected Polyvinyl Chloride (U PVC) and Clipping Ring of Poly Acetyl and Hose Adopter 'O' ring support, Ball Seal, O ring stem, Quick Joint O ring of either PP/POM/NBR/PE+PTFE material. All the materials used either internally or externally in the manufacture of Ball Valves shall be Ultra Violet (UV) stabilized, and shall conform to reputed national standards or ISO/DIN/EEC standards.

Electro fusion Tapping TEE

Electro fusion Tapping tee with coupler to be used for HDPE pipe as approved by Engineer-in-charge no extra cost will going to paid.

The MDPE pipes, lockable ball valve, G.I pipe ,Electro fusion tapping TEE compression fittings shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC, the

charges for the same shall be **borne** by the contractor

6.23.38 ITEM NO-38 STRAP SADDLE

SCOPE:

The specification covers the requirements for manufacturing, supplying testing at works of Composite Strap Saddle used for tapping water supply connection from D.I. pipe distribution line.

STANDARDS:-

Pipe compatibility: D.I. K – 7 pipe as per ISO: 2531, EN: 545, EN: 598, IS: 1239-1, IS: 3589. Comply with ISO: 4427 Part – 3 & EN: 12201 – Part -3

GENERAL SPECIFICATIONS:

Clamp saddles for service connection from water distribution mains shall be of wrap around design, wide skirt and wide straps support, which shall reinforce the pipe while providing excellent stability to the saddle. Clamp Saddles for service connections shall be of fastened strap type with threaded outlet for service connection.

The service connection threading sizes shall be conforming to IS: 554 Clamp saddles shall be suitable for DI/C.I pipes of nominal sizes The straps shall be elastomer coated (insulated) type for firm grip on pipe as well as to protect the coating on the pipe and to insulate the un-identical metals. The saddles shall be single strap type up to pipe sizes of NB 600 and service outlet of ½", ¾" and 1".

The design of the saddle body should be such that, the service connection outlet metal insert shall project out towards pipe side and align with the hole drilled on the pipe to ensure positive locking against rocking or creeping on the pipe, as might be caused by vibration, pressure or excessive external loading.

The clamp saddles shall be suitable for maximum working pressures up to 10 bars.

MATERIAL AND DESIGN SPECIFICATIONS

SADDLE BODY

The item includes providing and fixing of D.I. saddle with strap, reducing brass bush for C.I. & D.I. pipes.

Specifications-

1. strap -SR304- Powder coated, 2. outer body - DI- Powder coated, 3 Sealing bush-EPDM-Original black,4 Outer sleeve-ductile plastic-Pigmented Colour,56. Top Hex Bush For Ferrule- brass- original, 7. Nut For Strap - Brass-original,8 Retainer For Bolt -Brass-original 9. Strap Tightening Bolt- Stainless Steel 304,10. 'U'shape Locking Pin-Stainless Steel 304,11. Springs -Stainless Steel 304,12. Split Pins-Stainless Steel 304,13. 13'O' Ring (Seal For Ferrule)-EPDM- original black

SADDLE STRAP:

Saddle straps shall be made of stainless steel 304 grade to prevent corrosion over the long service life.

STRAP INSULATION

Elastomeric (rubber) insulation / lining shall be such that none of the Stainless Steel Strap is in direct contact with the pipe. It shall ensure a firm non slip grip mounting on the pipe to prevent the saddle

from rocking or creeping on the pipe, as might be caused by vibration, pressure or excessive external loading.

SADDLE SEAL

It shall be virgin rubber SBR Grade 30 / NBR (NSF 61 approved). It shall be of type pressure activated hydro-mechanical design. It shall be contoured gasket to provide a positive initial seal, which increases with increase in the line pressure. Gasket shall be gridded mat, with tapered ends, with the outlet section having o-ring contacting the saddle body multiple orings contacting the pipe, preferably with a Stainless steel reinforcing ring insert moulded to prevent expansion under pressure.

NUTS-BOLTS-WASHER

Stainless Steel Type 304, NC rolled thread, Tightening torque for ½" (M12) nut-bolt: 14 - 15 kg.m and for 5/8" (M 16) nut-bolt: 21-23 kg.m

The MDPE pipes, UPVC ball valve, G.I pipe, compression fittings shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC, the charges for the same shall be borne by the contractor

6.23.39 ITEM NO-39 G.I. PIPES COMPLETE WITH G.I. FITTINGS

Item includes:- Providing and fixing G.I. pipes complete with G.I. fittings including trenching and refilling etc.

Specification :- Pipes-Galvanised Iron

The pipes (tubes) shall be galvanised mild steel hot finished seamless (HFS) or welded (ERW) HRIW or HFW screwed and socketed conforming to the requirements of IS 1239 Part-I for medium grade. They shall be of the diameter (nominal bore) specified in the description of the item, the sockets shall be designated by the respective nominal bores of the pipes for which they are intended.

Galvanising shall conform to IS 4736 : The zinc coating shall be uniform adherent,

reasonably smooth and free from such imperfections as flux, ash and dross inclusions, bare patches, black spots, pimples, lumping runs, rust stains, bulky white deposits and blisters. The pipes and sockets shall be cleanly finished, well galvanised in and out and free from cracks, surface flaws laminations and other defects. All screw threads shall be clean and well cut. The ends shall be cut cleanly and square with the axis of the tube.

All screwed tubes and sockets shall have pipe threads conforming to the requirements of IS Screwed tubes shall have taper threads while the sockets shall have parallel threads.

All tubes shall withstand a test pressure of 50 Kg/sq.cm without showing defects of any kind. Fittings :

The fittings shall be of mild steel tubular or wrought steel fittings conforming to IS1239 (Part-2) or as specified. The fittings shall be designated by the respective nominal bores of the pipes for which they are intended.

Pipe shall be supplied from the PCMC approved list of the firms after third party inspection by SGS, RITES or any other agency approved by PCMC inspection charges shall be borne by the contractor.

6.23.40 ITEM NO-40 A] ELECTROMAGNETIC FLOW METER

Item includes:-

Providing installing Electromagnetic Flow Meters with cost of accessories required. Flow Meter are to be fixed for measurement of water flowing in & out of the distribution.

General Technical Specification

- 1.1 PCMC has provided the size of pipe is indicative. The actual size, O.D.I.D., thickness shall be measured by Manufacture before supply of meter, any deviation and delay or damage cost due to non-fitting of meter shall be borne by Manufacture. The liquidity damage due to delay in fitting for wrong selection of fittings and accessories lies with Manufacture.
- 1.2 If there is any problem with ovality of pipes after the pipes are cut, the contractor as per the relevant standards shall jack up the pipes and the jointing work shall be carried out.
- 1.3 The Manufacture will have a full system of local offices in India and full service capability in the Metro-cities throughout the country. Full contact details for key personnel, both national and local shall be furnished on request. The supplier shall provide evidence of at least five years involvement in the manufacturing of meters worldwide.
- 1.4 The sensor / transmitter cables shall be capable of withstanding the climatic condition as applicable at site and should be weatherproof. The cable shall be installed in a suitable uPVC duct to minimize the risk of damage during excavations for other works. All the cable laid at a minimum depth of 0.5 m below the ground. Maximum length between the sensor & the transmitter shall not be more than that recommended by the meter Manufacture.
- 1.5 The transmitter shall operate so as to avoid loss of data in the event of temporary loss of electrical power supply and contractor shall include of provision of maintenance free battery backup facility (8 hours duration) to cater for temporary loss of such power supply. The contractor must allow for normal variations in mains electrical power parameters to be expected at site without any extra cost.

Full bore electromagnetic flow meters should be designed, manufactured and calibrated according to ISO:17025 standard. The flow meter shall be capable of measuring bi-directional flow. Meter shall be a velocity sensing electromagnetic type, microprocessor based signal converter, sealed housing, flanged tube meter for 1.0 MPa working pressure. The meter shall be manufactured to highest standard.

The meter shall be equipped with minimum six digit digital totalizes, reading in units of kiloliters and shall be accurate within 0.5% of true flow. The accuracy should be inclusive of linearity, hysteresis, repeatability and pressure effect. The meter assembly shall operate within a range of 0.3 m/sec to 4 m/sec and be constructed as follows:

Meter Tube (Sensor) shall be fabricated from stainless steel tube and use class ANSI / PN10 flat face carbon steel flanges in accordance with IS 1538. The internal and external of the meter tube shall be blasted to near white and lined with hard rubber and with drinking water approval for linear preferably by SBR or EPDM. Meter tube shall have a constant nominal inside diameter offering no obstruction to the flow.

Coil Housing: All flow meters within the premises of ESRs /DMAs (for flow meters in submerged condition) should be fully welded to the tube providing completely sealed environment for all coils, electrode connections and wiring harness capable of submerged or buried operation. Coil protection shall be IP 68 only.

Upto 600mm dia. die cast aluminum epoxy coated / Stainless steel housing is acceptable.

Above 600mm dia. the housing should be Stainless steel only.

Signal Converter shall be pulsed DC coil excitation type with auto zeroing. The signal converter shall be remotely mounted away from the meter. The converter shall indicate direction of flow and provide a flow rate indication and a total of flow volume for both forward and reverse directions. The converter shall provide an isolated 4-20 mA output into minimum 500-ohm load and a frequency output of a maximum of 0-800 HZ and a scaled pulse output. The microprocessor based signal converter shall have a self-diagnostic test mode and a backlit display that continuously displays 'Rate of Flow' and 'Total Volume'.

The converter shall be compatible with Microsoft Windows and other software programmes with built in terminal communication capabilities of RS 232/HART interface.

The converter shall be remotely mounted up to 200 m from the sensor, and shall be supplied with all calibration complete for desired requirements. Converter shall be supplied with a programmable low flow drop out and empty pipe zero return. The signal converter housing should be die-cast aluminum with glass window. The converter cum transmitter should be fully programmable from the front fascia.

The programming should be user friendly, self-prompting menu driven. The complete meter assembly and signal converter must be wet accuracy tested and calibrated as a unit near minimum, intermediate and maximum specified flow ranges of the meter (full range of flow). The volume of water used to conduct the test must be shown on a shipping tag attached to the meter. To calibrate these meters, only direct volume comparison calibration method should be used. The overall accuracy of the calibration rig should be at least three times better than the accuracy of the full bore electromagnetic flow meter. All the meters shall be calibrated for a minimum of 3 point. The magnetic flow meter should perform within the required accuracy of measured value without being affected by change in pressure due to demand fluctuation. The length of the sensor should be strictly as per ISO up to DN 600 mm and for other sizes it should be as per the standard.

To avoid ingress of water in the sensor housing, sensor has to be of fully welded construction. The maximum distance between flow sensor and the signal converter transmitter can be at 150 mtr. Supplier should give calibration certificate for all the flow meters. The flow meter should have grounding rings only.

Flow Sensor:

Type : Pulse DC excitation

System : Separate with cable output

Power Supply : 240 V AC, 50 Hz

End Connection : CS Flanges

Flange Rating : PN 10

Electrode : SS 316

Electrode type : Round Head Electrodes

Meter Tube : SS 304

Liner : Hard Rubber

Coil Housing : SS 304 with fully welded construction

Protection category : IP 68

Connection / Junction Box : SS 304

Earthing : Grounding Rings (Grounding Electrode Not acceptable)

Accuracy : ± 0.5 % of MV inclusive of linearity,

Repeatability, pressure effects and hysteresis

Marking : Flow direction with arrow, size Serial No. & make.

Flow Transmitter / Converter :

Type : Micro processor based & Modular

Mounting : Remote

Display language : English

Display Two line back lit LCD for indication of actual flow rate, forward, reverse and sum totalizer.

Empty Pipe Detection : Required.

Output : One current output (4 – 20 mA)

Protection Category : IP 68

Enclosure : Die cast aluminum with polyurethane finish With glass window

Programming : From front fascia through keypad / optical pin programming. Programming should be done without the opening of display cover.

Power Supply : 240 V AC, 50 Hz

Cable Gland : $\frac{1}{2}$ " NPT, 4 glands double compression type

Mounting : Wall Mounted

Interface : HART

Power failure mode : Provision of RAM /PROM to store parameter entered and measured flow data during power failure.

Separation : Up to 100 metres.

Terminal : Shock -Hazard - Protected push lock Terminal

Error identification : 0/3.6/22 mA

Interchangeability : Fully interchangeable with all the flow Sensors

These tests should be performed in the in-house laboratory of the meter manufacturer. The Employer will depute Third Party Inspection Agency to the meter manufacturing facility of the manufacturer to inspect the meter as per QAP approved by Engineer In charge. inspection charges and all other charges shall be borne by the contractor.

6.23.41 ITEM NO-41 ELECTROMAGNETIC FLOW METER WITH BATTERY OPERATED

Item includes:-

Providing installing Electromagnetic Flow Meters with cost of accessories required. Flow Meter are to be fixed for measurement of water flowing in & out of the distribution.

General Technical Specification & Conditions for Electromagnetic (Full bore) :-

1.1 PCMC has provided the size of pipe is indicative. The actual size, O.D.I.D., thickness shall be measured by Manufacture before supply of meter, any deviation and delay or damage cost due to non-fitting of meter shall be borne by Manufacture. The liquidity damage due to delay in fitting for wrong selection of fittings and accessories lies with Manufacture.

1.2 If there is any problem with ovality of pipes after the pipes are cut, the contractor as

per the relevant standards shall jack up the pipes and the jointing work shall be carried out.

- 1.3 The Manufacture will have a full system of local offices in India and full service capability in the Metro-cities throughout the country. Full contact details for key personnel, both national and local shall be furnished on request. The supplier shall provide evidence of at least five years involvement in the manufacturing of meters worldwide.
- 1.4 The sensor / transmitter cables shall be capable of withstanding the climatic condition as applicable at site and should be weatherproof. The cable shall be installed in a suitable uPVC duct to minimize the risk of damage during excavations for other works. All the cable laid at a minimum depth of 0.5 m below the ground. Maximum length between the sensor & the transmitter shall not be more than that recommended by the meter Manufacture.
- 1.5 The Electro magnetic battery operated flow meter shall have inbuilt integral maintenance free batteries with a minimum of 10 years life, on continuous operation and rated not worse than IP68 protection.
- 1.6 The portable devices shall be compatible to the logger & flow meters for the purpose of retrieving data and resetting the data loggers / meter as part of this contract. The portable download devices should be simple to operate, robust in construction. The portable download devices should be compatible for downloading the data to a desktop or laptop computers. Supply of portable download devices also includes supply of necessary programming and communication leads for connection with data logger and desktop / laptop computers. All the necessary software for downloading of data from logger to portable devices & software for download of data from portable devices to laptop / desktop computers to be provided by the contractor.
- 1.7 The flow meter shall be supplied with compatible features for "Gateway for Remote Monitoring of flow meter via Web Browsers". The system should enable remote monitoring, remote diagnosis and remote configuration of connected HART sensors/actuators, either via telephone lines (analogue and ISDN), Ethernet TCP/IP and mobile communications (GSM). The measured data shall be web-compatible.
- 1.8 All safety precaution with lighting protection shall be provided to all the flow meters, the failure / damage to flow meter for any reason for the warranty and period of annual maintenance contract shall be with Manufacture, hence, cost of insurance against all failure / damage (if any) shall be borne by Manufacture no additional payment will be made.

Full bore electromagnetic flow meter shall consist of flow sensor (i.e. flow tube), flow transmitter and flow indicator and integrator and any other item required to complete the system. To avoid the effects of disturbances in the velocity profile, a straight and uninterrupted run, upstream as well as downstream from the location of the flow meter shall be provided, as required by the flow meter manufacturer and in line with the applicable standards. Contractor shall finalize the exact location of flow meter in consultation with Employer's Representative.

Flow measurement shall not be affected by physical properties of water viz., temperature, pressure etc., within given limits. Contractor shall provide compensating electronic circuits, if required.

Contractor shall construct a suitable concrete chamber for enclosing flow meter if it is to be mounted on underground pipe lines. A concrete enclosure shall be constructed above the chamber for housing

the flow transmitter. For surface pipelines, a concrete cabin shall be constructed around the pipeline for housing the flow meter and the flow transmitter.

A lockable enclosure shall be provided for the flow transmitter cum computing unit. Flow meters shall be suitable for the water turbidity at site during various seasons. Flow tube shall be rugged in construction and shall be suitable for continuous operation. Flow tube shall have waterproof construction and shall be suitable for installation on underground /above ground pipe lines.

The flow computer and transmitter shall be a single unit suitable for field mounting. It shall accept inputs from flow tube process the signals and shall provide an output proportional to the flow rate. The output shall be suitable for transmitting over a long distance.

Full bore electromagnetic flow meters should be designed, manufactured and calibrated according to ISO:17025 standard. The flow meter shall be capable of measuring bi-directional flow. Meter shall be a velocity sensing electromagnetic type, microprocessor based signal converter, sealed housing, flanged tube meter for 1.0 MPa working pressure. The meter shall be manufactured to highest standard.

The meter shall be equipped with minimum six digit digital totalizes, reading in units of kiloliters and shall be accurate within 0.5% of true flow. The accuracy should be inclusive of linearity, hysteresis, repeatability and pressure effect. The meter assembly shall operate within a range of 0.3 m/sec to 4 m/sec and be constructed as follows:

Meter Tube (Sensor) shall be fabricated from stainless steel tube and use class ANSI / PN10 flat face carbon steel flanges in accordance with IS 1538. The internal and external of the meter tube shall be blasted to near white and lined with hard rubber and with drinking water approval for linear preferably by SBR or EPDM. Meter tube shall have a constant nominal inside diameter offering no obstruction to the flow.

Coil Housing: All flow meters within the premises of DAMs (for flow meters in submerged condition) should be fully welded to the tube providing completely sealed environment for all coils, electrode connections and wiring harness capable of submerged or buried operation. Coil protection shall be IP 68 only.

Upto 600mm dia. die cast aluminum epoxy coated / Stainless steel housing is acceptable.

Above 600mm dia. the housing should be Stainless steel only.

Signal Converter shall be pulsed DC coil excitation type with auto zeroing. The signal converter shall be remotely mounted away from the meter. The converter shall indicate direction of flow and provide a flow rate indication and a total of flow volume for both forward and reverse directions. The converter shall provide an isolated 4-20 mA output into minimum 500-ohm load and a frequency output of a maximum of 0-800 HZ and a scaled pulse output. The microprocessor based signal converter shall have a self-diagnostic test mode and a backlit display that continuously displays 'Rate of Flow' and 'Total Volume'.

The converter shall be compatible with Microsoft Windows and other software programmes with built in terminal communication capabilities of RS 232/HART interface.

The converter shall be remotely mounted up to 200 m from the sensor, and shall be supplied with all calibration complete for desired requirements. Converter shall be supplied with a programmable low flow drop out and empty pipe zero return. The signal converter housing should be die-cast aluminum with glass window. The converter cum transmitter should be fully programmable from the front fascia.

The programming should be user friendly, self-prompting menu driven. The complete meter assembly and signal converter must be wet accuracy tested and calibrated as a unit near minimum, intermediate and maximum specified flow ranges of the meter (full range of flow). The volume of water used to

conduct the test must be shown on a shipping tag attached to the meter. To calibrate these meters, only direct volume comparison calibration method should be used. The overall accuracy of the calibration rig should be at least three times better than the accuracy of the full bore electromagnetic flow meter. All the meters shall be calibrated for a minimum of 3 point. The magnetic flow meter should perform within the required accuracy of measured value without being affected by change in pressure due to demand fluctuation. The length of the sensor should be strictly as per ISO up to DN 600 mm and for other sizes it should be as per the standard.

To avoid ingress of water in the sensor housing, sensor has to be of fully welded construction. The maximum distance between flow sensor and the signal converter transmitter can be at 150 mtr. Supplier should give calibration certificate for all the flow meters. The flow meter should have grounding rings only.

Flow Sensor:

Type : Pulse DC excitation

System : Separate with cable output

Power Supply : 240 V AC, 50 Hz

End Connection : CS Flanges

Flange Rating : PN 10

Electrode : SS 316

Electrode type : Round Head Electrodes

Meter Tube : SS 304

Liner : Hard Rubber

Coil Housing : SS 304 with fully welded construction

Protection category : IP 68

Connection / Junction Box : SS 304

Earthing : Grounding Rings (Grounding Electrode Not acceptable)

Accuracy : ± 0.5 % of MV inclusive of linearity,

Repeatability, pressure effects and hysteresis

Marking : Flow direction with arrow, size Serial No. & make.

Flow Transmitter / Converter :

Type : Micro processor based & Modular

Mounting : Remote

Display language : English

Display Two line back lit LCD for indication of actual flow rate, forward, reverse and sum totalizer.

Empty Pipe Detection : Required.

Output : One current output (4 – 20 mA)

Protection Category : IP 68

Enclosure : Die cast aluminum with polyurethane finish With glass window

Programming : From front fascia through keypad / optical pin programming. Programming should be done without the opening of display cover.

Power Supply : 240 V AC, 50 Hz

Cable Gland : $\frac{1}{2}$ " NPT, 4 glands double compression type

Mounting : Wall Mounted

Interface : HART

Power failure mode : Provision of RAM /PROM to store parameter entered and measured flow data during power failure.

Separation : Up to 100 metres.

Terminal : Shock -Hazard - Protected push lock Terminal

Error identification : 0/3.6/22 mA

Interchangeability : Fully interchangeable with all the flow Sensors

These tests should be performed in the in-house laboratory of the meter manufacturer. The Employer will depute Third Party Inspection Agency to the meter manufacturing facility of the manufacturer to inspect the meter as per QAP approved by Engineer In charge. inspection charges and all other charges shall be borne by the contractor.

6.23.42 ITEM NO-42 MECHANICAL FLOW METER

Item includes providing & fixing the meter as per instruction of Engineer-in charge

The water meter shall be 80 mm to 150 mm nominal diameter Class B Bulk Water meters as per ISO:4064-1:2005 (E) (latest edition), BS 5728 and IS: 2373. Woltman type with removable mechanism, magnetic drive, dry dial, hermetically sealed register of IP68 protection class, Class-B water meters in any position, manufactured in accordance with ISO: 4064 standards & have EEC / MID pattern approvals & shall bear EEC / MID marking on meter dial for each size

The water meter will be used for measurement of cold, chlorinated water supplied to domestic / non-domestic consumers.

The water meters will be manufactured in accordance with ISO-4064, BS 5728 and relevant IS standards (IS2373) latest revision and specifications stipulated herein. In case of any discrepancy, the decision of Engineer shall be final and binding.

The meters must have protection rating of IP68 or higher.

The meters must be tamper proof and hermetically sealed with lockable plastic seals with copper wire provided by the water meter supplier. The bulk water meter shall not measure flow of air, if any. Recommendations shall be provided for ensuring such measurement.

The meter casing shall be Cast Iron/bronze and body shall be bronze/brass and shall be flanged at both ends. The meter body and cover shall be made from highest quality material ensuring resistance to corrosion. Meter body and cover are epoxy powder coated for protection from any environment.

The meter parts coming in contact with water shall not create hazard and must be corrosion proof to withstand upto 2 ppm of residual chlorine in water.

The meters shall withstand maximum working pressure upto 1.6 MPa and conform to testing as per ISO:4064/BS 5728 and IS 2373 latest revision.

The functional working pressure shall be as per the working pressure available in the pipeline.

The meter shall include the following accessories suitable for flanged connection:

Set of short pipes, dismantling Joints & adaptors with flange connection.

Cast Iron strainer with stainless steel strainer element at inlet of same size.

The length of meters shall be as per ISO 4064.

The meters shall have protective devices which can be sealed in such a way that before and after the water meter has been correctly installed, there is no possibility of dismantling or altering the water meter or its adjustments device without damaging the protection characteristics.

The meters shall have the following meteorological characteristics: Class 'B' as per ISO 4064. Imported water meters shall be EEC certified.

During Transportation for supply, the water meters shall be packed in containers or boxes containing meters as per manufacturer's recommended practice.

The meters shall have analogue / digital indicating device. The meters shall be designed to withstand accidental reversal of flow without causing any deterioration / damage to the water meters.

The water meters shall be designed for easy installation, easy disassembly and re-assembly without the application of special tools / gadgets.

The water meters shall be designed for intermittent flow. The installation consisting of flanged adapters, short pipe with flange, strainer, water meter shall be housed in a covered chamber. Mandatory straightening length at both upstream and downstream of the water meter as per standard practice of shall be provided.

The water meter shall be marked with the following identification: Size, class and type of water meter, ISO No., Year of Manufacture, serial no. make of water meter, country of manufacturer, Purchaser's name, direction of flow, rate of nominal flow and working pressure.

Sr.No	Item Description	Bid Requirement
1.	Type	bulk meter of EEC mark removable mechanism type
2.	Size & Quantity	50 mm to 300 mm as per contract specifications
3	Class of Accuracy	Class B
4	Manufacturing Standard	ISO 4064-1/2005 & IS 2373 with all amendments
5	Testing Standard	ISO 4064 and IS 2373
6	Pipeline / Watermeter orientation	Horizontal
7	Tamper proof watermeter	To be provided
8	Material of Construction	Body : Cast Iron Construction
9	Protection	IP68 or higher.
10	Flow Conditions :	
	Maximum Flow	As per ISO 4064 / IS 2373
	Nominal Flow	As per ISO 4064 / IS 2373
	Minimum flow	As per ISO 4064 / IS 2373
11	Pressure loss at nominal flow	As per ISO 4064 / IS 2373
12	Reverse flow	Reverse flow
13	Accessories :	
	Y type strainer	To be provided
14	Meter shall be pulse/ signal enabled for remote sensing in future	To be provided

6.23.43 ITEM NO-43 SENSOR / TRANSMITTER CABLE

Providing, laying and jointing with test and trail of sensor / Transmitter cable 4 x 0.38 mm PVC cable common, braided copper shield etc. Including all labour & material rate required to complete the job in all manner including all central and local taxes etc.

6.23.44 ITEM NO-44 COIL CABLE :-

Providing, laying and jointing with test and trial of COIL cable 3 x 0.75 mm PVC cable common, braided copper shield etc. Including all labour & material rate required to complete the job in all manner including all central and local taxes etc.

6.23.45 ITEM NO-45 GI DUCT :-

Providing and laying GI duct of 100 mm with all the necessary fittings, joints etc, for housing the cables between sensor and transmitter etc. including the cost of support excavation and refilling required Including all labour & material rate required to complete the job in all manner including all central and local taxes etc..

6.23.46 ITEM NO-46 PANEL CABINET :-

Item includes providing, fixing suitable designed panel cabinet at location decided by the engineer-in-charge with all duly precaution for safety of panel including the cost Fixing of flow meter transmitter to internal walls of inside suitable designed panel cabinet with proper locking arrangement with glass window on front door for seeing reading of flow transmitter and data logger without opening of panel cabinet. It should house complete ancillaries and including the provision of connection of electrical power supply from nearby apartments. The panel cabinet shall be pre wired and suitable gland entries etc. as per detailed specification.

Material & size of panel shall be first get approved from the Engineer in -charge

6.23.47 ITEM NO-47 CUTTING OF EXISTING PIPELINE :-

This item shall be executed for use of cut pipes in required length only when directed by Engineer in charge and after obtaining the permission from him. The burn left after cutting should be trimmed off by light grinding or by filing method. The chamfering of pipes shall conform to IS 12288 — 1987.

The chamfering shall be suitable for push on joints / mechanical joint without damaging the rubber gasket. The pipe after chamfering should be so smooth that enables to pushed in gasket for push on jointing. This item includes cost of all labour and tools required for executing the complete item.

6.23.48 ITEM NO-48 MECHANICAL JOINTS AND FITTINGS :-

Mechanical jiffy collar coupling should be of exact size, dia. and to the specifications and these jiffy fittings should be of standard quality and confirming to IS standards (preferably be purchased from authorized dealer)

Rubber Gaskets shall be as per IS specifications mentioned in the schedule.

Synthetic rubber ring dimension should be as per IS 12820 / 89 and quality should be as per I.S. 5382/1985 and suitable for jointing of D.I. pipes as per I.S. 8329-2000 or C.I. pipes as per I.S. 1536-2001. Mechanical joint Bends, Tees, Reducer, Adopter etc. shall be of exact size, dia degree and as per standard specifications.

The special shall be coated or protected from rusting and shall be suitable for D.I. pipes (as per IS 8329/2000) or C.I. pipes (as per IS 1536-2001).

Mechanical compression sealing flanged socket tail piece (Jiffy flange adopter) shall be of exact size and dia. to match D.I. pipes (IS 8329-2000). Mechanical Joint double socket reducer shall be as per IS 13382-1992 and suitable to D.I. pipes (IS 8329-2000) sealing gaskets of S.B.R. shall be as per IS 12820-1989.

This item includes providing of special transporting the special to site and testing. It also includes cost of entire jointing material, cost of specials, and nut-bolts etc. Only labour charges required for jointing shall be paid separately under relevant items of this tender.

6.23.49 ITEM NO-49 MECHANICAL JOINTS AND FITTINGS :-

For detailed specification please refer item no 48 above.

6.23.50 ITEM NO-50 RCC VALVE CHAMBERS :-

The work which shall be carried out as per Construction Specification contained in this section, involves construction of RCC manholes at site or prefabricated as instruction of site in charge.

MANHOLES:

RCC Chambers will be provided at where it necessary. However if required the same has to be provided in the road. This type of Chamber will be used when manholes are provided in footpath. RCC Chambers: the wall will be constructed in cast in situ RCC. The roof will also be heavy duty RCC slab in two halves.

Specification for Reinforced Cement Concrete Manholes:

- a) chambers, due to constraints of the location, may have to be constructed on the road. The wall, roof and floor thickness will be 15 cm. The Manhole chamber with above said measurement should be constructed with solid RCC blocks having 15 cm thickness / or with prefabricated CC structure. The top of the manhole should be covered with prefabricated CC structure. The top of the manhole should be covered with RCC slabs. The RCC slabs so covered should be flush with the level of the adjacent ground; footpath etc., the drawing for manhole may be referred.
- b) All chambers / manholes shall be made water proof using water proofing compound. Necessary care shall be taken at construction joints to make the jointing chamber water proof. Whenever required, special water proofing treatment like gunting chemical water proofing treatment, cement based water proofing treatment, polythene sheet water proofing treatment etc., may be resorted as per direction of Engineer-in-charge.
- c) The Manhole chamber with the said measurement should be constructed using reinforced cement concrete (RCC) casting. The tope of the manhole should be covered with RCC slabs of size 15cm (thick) × 40 cm (width).
- d) After excavation, bottom of the pit shall be leveled and shall be free from stones and other objects and obstructions. Necessary space shall be prepared to accommodate sump. 75mm

cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size) shall be laid in level as a base course. Over this 10 cm RCC with 1:1½:3 mix shall be laid with 6 mm rod and 10×10 cm grid.

- e) Curing of concrete: After the concrete hardens, it shall be protected from quick drying with moist gunny bags, sand or any other materials approved by Site Engineer. The curing shall be done for a minimum period of 5 days or as determined by the Site Engineer.
- f) Finishing chambers / pedestal: The internal faces of roof, walls and neck of chamber and exposed areas of pedestals shall be finished smooth with cement mortar 1:3 (1 cement: 3 coarse sand), finished smooth with a floating coat of neat cement.
- g) Finishing of outer surface of chambers: Finishing of outer face of the chamber shall be done with 12 mm thick cement plaster 1:3 (1 Cement: 3 fine sand).
- h) Finishing of floor of chambers: The floor of manhole / hand hole including sump shall be finished with 40 mm thick (av) cement concrete flooring by providing adequate slope.
- i) Fixtures pulling – in – eyelet: It shall be secured to the reinforcement bar in the manhole floor and embedded in such way that a pulling force of 3 Tones can be withstood. An eyelet shall always be provided for each duct nest assembly and placed in the center line of the duct at the opposite corner or rear corner in the base of the Chamber.
- j) Holding bolts for pedestals: These shall be fixed during casting of pedestals. To maintain their position, templates shall be used after obtaining their approval from Engineer-in-charge. (Modified & Amended)
- k) Vertical Racking: Regarding Vertical Racking arrangement:-
Vertical Racking arrangement has been changed. Ladder in minimum three steps may be provided for going inside & coming outside from the manhole using 12mm dia M.S. rod on smaller size of walls and on opposite side and fixing it in RCC (as per drawing given).

The arrangement for pipe openings shall be done

Frame and cover assembly: The frame for the cover shall be fixed as per standard drawings. The top level of frame shall be flush with road level or footpath level as the case may be.

Cover Lifting arrangement:

Cover lifting arrangement may be as per drawing given. 16mm dia rod of 40cm. in U shape at existing positions and a bowl of S.F.R.C iron of 10cm. dia is to be provided so that the cover may be lifted easily.

- l) Loading : The manhole cover and frame shall be able to withstand heavy duty grade of loading conforming to relevant IS Code, square type and shall be galvanized according to ISO : 1460 R & R 1461 or IS 4736.
- m) Manufacture: Chamber cover and frame shall be MS Galvanized. Channels for cover and frames shall be folded with MS Galvanized sheet as per direction of the Engineer-in-charge. The inner cover shall be filled with cement concrete 1:1:2 (1 Cement: 1 coarse sand: 2 graded stone).
- n) Marking: Each manhole cover and frame shall have a permanent marking sunk cast on them providing following information. Year of manufacture. Figure of PCMC emblem.

STORES TO BE PROCURED BY THE CONTRACTOR

All materials for use shall be new and duly tested as per approved standards and shall comply the material specifications. Where no spec. is specified, it shall conform to BIS/ISI/PWD standards.

Construction of chambers (manhole) should be done as per the specification at places as instructed by the Site Engineer. The cost shall be paid at, with count on basic unit. In case dimensional variation is required due to site condition, the payment will be proportional to the volume of chamber.

Specification for stone aggregates, coarse sand, fine sand

Stone aggregate : Stone aggregate to be used in the work shall be hard broken stone and shall be conform to PWD specification .

Coarse Sand: Coarse sand to be used shall conform to PWD specifications

Fine Sand: Fine sand for finishing to be used in the work shall conform to PWD specifications

Note : Where only one variety of sand is available, the sand will be sieved for use in finishing work as directed by the Engineer-in-charge in order to obtain smooth surface and nothing extra will be paid on this account.

TESTING OF MATERIAL: To have the quality control on the material used for construction OF manhole; Contractor will prepare Cubes of a size as desired by site in charge using the same material which is used for construction of manhole. These cubes will be sent for testing by an authorized testing laboratory for verifying the quality of material.

FINAL INSPECTION:

No work shall be treated as complete until acceptance testing and quality control checks are completed and found satisfactory. All the defects pointed out by Engineer-in-charge shall be rectified and go re-tested by the contractor at his own cost before the work is treated as

completed. The responsibility of non-clearing the defects and thus non-completion of work shall always rest with the contractor.

The rejection of the work shall be intimated to all concerned to ensure prompt action.

ENGINEERING INSTRUCTIONS:

A. SAFETY PRECAUTIONS WHILE CONSTRUCTION OF MAHNOLE:

GENERAL :

- I. Where a road or footpath is to be kept opened up in the course of work, special care shall be taken to see that proper protection is provided to prevent any accidents from occurring. Work shall be done in such a manner that it will not unduly inconvenience pedestrians or occupants of buildings or obstruct road traffic.

DANGER FROM FALLING MATERIAL:

- II. Care shall be taken to see that apparatus, tools or other excavating implements are not left in a dangerous or insecure position as to fall or be knocked into the trench thereby injuring any workmen who may be working inside the trench.

DANGER OF CAVE-IN :

- III. When working in deep trenches in loose soil, timbering up the side will prevent soil subsidence. The excavated material shall be kept far enough from the edge of the trench or pit. Vehicles or heavy equipment must not be permitted to approach too close to the construction site.

PRECAUTIONS WHILE WORKING ON ROADS:

- IV. The flags and the lamps shall be placed in conspicuous position so as to indicate the pedestrians and drivers of vehicles the full extent, i.e. both width and length of the obstruction. The distance between lamps or between flags shall not generally exceed 1.25 mtrs. along the width and 6 mtrs. along length of the obstruction in non-congested areas, but 4 metres along the length in congested areas. If the excavation is extensive, sufficient notices to give adequate warning of the danger, shall be displayed conspicuously not less than 1.25 mtrs. above the ground and close to the excavation.
- V. Where any excavation is not clearly visible for a distance of 25 mtrs. to traffic approaching from any direction or any part of the carriage way of the road in which the excavation is not clearly visible for a distance of 25 mtrs. To traffic approaching from any direction or any part of the carriage way of the road in which the excavation exists, a warning notice shall be placed on the

kerb or edge of all such roads from which the excavation is not visible. Such warning shall be placed at a distance of 25 mtrs. From the excavation or as near the distance as is practicable but not less than 10 mtrs. From the junction of an entering or intersecting road with in the road in which the excavation exists.

- VI. All warnings, in these cases shall have a red back ground and shall be clearly visible and legible. All warning lamps shall exhibit a red light, but white lights may be used in addition to facilitate working at night. Wherever required a passage for pedestrians with foot bridge shall be provided. At excavations tools and all materials likely to offer obstruction shall be properly folded round and protected.
- VII. While permission for manhole work will be taken by PCMC but the manhole should be properly covered while no work is going on to avoid any accident. Contractor shall be solely responsible in case of laxity on his part.
- VIII. Contractor shall provide the caution board of appropriate size at his own cost on all the sides of the manhole stating "Caution, PCMC manhole work is progress."

DAMAGE TO UTILITIES:

- IX. The damage to the exposed utilities shall be contractor's responsibility. Round the clock safety of utilities shall be sole responsibility of the contractor and the damage cost shall be deducted from the contractor. While constructing manholes the utilities should be properly accommodated in manholes.

TRAFFIC CONTROL:

- X. The Police authorities are normally responsible for the control of traffic and may require the setting up of traffic controls to reduce the inconvenience occasioned by the establishment of a single line of traffic due to restriction in road width or any other form of obstruction caused by the work. As far as possible, such arrangements shall be settled in advance. If there are any specific regulations imposed by the local authorities, these shall be followed. For control of traffic if any liaison with local bodies/ Police is required it will be managed by the Contractor.

IMPORTANT INSTRUCTIONS FOR RCC MANHOLE:

1. The size of the RCC Manhole (LxBxH) is Internal Dimensions
2. The size of the RCC MH Cover (LxBxH) is Internal Dimensions
3. The RCC MH Cover reinforcement & cement concrete Mixture 1:1:2 (1-Cement, 1-Coarse Sand, 2-Graded stone of aggregate 2.5mm nominal size with 12mm reinforcement and 10x10 cm grid.
4. The internal faces of roof/walls and neck of chamber and exposed Areas of Pedastals shall be finished smoother with cement mortar 1:3 (1-Cement: 3-Coarse Sand) finished smooth with a floating coat of neat cement.

5. Finishing of outer face of the chamber shall be done with 12mm thick Cement plaster 1:3 (1-Cement: 3-Fine sand).
6. The floor of Manhole shall be finished with 40mm Thick (av.) cement concrete flooring by providing adequate slope.

6.23.51 ITEM NO-51 C.I. STRAINER "T" (Basket) type :-

Item includes providing & fixing C.I. Strainer "T" (Basket) type with flanged ends and stainless steel or brass mesh with opening of 2.5 mm to 3mm and suitable for operating pressure of 16 kg/cm².

6.23.52 ITEM NO-52 PROVIDING AND INSTALLING DOMESTIC METER

Domestic Type Water Meter – (without remote reading facility)

Scope:

Providing, installing and giving satisfactory field testing of Domestic water meter 15 mm size, brass body, horizontal inferential multijet type , magnetic drive with anti-fraud shield and dry dial with IP 68 .Totalizer of meter shall be made of copper can or any other suitable anti corrosive metallic material required to maintain IP68 protection class, suitable for ambient 50° C Temperature duly sealed against tampering complete with couplings at both ends and confirming to ISO 4064 : 2005 with valid CE mark mentioning notified body number along with MID / OIML / EEC certification from a recognised International laboratory with facility for wireless AMR compatibility.

Meter must have the Endurance / Life Cycle test certificate from FCRI, manufacturer's test report and 60 month manufacturer's warranty certificate

TECHNICAL SPECIFICATION FOR METERS:

Applicable Standards:

Water meter 15 mm size, brass body, horizontal inferential multijet type , magnetic drive with anti-fraud shield and dry dial with IP 68 .Totalizer of meter shall be made of copper can or any other suitable anti corrosive metallic material required to maintain IP68 protection class, suitable for ambient 50° C Temperature duly sealed against tampering complete with couplings at both ends and confirming to ISO 4064 : 2005 with valid CE mark mentioning notified body number along with MID / OIML / EEC certification from a recognised International laboratory with facility for wireless AMR compatibility.

The manufacturing plant in India must have the valid EEC / MID certification form recognized International body. Valid EEC / MID certification to be submitted along with bid documents for evaluation.

The meters shall be supplied complete with brass nuts and brass nipples. Strainer & sealing shall be provided as per relevant IS provision.

Material of construction

The manufacturer shall provide specific details of materials used for various parts of the meter which must meet the specifications for the material of construction of the individual parts of the meters as per IS 779:1994 (latest amendments) or ISO 4064

- A) The body of the meter shall be of Brass. The firm shall specifically mention in the offer, the metal used in manufacturing. Material that come in contact with the water supply shall withstand 2 ppm (parts per million) of chlorine residual in the water supply and shall be resistant to corrosion.
- B) The water meter and accessories shall be manufactured from materials of adequate strength and durability. The materials, which come in contact with the potable water, shall not create a toxic hazard, shall not support microbial growth, and shall not give rise to unpleasant taste or discoloration in the water supply. However, the spindle and bearings inside the hydraulic chamber shall be made of polished stainless steel with hard metal tip/ sapphire.
- C) An anti-fraud shield of stainless steel is mandatory to avoid magnetic tampering on meter or to protect the magnetic transmission
- D) The internal pressure cup shall be made of Engineering plastic. The lower case of the meter shall be painted with thermal painting externally. The painting materials should be safe for human uses and not affect human health.
- E) Meter will be provided with monolithic plastic seal with copper/SS wire or Rust proof sealing wire
- F) Impeller and Impeller Chamber:-The pivot of the impeller should be guaranteed against any corrosion or damage for at least Five years after the first installation. The impeller chamber shall be resistant to corrosion.
- G) Seal: - The meter shall be sealed by the manufacture before delivery and shall be provided with a hole for sealing the meter with the service valve on the inlet side of the meter. Additional seals to be provided at adjacent check nuts with meter so as not to be tempered against flow direction.
- H) Each meter should be supplied in separate individual box with its accessories and test certificates and guarantee card for free repair/ replacement for duration of 5 years. The no. of individual boxes of meters shall not exceed 30 nos in each cartoon.
- I) Supply shall be made strictly as per the sample meters including the weight as approved by the Board after testing at National Physical Laboratory or at Fluid Control Research Institute, Kerala.
- J) Minimum three meters shall be sent for testing at FCRI from each batch of supplied meters before installation at site

Markings On The Body Of The Meter:

Marking on dial/ cap.

- i) Class "B"
- ii) Multijet/ Model Name
- iii) As per ISO 4064
- iv) EEC/OIML/MID Mark and approval no.
- v) Make/Brand
- vi) Sr. No. / Year of Manufacture.
- vii) Size
- viii) Direction of flow of water on both sides of the body of meter.
- ix) NAME OF PCMC

1.5 The Register and Register Shield:-

The Register shall be designed in such a way that if the Register protective glass is broken for a reason or another the Register cannot be removed from its place. The Register

protective cover shall be made of mineral glass and shall have a thickness of not less than 5mm and shall pass specified tests.

1.6 Register:-

- A] It shall be of straight reading type
- B] The Register shall register in cubic meter units
- C] The Register reading should be less than 1KL when supplied
- D] The Register shall consist of a row of at least 5 in-line consecutive digits to denote minimum reading of 99999 KL.
- E] Another two digits or pointers shall register flows in litres and should be of a different colour.
- F] The Register should be of closed type.
- G] The Register must be suitable for test on an electronic test bench.
- H] The totaliser can shall be made of copper having 5mm thickness mineral glass cover or any other anticorrosive metallic material.(required to maintain IP 68 protection class.)

Metrological Characteristics:

The meter's performance shall be as per IS 779 or ISO 4064

Pressure and temperature –

The mechanical water meter working pressure shall be at least 10 bar, the testing in accordance with ISO 4064. The meter shall be capable to operate in an ambient temperature of up-to 50⁰C.

Pressure loss

through mechanical water meter shall not be greater than 0.25 bar at Q_n and 1.0 bar at Q_{max}

Endurance Test –

The meters proposed should possess successful Lifecycle/Endurance Test Certificate as per IS 779 /ISO 4064 from Fluid Control Research Institute, Kerala.

Weight-

Variation in weight of the meter will be permissible to $\pm 5\%$ of the weight indicated by the bidder in his technical bid.

Packing –

Each meter should be supplied in separate individual box with brass nuts - nipples and test certificates. The no. of individual boxes of meters shall not exceed 30 nos. in each carton.

These tests should be performed in the in-house laboratory of the meter manufacturer. The Employer will depute Third Party Inspection Agency to the meter manufacturing facility of the manufacturer to inspect the meter as per QAP approved by Engineer In charge. Inspection charges and all other charges shall be borne by the contractor.

6.23.53 ITEM NO-53 PROVIDING AND INSTALLING DOMESTIC CUSTOMER FULLY AMR METERS

Providing, installing and giving satisfactory field testing AMR WATER METER SPECIFICATIONS

Meter shall be manufactured as per ISO 4064 standards & have European Economic Council (EEC) or International Organization of Legal Metrology (OIML)/MID pattern approvals & shall bear EEC marking on dial of water meter for each size.

1. The water meters of domestic sizes shall be equipped with RF based AMR technology, directly fitted on the water meter & wireless, , multi-jet, inferential type, dry dial, MID approved water meters .
2. Water meters of each size should have been duly tested and passed as per the relevant standards and specifications from Fluid Control Research Institute (FCRI) Kerala for performance test supported with test certificate.

Applicable Standards:

Water meter straight reading means – 15mm size domestic water meters, inferential type, multi jet, magnetically coupled, having dry dial, Class 'B' conforming to IS-779: 1994 with up to date amendments or ISO 4064:1993 standard with EEC/OIML/MID certification mark shall be with protection class of IP-68.

The meters shall be supplied complete with G I fittings, brass nuts and brass nipples. Strainer & sealing shall be provided as per relevant IS provision.

Material of construction:

- a) The manufacturer shall provide specific details of materials used for various parts of the meter which must meet the specifications for the material of construction of the individual parts of the meters as per IS 779:1994 (latest amendments) or ISO 4064: 1993.
- b) The body of the meter shall be of either Brass or Bronze. The firm shall specifically mention in the offer, the metal used in manufacturing. Material that come in contact with the water supply shall withstand 2 ppm (parts per million) of chlorine residual in the water supply and shall be resistant to corrosion.
- h) The water meter and accessories shall be manufactured from materials of adequate strength and durability. The materials, which come in contact with the potable water, shall not create a toxic hazard, shall not support microbial growth, and shall not give rise to unpleasant taste or discoloration in the water supply. However, the spindle and bearings inside the hydraulic chamber shall be made of polished stainless steel with hard metal tip/ sapphire.
- i) The internal pressure cup shall be made of low-ferrous brass not exceeding 0.02% Fe contents / Engineering plastic. Furthermore the internal pressure cup should overlap the meter body. The lower case of the meter shall be painted with thermal painting externally. The painting materials should be safe for human uses and not affect human health (Health certificates should be included in the bidding documents). The painting colour shall be decided in consultation with the department after order of award.
- j) Variation in weight of the meter will be permissible to $\pm 5\%$ of the weight indicated by the bidder in his technical bid.
- k) Each meter should be supplied in separate individual box with its accessories and test certificates and guarantee card for free repair/ replacement for duration of 5 years. The no. of individual boxes of meters shall not exceed 30 nos in each cartoon.
- l) Supply shall be made strictly as per the sample meters including the weight as approved by the Board after testing at National Physical Laboratory or at Fluid Control

Research Institute, Kerala.

- K) Minimum three meters shall be sent for testing at FCRI from each batch of supplied meters before installation at site

Markings On The Body Of The Meter:

(a) Marking on dial/ cap.

- i. Class "B"
- ii. Multijet/ Model
- iii. Magnetic Type
- iv. As per IS: 779-1994 OR ISO: 4064-1993.
- v. ISI OR EEC or MID/OIML Code No.
- vi. Make/Brand
- vii. Sl.No. / Year of Manufacture.
- viii. PCMC

(b) Embossing/ engraved on meter body.

- i. 15 mm
- ii. Direction of flow of water on both sides of the body of meter.

The Totalizer and Totalizer Shield :-

The totalizer shall be designed in such a way that if the totalizer protective glass is broken for a reason or another the totalizer cannot be removed from its place. The totalizer protective cover shall be made of sturdy glass and shall have a thickness of not less than 5mm and shall pass specified tests. Sturdy glass is defined as the ability of the counter protection glass to withstand, without damage, a free fall of a metal ball weighing 27.2 grams from a vertical distance of not less than 70 cm or sturdy Engineering plastic window subject to clear visibility till end of contract period guaranteed by bidder may be allowed.

Totalizer :-

- A] It shall be of straight reading type
- B] The totalizer shall register in cubic meter units
- C] The totalizer reading should be less than 1KL
- D] The totalizer shall consist of a row of minimum five on-line consecutive digits to read at least 99,999 m³.
- E] Another three digits or pointers shall register flows in litres and be of a Different colour.
- F] The totalizer should be of closed type.
- G] The totalizer must be suitable for test on an electronic test bench.
- H] Totaliser shall be made of copper CAN having 5mm thickness mineral glass or any other Suitable material required to maintain IP 68 protection class.
- I] Meter will be provided with monolithic seal with copper wire.

AMR SYSTEM

1. The water meters shall have the anti – magnetic properties / immunity, as specified in ISO: 4064 – 2005, when tested with 400 gauss magnet is mandatory. For AMR system resistivity against application of magnate is not required
2. The remote reading of AMR water meter needs two way communications without affecting battery life and reading perforations throughout O&M period.
3. The remote readings of AMR water meter should be obtainable by either 'Walk by' or 'Drive

by' methods.

4. The AMR trans-receivers shall be wireless and have IP 68 protection class i.e. no ingress of water after submerging AMR water meter for 48 hours under 3 meters of water column.
5. The AMR trans-receivers shall be used (RF End units/ Wireless RF transmitter/Receiver) for communication and remote reading. If the water meter & AMR trans-receivers are independent units then they must be from the same manufacturer
6. AMR shall be obtainable even under submerged conditions.
7. Remote readings of different water meters shall be obtained with single command. The remote readings shall have instant reading facility. The remote readings and dial readings of water meters shall match at all the times.
8. All A. M. R. readings shall show the date and time of the reading recorded.
9. The AMR system shall have facility to detect the reverse flow in water meters readings on the Hand Held Device (HHU) i.e. AMR reading device and on computer screen.
10. The AMR system shall have the facility to record the abnormalities like application of very high consumptions, water leakages etc. along with necessary alarms in HHU and in software
11. The battery life of AMR water meter shall not be less than 7 (seven) years from successful installation of said AMR water meter along with its AMR system, the battery life shall be calculated by considering the monthly remote reading. During remote reading the battery life of AMR water meter shall be displayed / indicated on HHU.
10. If the AMR communication frequency is using / operating on paid frequency band, then the AMR water meter manufacturer has to produce the valid copy of license issued by Govt. of India / Deptt. of Telecom (DOT), for using the said operating frequency band. The cost of the same will be presumed as included in the quoted rates.
12. The technically qualified bidders shall obtain license for using frequency band to conduct the demo in the area of demonstration. The bidder will have to start the demonstration within 10 days of submission of bids and hence they would be allowed to produce the certificate till such time.
13. The AMR water meter shall not get affected for its AMR functioning due to High Tension or High Voltage line concentration.
14. All the time electronic index of the water meter shall match with mechanical index.
15. All water meter shall be fitted with RF based wireless remote trans receivers for AMR reading. It shall be either inbuilt or directly fitted on the water meter without wires.
16. The water meters fitted with A.M.R. shall have the facility to transmit reading in maximum submerged condition (as specified for IP-68 compliance)& the remote readings should be obtained outside the meter chamber, with water meter in submerged condition & lid of the chamber closed.
17. The manufacturer shall specify the frequency of the AMR operating system & shall possess the necessary license of said operating frequency, as per norms of Department of telecommunication, Govt. Of India issued by Government of India (GOI) / Department of Telecom (DOT). In case, if he claims frequency of the operation in the free band, necessary documents / clearance from GOI / DOT shall be submitted, along with the offer. However, the Utility reserves the right for acceptance of offered frequency & Power subjected to the guidelines issued by DOT / WPC.
18. AMR system should be compatible for up gradation to fixed net work if required in future.

Lab Testing:

The lab testing shall include following tests as per ISO:4064:2005 standards . The same will be conducted at FCRI, Palghat.

- i. Accuracy testing of water meters at Qn.
- ii. Accuracy testing of water meter at Qn after clamping the magnet on the water meter.

- iii. IP 68 testing of water meter & AMR system.
- iv. Remote reading of water meter in dry i.e. open air condition.
- v. Remote reading of water meter in submerged condition i.e. under water, with under variable water depth conditions.
- vi. Remote reading with different tamper alarms for back flows, magnet and physical damage, etc.
- vii. Response time of AMR reading on HHU.
- viii. Visual inspection of AMR water meter and its AMR system along with its software.
- ix. Real Index test i.e. all the time electronic index of the water meter shall match with mechanical index.
- x. Demonstration of uploading of readings from hand held unit to PC and vice versa.
- xi. Life cycle and endurance test.

These tests should be performed in the in-house laboratory of the meter manufacturer. The Employer will depute Third Party Inspection Agency to the meter manufacturing facility of the manufacturer to inspect the meter as per QAP approved by Engineer In charge. inspection charges and all other charges shall be borne by the contractor.

6.23.54 ITEM NO-54 PROVIDING AND INSTALLING WOLTMAN TYPE AMR BULK WATER METER

Item includes providing and fixing Woltman type AMR bulk water meter, Cast Iron Body (FG 260) magnetic drive, dry dial, hermetically sealed register of IP68 (Totalizer of meter made of copper can / suitable anti corrosive metallic material required to maintain IP68 protection class) protection class with removable mechanism and be fitted with a low mass rotor which is parallel to the direction of water flow and exhibits dynamic thrust relief, conforming to ISO 4064:2005 with valid CE mark mentioning notified body number on meter dial for each size, along with MID / OIML certification from a recognized International laboratory,

For detailed specification please refer item no 53 above.

6.23.55 ITEM NO-55 HAND HELD UNIT

Item includes :- Supply, installation of Hand Held Unit along with license copy of HHU Software for data collection complete with RF transceiver

1. The hand held device or reading device shall have the sufficient memory for storage of maximum data / reading along with sufficient power back up.
2. The HHU or reading device shall have the onsite search facility, to locate the exact physical location of water meter in particular area and to obtain the corresponding details of it.
3. The HHU or reading device should be adjustable back light, sun light readable, colour display and touch screen.
4. The HHU or reading device shall have minimum 64 MB flash memory and 128 MB RAM.
5. The battery of HHU or reading device shall give power back up for at least 5 hours continuously.
6. The HHU or reading device must be ergonomically designed to be comfortable for handheld meter reading.
7. The handheld must come with an integrated intelligent fast charge capability that

- allows full charge within 5 hours.
8. The hand-held must have a 3G/GPRS connectivity for real-time data communication with central server software and integrated Global Positioning System (GPS) for route monitoring and configuration.
 9. HHU software should have at least three different level of security.
 10. The hand-held must have integration with Global Positioning System (GPS) for route monitoring and configuration.
 11. The read-out device should be connected to the Hand held device and needs to be USB powered.
 12. The quantity of HHU in BOQ has been considered @ 1 HHU on every 54000 AMR water meters

6.23.56 ITEM NO-56 WEB BASED AMR SOFTWARE

Item includes :- Supply & installation of License copy of web based AMR Software and One time implementation charges for maximum 1 Lakh end points

1. The software shall give output, at least in XML/CSV/XLS format and the data should be in standard format compatible to the utilities RMS system.
2. The Route Management software must be capable of running on a standard PC compatible with minimum Pentium processor; in addition the software must run under Windows95, Windows XP Professional, Windows Vista, Windows 7, windows 8 and / or latest version of windows operating system.
3. The software shall allow the PC operator to review and edit any account in Route Manager database. Also, the PC operator shall be able to generate route and activity reports. The 90 days historical data should be available in the route as well as the data along with historical data in the output in the XML/CSV/XLS format compatible to utilities billing system without affecting the system performance throughout project period.
4. The software shall alert the meter reader for unread accounts in that route.
5. The software shall enable the user to specify the data to be exported from the database for transferring to billing system.
6. The software shall take routes from an existing database for loading into a reading device.
7. The software shall select the routes to be read, and assignment of routes to a reading device and dynamic updating of routes and sub-routes to be enabled.
8. The software shall upload routes from the reading device.
9. The software shall post the reading from the reading device onto appropriate accounts within the database.
10. Software shall be able to set meter status such as , meter not okay, reading not reliable, meter maintenance required etc
11. The GPS coordinates can be visualize in the PC software itself.
12. The software must have web portal access, so that user can view customer data (address, meter details, meter reading) through web browser. Also it should have analysis facility of meter data.
13. Addition to above specification, software should have facility for individual customer's to view their meter consumption data through web portal.

ADDITIONAL SPECIFICATIONS:

1. HHU should have at least three different levels of security or as directed by Engineer -in charge.
2. In case of AMR reading, if reading not captured due to some reason, HHU should have capability to record to data manually along with route data to be downloaded with notification of cause of manual reading.
3. Different type of indications such as read meter/unread meters/meters to be read, meters read with observations , meter with alarm, unreadable meters/meter not okay, reading not reliable, meter maintenance required should appeared on HHU & BCS.
4. Since HHU integration for route monitoring and configuration is required, bidder should adopt off field method. However field experience should also be utilized to optimize the grouping of meters. HHU should also have the facility to create route, modify route on site and to arrange in desired sequence as per site conditions.
5. HHU should be a single unit with required storage capacity and capable to receive required data from already defined numbers of installed meters through radio frequency and to download the same to the base computer.

6.23.57 ITEM NO-57 PROVIDING PRESSURE REDUCING VALVES

ITEM INCLUDES :- Providing Valve of approved make from PCMC

The Pressure Reducing Valve shall reduce higher pressure to lower preset downstream pressure regardless of fluctuating demand or varying upstream pressure head.

Main Valve:

The main valve shall be a center guided, diaphragm actuated globe valve of either oblique (Y) or angle pattern, design. The body shall have a replaceable, raised, stainless steel seat ring. The valve shall have an unobstructed flow path with no stem guides, bearings, or supporting ribs. The body and cover shall be ductile iron. All external bolts, nuts, and studs. shall be Duplex coated. All valve components shall be accessible and serviceable without removing the valve from the pipeline.

Actuator: The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall be center guided by a bearing in the separating partition. The replaceable radial seal disk shall include a resilient seal and shall be capable of accepting a V-Port Throttling Plug by bolting.

Control System: The control system shall consist of a 2-Way adjustable, direct acting, pressure reducing pilot valve, a needle valve, isolating cock valves, and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested and factory adjusted to customer requirements. The required numbers of switch/contacts meet requirements for PLC system.

Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard. The main valve shall be certified as a complete drinking water valve.

Material of construction :

Body, Cover & Stem Cap in Ductile Iron ASTM A 536 65/45/12. Stem, Seat Ring, Spring of SS: 316. Diaphragm, Seals, O-Rings EPDM/Buna N. The Valve body will be straight type and not Y type. The SS: 316 Seat Rings shall be guaranteed for life of the Valves for potable water use only. The Valve shall have

removable Stem Cap for in line inspection and easy maintenance. The painting shall be NSF 61 fusion bonded epoxy coating safe for drinking water. All external fasteners shall be SS: 304.

The valves shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC, the charges for the same shall be borne by the contractor

6.23.58 ITEM NO-58 ALTITUDE VALVE

ITEM INCLUDES :- Providing and fixing Valve of approved make from PCMC including the cost of 2 isolation DI Valve on upstream & downstream of Altitude Valve

Altitude Control Valve for maintaining water level in the reservoir and reducing NRW on account of over flowing. Models 106-A-Type 4 - One-Way type. Fully mechanically operated without any level sensors/PLC etc.

Functions :

Closes on high reservoir level (FSL). Opens when reservoir level drops a set (Adjustable) amount (RL/LDL).

Material of construction:

Body, Cover & Stem Cap in Ductile Iron ASTM A 536 65/45/12. Stem, Seat Ring, Spring of SS: 316. Diaphragm, Seals, O-Rings EPDM/Buna N. The Valve body will be straight type and not Y type. The SS: 316 Seat Rings shall be guaranteed for life of the Valves for potable water use only. The Valve shall have removable Stem Cap for in line inspection and easy maintenance. The painting shall be NSF 61 fusion bonded epoxy coating safe for drinking water. All external fasteners shall be SS: 304.

The valves shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC, the charges for the same shall be borne by the contractor

6.23.59 ITEM NO-59 DESIGN, SUPPLY, INSTALLATION, TESTING, INTERFACING, INTEGRATION OF PLC AND COMMISSIONING OF SCADA SYSTEM SOFTWARE

The scope of the works includes design, manufacture, testing at works (FAT), supply at site, storage at site, installation / erection, testing, commissioning, programming, integrating with existing systems, providing, field testing (SAT) and development of integrated SCADA server and Monitoring system consisting of Central SCADA with cloud server facility, PLCs at various locations with HMIs, flow meters, pressure transmitters, chlorine analysers and automation of valves through actuator control within 40% water supply distribution network of PCMC.

General Description of Proposed System

The Telemetry / SCADA specified herein shall be designed, manufactured, installed, tested and shall provide along with the following functions:

- To provide central monitoring system and Master Control Centre to collect, store, control and monitor the Water Distribution Management System (WDMS) for all ESRs/ GSRs covering 40% project area water supply components.
- To monitor Real-time water distribution & management process
- To perform calculations based on sensor and manual operator data inputs.
- Store and retrieve all the information of each locations.
- Compile and prepare daily, weekly and monthly reports for water & energy and as directed by engineer in charge.
- Provide mimic / graphic display to indicate water supply and distribution system through extensive graphics support, which also reduces the learning curve of an average operator. All the data logged at central server shall be analysed through representation of this data in various meaningful user defined graphs, trends and customized analytical requirements of the system.

All the required field instruments to measure flow, level and pressure, residual chlorine shall be provided, calibrated, tested and installed. The signals from the field instruments both existing and newly proposed instrumentation shall be wired to the PLCs with necessary programming etc. Complete for further communication and data integration with Central SCADA Server software.

The system shall be open system architecture utilizing standard operating and communication systems like GPRS. The system supplier shall provide documentation of successful field performance of the proposed system, including hardware and software applications. Unproven or proprietary systems shall not be acceptable.

The SCADA System project Plan

The contractor is expected to personally visit, inspect and collect all the required field details personally and include in the scope of work all the components that may be required to make the system fully operational.

It shall provide an overview of the proposed system including systems architecture, diagrams, the approach to work, the proposed work schedule (Bar chart) indicating milestones and potential meetings, project personnel while submitting the System Improvement Plan (SIP) for approval of Engineer. It shall also include the project timelines for implementation of proposed central SCADA system and monitoring system with details of schedules which shall illustrate all major project milestones including the following:

1. Schedule for all subsequent project submittals.
2. Tentative dates for all project meetings.
3. Schedule of manufacture and staging of all instrumentation and control system equipment.
4. Schedule for Factory Acceptance Test.
5. Schedule for shipment of all instruments and control system equipment all peripheral devices.
6. Schedule for equipment start up.
7. Schedule Field Acceptance Test.
8. Schedule for all Training.

The Contractor should take note of the importance of this obligation and perform assessment of the system and objectives envisaged under this project.

Contractor shall be responsible to provide the following;

- a) Layout drawings for each piece of equipment fabricated or assembled by the Contractor, showing the position of each component with required clearance where applicable, and with overall dimensions.
- b) Wiring diagrams indicating each component of the system and all wiring and cabling thereto, showing manufacturers, types, duties, ranges and nomenclature, referencing the P&I diagram where applicable, with inputs, output, cable wiring and terminal identifications clearly marked.
- c) PLC IO instrumentation drawings, cable along with sizings and cable layout trenches as per site condition.
- d) Communication details / protocol details for all communicating instruments viz. PLC, GPRS telemetry, SCADA, etc. shall be provided.
- e) Mimic video displays in the form of hard copies or photographs which are clearly legible and are notated to indicate dynamic data and control pick points where applicable.
- f) Control video displays in the form of hard copies or photographs which are clearly legible and are notated to indicate dynamic data and control pick points.
- g) Complete input and output list giving type, circuit number, tag name, short description, outstation, database reference, associated field device, range (if applicable), critical/non-critical alarm status and the like.
- h) Description of quality control methods and approvals.
- i) Calibration certificates for all the instruments along with test procedures.
- j) Detailed works and acceptance test procedures.
- k) Programme for manufacture, delivery, installation and commissioning.
- l) Appendices, as necessary, to include manufacturer's literature for each item of equipment supplied.
- m) Operation and maintenance manuals detailing the following:
 - General description and operating principles;
 - Technical description of the equipment – manufacturer's standard brochures only being acceptable if the particular item of equipment described is clearly designated, adequate information is supplied, and irrelevant information is deleted or otherwise delineated;
 - Complete operating instructions defining the sequence of operation, including flow charts;
 - Procedures for dismantling, cleaning, servicing, replacing parts and reassembling, including recommended clearance and tolerance;
 - Details of all instrument and equipment settings as applicable to this contract;
 - Maintenance and lubrication schedules;
 - Fault diagnosis procedure;

- Dated and priced list of significant spare parts and special tools, including identification numbers and sources of supply;
- Simplified arrangement drawings showing all components of the equipment.

n) General operating manual comprising the following:

- General description and operating principles;

Operating instructions for normal procedures in a step-by-step format including control operations, requirements for display or printing of data, performance monitoring, response to alarms or failures, changing of operational parameters, and manual data entry.

Equipments / Instrumentation/ Software, SCADA etc. Shall be provided as per Approved Make specified at Annexure-1 of this document

SCADA PC Consol

The local SCADA System shall be located in the control room to be set up by contractor within project area or location specified by Engineer. The system shall have all the facilities such as communication ports and modules for interfacing, data recording and display with the Central Monitoring System at control room of proposed SCADA & Monitoring System. Contractor shall provide all the required furniture for the PCs & system with air-conditioning unit.

SCADA Pc configuration:- Reputed make Industrial grade PC with latest i5 series, 3 GHz or above, 4 MB L@ cache, 8GB RAM, 1000 GB HDD, 10/100 Ethernet, Keyboard, optical Mouse, 1.44 MB FDD, CD/DVD ROM, DVD writer, Windows latest operating software with commercial grade LED monitor not less than 50" etc. and all required accessories. The Contractor shall supply and install all necessary cables, and connectors, UPS (Power supply backup) etc.

SCADA Server & Softwares

The contractor shall supply all programming (PLCs) and SCADA software's necessary to provide a fully debugged water distribution management system (WDMS) and control operation of valves actuators. SCADA System shall communicate with field PLC through GPRS for data and information. The software required shall consist of those programs necessary for the system to efficiently perform the functions specified herein, plus enable convenient and efficient preparation of new programs. The system shall be capable of operating in a foreground/background mode. The contractor shall assume complete responsibility for the successful operation of all software and application programs provided as part of the system. All programs can be completely debugged and operable prior to delivery of the system. The PCMC shall not be required to expend any programming effort in order to achieve a fully operational system.

Operating system, database software, monitoring & display software, water distribution planning software etc. and all other required peripherals shall be provided under this contract for achieving required functionality of the SCADA system.

The central processor shall be provided with self-test diagnostic routines, which are automatically executed every time the processor is powered up or the bootstrap routine is initiated. The Contractor shall supply and install all necessary cables and connectors etc.

It is under the scope of this contract that the contractor shall provide the web enabled facility/ cloud server facility for server data of whole Central monitoring System including internet facility and

necessary communications. PCMC users can be able to access this data with user name and password facility. Contractor shall maintain the website through entire operation & maintenance period and store the data up to the complete contract period.

SCADA Integration

The new SCADA software shall be compatible to connect with the existing SCADA system to retrieve the relevant data of the existing system. The required hardware/software/interfacing devices/cabling/licenses required for establishing a seamless channel for communication shall be in the scope of the bidder.

The bidder is required to understand the existing SCADA of PCMC at the time of bidding and will understand the integration requirements.

End User Interface

There shall be three levels of End user Interface

j) Central Monitoring Station

The Central Monitoring Station shall have the following main components

1. Screens to display the layout schematic of the system as per actual configuration on the field
2. Online and historical trends plotted with respect to benchmark graphs. The benchmarks are to be arrived at using practical data over a reasonable period of time
3. Settings screen for important parameters like timing, pressure and flow, residual chlorine
4. User login and authentication screens
5. Dashboards of important KPIs as specified by the Engineer in Charge
6. Bar graphs as per Engineer-in-charge to be plotted against Benchmark levels

ii) Cloud based web Pages

1. Important Data to be uploaded to the cloud using state of the art protocols like IOT drivers etc. and viewed using Http protocol. Any software/hardware/drivers required for the same shall be provided by Contractor
2. This shall be only in view mode and no changes shall be possible in this method
3. It should be possible to add a link to these webpages on the PCMC website. The link to be added by the customer using the services of the service provider/agency maintaining the website of PCMC

iii) Apps

1. Apps for IOS and android devices to be developed by the contractor

2. Apps to be downloadable by users/citizens if required
3. Screens of the apps to be developed as per Engineer in Charge
4. No Changes to be possible using the apps.

6.23.60 ITEM NO-60 PROVIDING SUPPLYING, FIXING AND COMMISSIONING GSM DATA LOGGER

Providing supplying, fixing and commissioning GSM Data logger with internal battery having (3 years battery life) dual channel for flow and pressure logging with internal pressure transducer, one PDA for local download, PC software, PC connection cable, Infra-red reading head, pressure hose, instruction manual etc. complete as directed by the Engineer-in-charge.

The contractor shall supply the required **GPRS enabled Data logger** to be installed at remote locations within DMAs . **The GPRS DATA LOGGER SHALL be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC**, the charges for the same shall be borne by the contractor. Equipments / Instrumentation Shall be provided as per Approved Make specified at Annexure-1 of this document

The minimum technical specifications of the instruments shall be as follows;

Sensor Input Options	Digital	One or two bi-directional pulse input for Flow Reed switch contact closure type or other non powered sensors including Kent LRP, PD10 with ext battery box, Aquamag/Magmaster. Two single-directional pulse inputs for Flow logging, via a single 4 pin mil connector (optional) Up to 64 pulses per second.
	Analogue	Internal Pressure Transducer (optional). External pressure (optional). 4-20 ma (optional) 0-20 bar / 0-200 metres head / 0-300 psig, 0.1% repeatability / 0.1% accuracy optional Please note that the logger is calibrated to 10bar as standard. 20bar calibration must be specified at time of order if required.
Logger Features	Memory	Primary recording 179,760 readings. Can be programmed to read continuously (cyclic mode) or for a specific period of time (block).
	Frequency	Variable sample rate 1 to 59 mins, then 1 to 24hrs (please note that this may affect battery life and communications cost).
	Alarms	Minimum or maximum duration-triggered threshold alarm per channel. 16 Alarms per logger. Each alarm out comment field 16 characters. Can be programmed to auto dial up to 4 telephone numbers on alarm with telemetry option (i.e. 1 per alarm).
	Logger ID	Up to 7 alphanumeric characters. Also readable factory set serial number in firmware.
	Clock	On board 24 hour real time clock with date facility.
	Count and Event Logging	Count and Event logging modes independent for both recordings
Communication	Serial	RS232 by Infra-Red reading head for connection to PDA hand held programming and data collection unit, laptop, or desktop PC using 9600 Baud.
	Internal Cellular modem	GPRS to FTP site using HWM DataGate or customer specific FTP. SMS Back Up* SMS to HWM DataGate or customer modem. Multiple messages per day. Quad band modem supplying 850/900/1800/1900MHz bands. GPRS can send data down to every 15 mins, with appropriate battery pack
Dimensions / Weight	Dimensions / Weight	110H (130H with int pressure sensor) x 150W x 105D mm. Weight 590 grams (1.3lb)
	Construction	Tough ABS plastic enclosure (colour Blue).
	Operating Temp	-20 to +70°C (-5 to +160°F)
	Ingress protection	IP68 submersible
	Power	Lithium Thionyl-Chloride cell operational for 5 years under standard operating conditions *, complete with low battery alarm

6.23.61 ITEM NO-61 PROVIDING SUPPLYING, FIXING AND COMMISSIONING PRESSURE GAUGES AND TRANSMITTERS

Pressure gauges shall comply with BS EN 837-1:1998 and BS1780. Pressure gauges and transmitters shall have over range protection up to 1.5 times the maximum line pressure and shall be capable of withstanding full line pressure on any side with the other side vented to atmosphere without damage or effect on the calibration. No plastic material shall be used in their construction. Internal parts shall be of stainless steel, bronze or approved corrosion-resistant material. Where necessary, a special diaphragm shall be used to segregate the gauge tube from corrosive fluid media. In chlorine applications, the diaphragm shall be in silver or tantalum. The minimum diameter for any pressure gauge shall be 150 mm unless specified otherwise or where the gauge forms part of a standard item of equipment.

Where compensation of more than 2% of the instrument span is needed for the difference in level between the instrument and the tapping point, the reading shall be suitably adjusted and the amount of compensation shall be marked on the dial. The zero and span of a pressure transmitter shall not change by more than 0.1% of the span per 0C change in ambient temperature. After application for 10 minutes of pressure at 130% of maximum pressure, the change in zero and span shall not exceed 0.1% of the span.

Pressure transmitters shall have accuracy typically better than 0.25% of span, depending on the application and shall be protected to BS EN 60529:1992, IP 65 standard or higher. For transmitters installed in locations liable to flooding or underwater applications, they shall be to IP 68 standard and shall operate up to a maximum submergence of 20 meters of water.

Pressure transmitters shall provide a 4 to 20mA d.c. output proportional to the pressure range at a maximum load of 750 ohms.

Differential Pressure Transmitter:

Differential Pressure transmitters shall have pressure dampeners.

The specifications for pressure transmitter shall be as follows,

- a. **Type** : 2 wire type
- b. **Housing** : IP 67
- c. **Output** : 4-20mA
- d. **Supply** : 24 VDC
- e. **Local Display**: LCD.
- f. **Accuracy** : Better than 0.5 % of range

The contractor shall supply the required Pressure gauges and transmitters and interface the same with PLC's . **The Pressure gauges and transmitters shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC, the charges for the same shall be borne by the contractor**

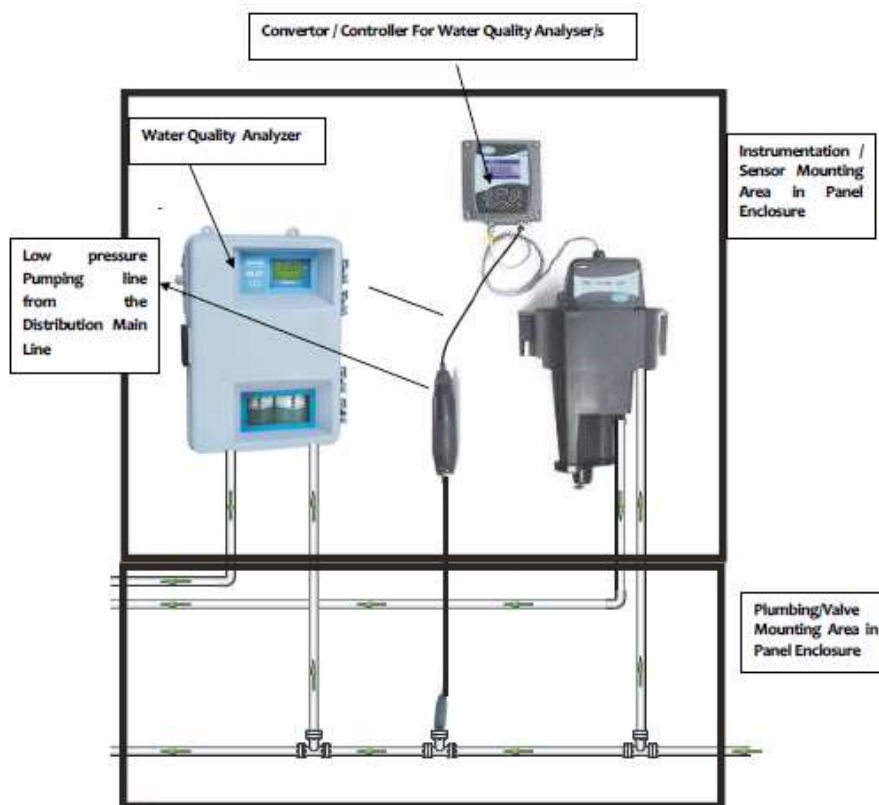
EQUIPMENTS / INSTRUMENTATION SHALL BE PROVIDED AS PER APPROVED MAKE SPECIFIED AT ANNEXURE-1 OF THIS DOCUMENT

6.23.62 ITEM NO-62 CHLORINE ANALYSER

The Analyzer shall operate on Analysis Method like DPD Colorimetric principal. The application is for Drinking Water Residual Chlorine analysis.

Following specifications as a minimum shall be applicable in the basic Instrument model offered as chlorine analyser. The analyser shall be provided with all the necessary accessories required to operate the Instrument once unpacked and installed at site.

- a. Range : 0.1 to 5 mg / Lit free or total residual chlorine, with automatic colour / turbidity compensation
- b. Programming : The instrument shall be freely programmable using Menus & Key pad.
- c. Sensor Operating Pressure : 1 Bar
- d. Sensor Op Temp. : 45 Deg. C.
- e. Response Time: < 120 Sec.
- f. Min. Detection Limit : 0.035 mg/L
- g. Cycle Time: One complete sample analysis every 2-1/2 minutes . The output shall be retained at the same value until next sampling is carried out.
- h. Accuracy: 0.5 % of range or 0.035 mg/L as Cl₂, whichever is greater
- i. Supply: 230 VAC +/- 10%, 100 VA Max.
- j. Output: 4-20 mA. Output shall be Programmable and shall be isolated from the ground. Additionally Potential Free Contact output (230 V, 5 A Rating) for sample concentration shall be available.
- k. Load : <= 500 ohm
- l. Display: 4 & ½ Digit LCD
- m. Repeatability: Better than 0.2% of range
- n. Enclosure: IP62 Min. & Housing shall be in ABS plastic.
- o. Accessories: All the required accessories shall be built in to the system offered and no external accessories shall be required to operate the instrument in the normal fashion.
- p. Certification: The offered instrument shall be at least CE approved and UL listed.
The instrument shall work continuously at remote place without any requirement of calibration etc. at least for a period of 30 days, from the previous maintenance date. The instrument shall be Tamperproof or pass word protected to prevent unauthorised handling of the same.



Typical Physical G.A Drawing for Water Quality Analyser/s Installation in Enclosure at Field Stations

The contractor shall supply the required chlorine Analyzer with all related mounting accessories etc. complete. **The chlorine Analyzer shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC, the charges for the same shall be borne by the contractor** Equipments / Instrumentation Shall be provided as per Approved Make specified at Annexure-1 of this document

6.23.63 ITEM NO-63 COMMISSIONING OF PLC WITH PANEL AT EACH ESR / DMA LOCATION WITH MODEM TO HAVE PRESSURE AND FLOW MONITORING/RESIDUAL CHLORINE AND CONTROL OF VALVE ACTUATORS.

PLC System

PLC shall be provided as a Hot-Standby configuration to perform combinational and sequential logic functions, status monitoring and reporting functions with counter and timer facilities.

PLC Panel interrogation power supply should be fully redundant.

PLC shall comprise of necessary processors, required input/output (I/O) modules with future provisions, communication interface modules and man-machine interface (MMI) required to perform the desired functions.

Each PLC shall have memory protected built in historical archiving/data logging of system alarms & events and process variables. Data logger shall be able to log data based on time or an event PLC shall have enough memory allocated to allow 200,000 time and data stamped discrete and /or analog values to be archived. The historical archive shall allow the oldest data to roll off the system as memory is used keeping the 200,000 most current data points available. Process point time stamping frequency shall be selectable within the configuration software. It shall be possible for the archived data to be exported in CSV format allowing use with standard spreadsheet and data software applications

PLC shall have the following attributes as a Hot-Standby configuration.

- carry out sequential logic implementation for operations of plant;
- carry out computation and interfacing for data acquisition, data storage and retrieval;
- it shall accept downloaded program from a programmer;
- it shall have different functional modules to perform the desired functions;
- it shall scan the inputs in time cycles and update the status of its outputs.

The PLC shall be non redundant, modular.

The PLC shall be capable of having following minimum specifications:

- Digital Inputs: 48 Nos (24 VDC)
- Digital outputs:24 Nos (24 VDC Transistor/ Relay)
- Analog Inputs: 16 Nos (Min.12 Bit resolution)
- Analog Outputs : 8 Nos (Min 12 Bit resolution)
- Communication ports: 3 Nos. One for HMI, One for Connecting various parameters through MODBUS and one for MODEM/ Router.

PLC Control Panel:

The Panel shall be stand alone, floor mounting type with IP 55 protection and shall house PLC, HMI-7inch colour touch screen, 24 VDC, 5 A, SMPS, Modem / Router, Relay boards, MCBs for Incoming Power (DP), PLC Power, I/C & O/G for 24 VDC supply, service socket, 2 additional DP MCBs for auxiliary supply.

PLC Panel for filter bed shall be pedestal desktop type panel only for ease of operation. Necessary UPS/ Power back arrangement shall be provided with PLC's to avoid any data loss.

Modem/ Router:

The device shall act as REMOTE MANAGEMENT DEVICE.

This shall have facility to connect PLC with central SCADA server PC at central location office through GPRS or PSTN.

The Corporation will provide any of the PSTN / Broad band with dynamic IP connection or SIM card with GPRS enabled with Dynamic IP. The connection will be provided based on best available connectivity at each ESR or DMA location. The Contractor shall provide connectivity device which will be able to incorporate any connection. The specifications for the device shall match following. Remote

Maintenance PLC point to Point RAS or Internet remote access: and any PLC / device / equipment with TCP/IP

Remote Service : Data acquisition (Tag names) in MODBUS/RTU, MODBUS/TCP 'Tag names' enable alarm management, Basic programming, custom Web pages, reporting, Data Logging: Internal data base for data logging 21.000 points. Retrieval of the data base with files transferred by FTP put or email attachment.

- Alarms: 'Tag name' database: 128Kb. Alarm Notification by email, SMS, FTP put and/or SNMP trap.
- Available standard limits to configure: Very Low, Low, High, Very High + Dead zone and activation delay.
- Alarm summary and historian available in HTTP and via FTP files transfer.
- Alarm cycle management: ALM, RTN, ACQ and END.
- MMI HTTP: System and user defined Web site.
- SNMP: 'Tag Name' read/write
- FTP: Whole set of parameters are available in files
- Callback: Call back on user request or on amount of rings
- Direct or Internet call back (supports dynamic DNS)
- Firewall IP filtering
- Script Dedicated application to be programmed with the Basic language.
- Router IP forwarding, NAT, port forwarding and routing tables.
- Internet RAS connection (PPP), PAP/CHAP security. Data compression, ISP connection (Internet Service Provider) primary et secondary, supports DNS.
- Synchronization Embedded real-time clock, manual setup via http or automatic NTP setup
- File Management FTP client and server for configuration and data transfer.
- Web Site Security: DAA and session control. HTML standard supports the entire PDA browsers.
- SSI technology (Server Side Include) and BASIC scripted ASP (Active Server Pages).
- Maintenance SNMP V1 with MIB2 and/or via FTP files
- Material ARM processor @75Mhz, 8Mb SDRAM, 8Mb Flash, Din Rail Mounting
- Power supply 12 - 24VDC +/-20%, SELV; consumption: 3-6 watts
- 1x SUBD9 serial port: RS232, RS422 or RS485, 1,5kV isolation
- 1x RJ45 Ethernet 10/100 baseTx; 1,5kV isolation
- 1x digital input: 0/24VDC; 3,5kV isolation
- 1x digital output: open collector 200mA@30VDC; 3,5 kV isolation
- Embedded modem: PSTN or GSM/GPRS
- Operating Temperature range: 0° to 50°C, 80% humidity (no condensation).

EQUIPMENTS / INSTRUMENTATION / PLC SHALL BE PROVIDED AS PER APPROVED MAKE SPECIFIED AT ANNEXURE-1 OF THIS DOCUMENT

6.23.64 ITEM NO-64 INSTRUMENTATION CABLE

All cabling required for connecting all field instrument, sensors, transmitters, PLC etc. shall be provided by contractor. This item shall be executed as per specific requirement supported with justification with prior consent and approval of the Engineer.

Specifications for cables:-

1. All conduit and cable entering control panels shall be gland sealed to prevent the intrusion of gas and

moisture.

2. All signal cables for carrying 4-20 Ma , 0-5 V, low level transducer outputs, etc shall be copper PVC insulated twisted pairs, individually screened with tinned copper drain wire, overall screened, steel wire armoured and overall PVC sheath. The twisted pairs shall be constructed with 24-30 twists per metre.
3. The rated working voltage shall be 100 V rms and the maximum working voltage shall be 600 V rms. The continuous current rating shall be at least 5. Insulation between conductors and earth shall not be less than 10 Mega Ohms at 500 Volts.
4. Screening shall provide a minimum of 95% coverage of Copper braid or Mylar backed Aluminium foil. Individual shields in multi core cables shall be insulated from each other and from the overall shield and armoring.
5. Strict segregation shall be followed with not more than one type of signal run in any multi core cable. The different types of signals shall be segregated from each other and shall be contained in separate cables.

6.23.65 ITEM NO-65 CONSTRUCTING ROOM

Item include :- Designing, providing and constructing control room of required size and shape with RCC framed structure including excavation in all strata, 15 cm thick, PCC bedding in M-150 below foundation, providing M-200 RCC footing, columns, beams, lintels, chajjas and roof slab as per requirements and design. Providing and constructing B.B. masonry wall of 23 cm thickness in CM 1:6 together with providing and applying 20 mm thick cement plaster in CM 1:3 externally and internally including gray cement base marble mosaic tile flooring 25 cm x 25 cm x 20 mm thick, providing and fixing one steel door, fully glazed steel windows (the area of these windows shall be 20% of the floor area of building) together with proper spacing of windows as directed, including providing and applying three coats of oil paint to doors including two coats of snowcem paint of approved shade and make to external surfaces and one coat primer and two coats plastic immersion paint of approved quality and shade be provided to internal surfaces of building including electrification to control room as per detailed specification and as directed by Engineer-in -charge

The contractor needs to follow the detailed specification of PWD civil works specification for this item, the material test also be performed as per PWD norms and specification.

6.23.66 ITEM NO-66 INTERFACING MECHANISM OF NEW PLC BASED PANELS WITH EXISTING PLC

PLC Panel Integration / Interfacing

The existing PLC based panels have to be used to import data of the existing instrumentation parameters into the new PLC based panel for proposed SCADA system. This can be done by installing additional hardware like communication modules with required wiring modification in the existing panel and collect data over a standard protocol like MODBUS. All the additional hardware/software/interfacing devices/cabling/licenses required to achieve this connectivity shall be in provided by the contractor.

The contractor shall ensure that while carrying out the integration part the existing system should not get damaged or hampered in any way to avoid any recovery charges.

The bidder is advised to understand the existing system before bidding and shall be responsible to communicate / liaison to ensure smooth data transfer between the existing and the new system.

All the logic shall be in the new PLC based panel and the existing system shall be used only to retrieve data of the existing sensors/instrumentation.

6.23.67 ITEM NO-67 HORIZONTAL DIRECTIONAL DRILLING (HDD)

Item includes :- installation of HDPE pipe (PE 100) , PN 10 by Horizontal Directional Drilling (HDD) method including preparation and setting up the plant and equipment, preparing new pipe work material, installing new pipe work, hydro/ pneumatic testing and commissioning pipe work or making the system ready for commissioning by HDD operation including, all related civil and mechanical work like excavation, shoring/ strutting, etc, drilling, stringing, reaming and pulling back the new pipe work on the designed bore path alignment, proper disposal of drilling fluid all inclusive as per Ind STT:101-2007 code of Practice for Horizontal Directional drilling Technique suiting Indian Conditions.

Description

This pipe installation method is called Horizontal Directional Drilling (HDD). This method is defined as a steerable technique for the installation of pipes, conduits, and cables in an arc shape using a surface launched drilling rig. This method requires the execution of a pilot bore which is then enlarged with the use of a reamer prior to installation of the product pipe. Depending on the diameter of the product pipe, multiple enlargements may be required. The excavation is performed by the mechanical action of a fluid assisted cutting head.

Allowable forces

In case of HDPE pipe, an extra 1.8 m section of the pipe must be pulled out of the borehole to check for any sign of stress or damage.

Allowable pulling force for all diameters shall be determined depending on the pipe size, wall thickness, manufacturer, field conditions, pull distance, manhole integrity, bearing capacity of soils, adjacent infrastructure, related equipment, cable strength, and all other related considerations.

Construction

Minimum Allowable Depths

The minimum allowable installation depth of cover of a HDD installed pipe under the road and shoulder surface is correlated to the pipe diameter. Table 2. Summarizes the minimum allowable depths:

Table 2 -- Minimum Allowable Depth

Pipe Diameters	Depth of Cover
Small (< 100 mm)	1.0 m
Mini (100 – 300 mm) Medium (325- 600 mm)	1.3 m 1.5 m
Large (> 600 mm)	2.5 m

To help with future locating of installed pipes, installation of a trace wire on plastic pipes and submission of an as-built (both plan and profile) for all installations are required.

In locations where the road surface is super elevated, the minimum depth of the bore shall be measured from the lowest side of the pavement surface.

Equipment

Equipment used for this method varies greatly. However, the basic operations of boring and pulling the pipe into position are essential. Please refer to the specific operator's manual for more information.

Method

- (a) The ends of each section of HDPE pipe shall be inspected and cleaned as necessary to be free of debris immediately prior to joining the pipes by means of thermal butt fusion/electro fusion.

The Polyethylene pipe shall be of the same type, grade, and class of the polyethylene compound used in the process. This process provides joint weld strength equal to or greater than the tensile strength of the pipe.

- (b) The handling of the joined pipeline shall be in such a manner that the pipe is not damaged by dragging it over sharp or jagged objects. Sections of the pipes with cuts and gouges exceeding 10 percent of the pipe wall thickness or kinked sections shall be removed and the ends rejoined.
- (c) HDPE Pipes shall be stored on level ground, free of sharp objects, which could damage the pipe. Stacking of the polyethylene pipe shall be limited to a height that will not cause excessive deformation, bending, or warping of the bottom layers of pipes under anticipated temperature condition.
- (d) Sufficient space shall be allocated to fabricate and layout the product pipeline into one continuous pipe length, thus enabling the pull back to be conducted during a single operation. If space considerations are discovered that make this impossible, the permit applicant shall obtain specific alternative instructions from the owner's Engineer.
- (e) Sufficient space is required on the rig side of the machine to safely set up and perform the operation.
- (f) The drill path alignment shall be as straight as possible to minimize the frictional resistance during pullback and maximize the length of the pipe that can be installed during a single pull.
- (g) The radius of curvature is determined by the rig. The minimum radius of curvature of HDD path should be 1,200 times the nominal diameter of the pipe to be installed.
- (h) The required piping shall be assembled in a manner that does not obstruct adjacent roadways or public activities. The HDD operator shall erect temporary fencing around the entry and exit pipe staging areas.
- (i) Several pre-reams may be employed to gradually enlarge the hole to the desired diameter and reduce road surface heaving potential. No back ream diameter increase shall exceed 37.5 mm. Furthermore, during the final pullback, the pull back rate shall not exceed 3 m per minute.
- (j) The pipe shall be sealed at both ends with a cap or a plug to prevent water, drilling fluids and other foreign materials from entering the pipe as it is being pulled back.

- (k) Pipe rollers, skates or other protective devices shall be used to prevent damage to the pipe, eliminate ground drag, reduce pulling force, and reduce the stress on the pipe and joints.
- (l) The drilling fluid in the annular region outside of the pipe shall not be removed after installation, and remain in place to provide support for the pipe and neighboring soil.
- (m) Should the drilling operation be unsuccessful, the contractor shall ensure the backfill of any void(s) with flow able fill.
- (n) Entry penetration angles are limited by equipment capabilities. However, according to most HDD drilling rigs' design, the best entry angle should be between 100 and 120.
- (o) Exit angles should generally range from 50 (for large diameter steel pipelines) to 120. However, when high exit angles are encountered or designed, the pipe must be supported in an elevated position during the pull back operation to prohibit the pipe from bending, deforming, kinking, or even breaking.

Drilling Site

(a) Location

A minimum distance of 6 m, from the edge of the paved shoulder or curb to the face of any equipment, and supplies, shall be maintained in areas posted at 50 kmph or less; otherwise, a minimum distance of 9 m shall be maintained.

(b) Protection

- At discretion of owner's Engineer/Inspector, traffic barriers shall be installed adjacent to machine site locations according to the owner's plans and current Standard Specifications for such Construction. Temporary beam guardrail shall also be installed according to the current Standard Specifications for Construction.
- Fencing barriers shall be installed adjacent to equipment and supplies with suitable fencing and plastic drums to prohibit pedestrian access to the work site. Equipment shall not be used as fencing to protect access pits.

Overcut Allowance

The overcut diameter shall not exceed the outside diameter (OD) of the pipe by more than 37.5 mm, to ensure excessive voids are not created resulting in post installation settlement.

Watertight Joints

Water tight pipe joints are required to ensure, the integrity of the road bed. Pipe shall be constructed to prevent water leakage or earth infiltration throughout its entire length.

A watertight specification refers the HDPE specification & hydraulic testing should be given as per the technical specification of HDPE pipe given in contract.

Drilling Fluids

- (a) Drilling fluid shall be used during drilling and back reaming operations. Using water exclusively may cause a collapse of the borehole while in unconsolidated soils, and may also cause soil swelling while in clay soils. Either case may significantly impede the installation of the pipe.

- (b) Excess drilling fluid shall be contained within a lined pit or containment pond, or trailer-mounted portable tank, until removed from the site.
- (c) All drilling fluids shall not enter the streets, manholes, sanitary and storm sewers, and other drainage systems, including streams and rivers.
- d) Any damage to any highway or non- highway facility caused by escaping drilling fluid, or the directional drilling operation, shall be immediately restored by the HDD operator.

Pipe Locating and Tracking

- (a) During construction, continuous monitoring and plotting of pilot drill progress shall be undertaken to ensure compliance with the proposed installation alignment and allow for appropriate course corrections to be undertaken.
Monitoring shall be accomplished by manual plotting based on location and depth readings provided by the locating/tracking system or by computer generated bore logs which map the bore path based on information provided by the locating/tracking system. Readings or plot points shall be undertaken on every drill rod.
- (b) Pipe installed by the HDD method shall be located in plan as shown on the drawings, and shall be no shallower than shown on the Drawings unless otherwise approved. The Contractor shall plot the actual horizontal and vertical alignment of the pilot bore at intervals not exceeding 9 m. This “as built” plan and profile shall be updated as the pilot bore is advanced. The HDD operator shall at all times provide and maintain instrumentation that will accurately locate the pilot hole and measure drilling fluid flow and pressure. The HDD operator shall grant the Engineer/ Inspector access to all data and readout pertaining to the position of the bore head, the fluid pressures, and flows.

Settlement/Heaving Monitoring

- (a) This method shall be performed in a manner that will minimize the movement of the ground in front of, above, and surrounding the boring operation; and will minimize subsidence of the surface above and in the vicinity of the boring.
- (b) Potential settlement shall be monitored at each edge of right of way, each shoulder point, each edge of pavement, the edge of each lane (or centerline for two lane roads), and otherwise at 15 m intervals along the pipe centerline.
- (c) A survey shall be performed 1 day prior to initiating this operation at each required monitoring location. A similar survey shall then be performed at each location, on a daily basis, until the permitted activity has received a final inspection. This survey establishes the preexisting and post construction conditions, and the amount of settlement. All survey readings shall be recorded to the nearest one-hundredth (0.01) of a meter. Whenever possible, trenchless pipe installations shall not be installed directly under a pavement crack. Digital photographs of the pavement conditions shall also be taken prior and after the pipe installation.
- (d) All operations shall stop immediately whenever monitored points indicate a vertical change in elevation of 12 mm or more, or any surface disruption is observed. The Contractor shall then immediately report the amount of settlement to the owner’s Engineer/ Inspector.

Ground Water Control

Dewatering is not an issue with this method of installing pipe.

Boring Failure

- (a) Should anything prevent completion of this operation, the remainder of the pipe shall be constructed by methods approved by the Engineer in charge.
- (b) Abandonment of any component of the installation shall only be allowed as approved by the owner's Engineer in charge.

Contamination

When an area of contaminated ground is encountered, all operations shall stop immediately, and shall not proceed until approved by the Engineer in charge. Any slurry shall be tested for contamination and disposed of in a manner, which meets locally applicable requirements.

Bulkhead

Pipe ends shall be temporarily sealed with a cap until the connection is made permanent, to prevent water or earth infiltration.

Work Site Restoration

- (a) Access pits and excavations shall be backfilled with suitable material, and in a method approved by the Engineer in charge.
- (b) The disturbed grass-surface area shall be top soiled, seeded, fertilized, mulched, and anchored according the tender Specifications for construction. Slopes steeper than 1-on-3, shall be sodded. If a final site restoration is not completed within 5 days after completion of the operation, the installation of temporary soil erosion and sedimentation control measures shall be required.
- (c) Upon completion of the work, the contractor shall remove and properly dispose of all excess materials and equipment from the work site.
- (d) The permit, including the surety requirements, shall remain in effect for a minimum of one year after completing the work to monitor for settlements of the pavement and/or slope.

6.23.68 ITEM NO-68 DI JOINT (BELL JOINT) LEAK REPAIR CLAMP

Item includes providing & fixing leak repair clamp

Specifications of leak repair clamp

Body: 1. Ductile Iron ASTM A 536, Grade 65-45-12.

2. Gasket :- Virgin SBR compounded for water service. Meets ASTM D2000 MBA 710.

3. Bolts and Nuts: High strength, low alloy steel track head bolts. UNC rolled thread and heavy hex nuts, with black finish. Steel meets AWWA C111.

INSTALLATION INSTRUCTIONS: Clean pipe joint and bell face thoroughly. Caulked joints should not have caulking extending beyond the bell face. If recessed more than 1/8", face with lead wool or other suitable material if possible. Wrap gasket around pipe with beveled side facing away from bell face. Gasket extension piece is for larger diameter pipe only. Assemble spigot ring onto pipe.

Assemble bell ring onto pipe and install bolts so that nuts are located on spigot end. Tighten bolts uniformly and progressively to approximately 60-70 foot pounds of torque.

6.23.69 ITEM NO-69 STAINLESS STEEL SINGLE/DOUBLE/TRIPPLE BAND LEAK REPAIR CLAMP

Item includes providing & fixing leak repair clamp

All Stainless Steel Repair Clamp combines the corrosion-resistant characteristics of stainless steel and the sealing capabilities of rubber to provide a strong, dependable and versatile repair clamp . The all stainless design is lightweight and easy to handle under adverse conditions associated with almost every main break.

The fixed position of the studs provides uniform control and fewer parts to fall into the trench. The sliding lifter bar is retained on the studs by the heavy hex nuts and facilitates the installation by serving as a handle while installing the clamp.

Bi-directionally tapered lugs allow the lifter bar to easily slide into locking position on the sidebar

Specifications:

Band: 18-8 Type 304 stainless steel.

Studs and heavy hex nuts :18-8 Type 304 stainless steel. Coated nut threads to prevent galling.

Studs are permanently attached to the clamp sidebar by means of a Metal Inert Gas (MIG) weld.

Lugs: 18-8 Type 304 heavy gauge stainless steel, MIG welded to clamp sidebar. Lugs are rounded and tapered for easy installation.

Sidebar: 18-8 Type 304 heavy gauge stainless steel Tungsten Inert Gas (TIG) welded to form a strong, permanent fusion with the repair clamp band.

Lifter Bar: 18-8 Type 304 heavy gauge stainless steel.

Lip curve holds bolts in position while tightening and serves as a bearing surface for stainless steel nuts and washers.

gasket: Gridded virgin Styrene Butadiene Rubber (SBR) compounded for water service, ASTM D2000.

Gasket ends are tapered for a dependable seal. SBR is suitable for temperatures of 150°F continuous, 180°F intermittent. An optional Buna-N, nitrile gasket is recommended for 220°F continuous and/or 240°F intermittent.

armor: 1/4 hard heavy gauge stainless steel vulcanized and recessed into the gasket to ensure uniform compression against the pipe .

Passivated: All clamps are fully passivated by means of a chemical technique which restores the corrosion resistant characteristics of the stainless steel.

6.23.70 ITEM NO-70 DEWATERING

Item includes:- Dewatering the excavated trenches and pools of water in the building trenches/ pipeline trenches, well works by using pumps and other devices including disposing off water to safe distance as directed by Engineer-in-charge (including cost of machinery, labour, fuel) etc complete. The

The scheme for dewatering and disposal of water shall be approved by the Engineer-in charge. The Contractor shall suitably divert the water obtained from dewatering from such areas of site where a build up of water in the opinion of the Engineer-in-charge obstructs the progress of the work, leads to unsanitary conditions by stagnation, retards the speed of construction and is detrimental to the safety of men, materials, structures and equipment.

When there is a continuous inflow of water and the quantum of water to be handled is considered in the opinion of Engineer-in-charge, to be large, a well point system-single stage or multistage, shall be adopted. The Contractor shall submit to the Engineer-in-charge, 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 approval.

6.23.71 ITEM NO-71 INSTALLATION OF LDPE/MDPE DUCT/PIPE

The Scope of works generally envisaged under Trenchless tender include but not limited to the following: Installation of LDPE/MDPE duct/pipe by Moling method including making of entry and exit

pits , all related civil works like excavation, shoring/strutting, maintaining the pits, backfilling the pits after pipe installation etc. and restoration of site after completion but excluding the cost of the duct/pipe.

- Interpretation and verification of all data in respect of hydrological and geotechnical surveys. Carrying out all additional surveys required for connecting data related to design and construction of the crossings.
- Design and Engineering of crossing to meet the technical parameters of the Crossing and specifications.
- All underground utilities shall be identified and mapped and shall be submitted before start of work. The mapping shall include both horizontal as well as vertical position of underground utility and structures/ obstructions.
- Performing all engineering and design calculations to verify suitability of pipe thickness proposed for installation in accordance with requirements of application codes/ standard for owner's review and approval.
- Preparation of all detailed construction/Installation drawing and methodology for trenchless and look up for PCMC approval.
- Submission of QA/QC Procedure for PCMC approval.
- Procurement and inspection of all materials and consumables required for or in connection with execution of the crossing other than those specially undertaken to be supplied by the PCMC.
- Mobilizing equipment, manpower and other resources etc, site preparation including arranging of additional land required for pipeline/fabrication, stringing, placement of equipment and preparation of pipeline connecting area and access to work site.
- Setting out works including establishing the location of extremity points (i.e. entry and exit locations of drilled portion of the pipeline to be laid by trenchless techniques, etc) on ground including carrying out of pre-construction survey and collection of all necessary data.
- Preparation of pipe string, installation of the carrier pipe string below the river/water course bed or at the designated crossing location prepared by single trenchless operation to the correct profile as per the drawing approved by the PCMC.
- Disposal of drilling fluid returns and cutting produced from drilling operation from worksite including arranging disposal site at contractors cost and initiative.
- Submission of daily log activities with all relevant details connected with trenchless operations for installing pipeline as required by Engineer in Charge.
- Final cleanup & restoration of ROW including de-mobilization
- Submission of as built drawings,
- All other works, which are not specifically indicated above, but required for successful completion of the trenchless work, associated mainline work and allied works, drawings, construction methodology & details engineering calculation etc.

Impact moling is a technique using a compacting device that is forced through the soil typically from an entry shaft to an exit shaft by applying a static thrust force, a rotary force and/or dynamic impact energy; the soil along the alignment is displaced rather than being removed. Impact moling is divided into three methods, the push rod method, the rotary method, and the percussion method. The push rod method utilizes a machine that pushes or pulls a solid rod or pipe through the soil to create the borehole by displacing the soil without rotation or impact. The rotary method combines the rotating drill rod and the compaction effect developed from utilizing a compaction bit. The percussion method or the impact moling method utilizes piercing tool that is self-propelled by a pneumatic or hydraulic power source

6.23.72 ITEM NO-72 PROVIDING ,SUPPLYING, LAYING & JOINTING BLUE MDPE PIPES

Providing and supplying in standard length ISI mark **Medium Density Polyethylene (MDPE) anti rodent pipes suitable for (Moling method)** & suitable for potable water as per IS specification

Raw Material

Raw material used to Manufacture MDPE Blue Pipes shall be Virgin Natural Resin PE 80 containing those anti – oxidants, UV Stabilisers & Pigments necessary for Manufacturing of pipes. The Density of Pipes shall be in the Range 0.926 to 0.940 g/cm³ confirming to ISO 4984 & ISO 4427 Standard. The PE 80 Resin shall have MRS of 8 Mpa.

Effects on Water Quality :

The MDPE PE 80 Blue Pipes shall confirm to ISO 4984 & ISO 4427 for conveyance of Water for Human Consumption. Also the pipes intended for conveyance of Potable water for Human consumption to be tested to comply with BS 6920 specifications in any of the laboratories like DVGW/KIWA/SPGN/WRC-NSF and certificate of compliance to be produced for the following parameters

- a. Odour & Flavour of Water
- b. Appearance of Water
- c. Growth of Micro Organism
- d. Extraction of substances that may be of concern to Public Health (Cyto Toxicity)
- e. Extraction of Metals.

Pipe should be anti rodent & should be meet the requirement to use in Moling method of trenchless.

Pressure Rating:

The Pressure rating of MDPE Blue PE 80 Pipes shall be confirming to clause 4.1 of ISO 4984 of ISO 4427 : 1996.

Colour of Pipes:

The Colour of MDPE PE 80 Pipes shall be BLUE confirming to clause 3.2 of ISO 4984 of ISO 4427 : 1996.

Dimensions:

The pipe dimensions shall be as per latest revisions clause 4.1 of ISO 4984 of ISO 4427 : 1996 and pipes upto diameters 32 mm shall be supplied in Coils of 300 mtrs. The internal diameter, wall thickness, length and other dimensions of pipes shall be as per relevant tables of ISO 4427:1996. Each pipe shall be of uniform thickness throughout its length.

The wall thickness of the PE 100 Pipes shall be as per the table given below:

Nominal Dia of MDPE Pipe (mm)	PR rating	Wall thickness	
		Minimum	Maximum

20	PN 16	2.3	2.8
25	PN 12.5	2.3	2.8
32	PN 12.5	3.0	3.5

The dimension tolerances shall be as per ISO 4427

Performance requirements

The Pipe supplied should have passed the acceptance test as per ISO 4427. The manufacturer should provide the test certificates for the following tests.

1. Melt Flow Rate
2. Density,
3. Oxidation and Induction test,
4. Hydrostatic Test ,
5. Pigment dispersion Test,
6. Longitudinal Reversion Test.

These tests should be performed in the in-house laboratory of the meter manufacturer. The Employer will depute Third Party Inspection Agency to the pipe manufacturing facility of the manufacturer to inspect the pipe as per QAP approved by Engineer In charge. Inspection charges and all other charges shall be borne by the contractor.

The pipes shall be accepted successful after the third party inspection by SGS, RITES or any other agency authorized by PCMC, the charges for the same shall be borne by the contractor

6.23.73 ITEM NO-73 PROVIDING AND MAKING HSC ON CI/DI PIPES

One Service connection means one tapping from a distribution main / sub- main including one tapping saddles, double compression elbow, female threaded adopter with metal insert, MDPE to metal pipe connector, UPVC/metal lockable ball Valves, GI casing pipe of 40/50 mm for road crossing (**excluding the cost of service pipe, the service pipe cost will be paid separately as per Item no-72**).

Providing required size of HSC brass ferrule with union confirming to relevant IS make hole by drilling on top of distribution mains, fixing the ferrule on saddle making the connection water tight etc., as shown in the drawing (**excluding labour required for excavation, refilling, instead of open excavation Moling method will be used and the cost will be paid separately as per Item no-71**) including closing water supply in that area, dewatering and restarting the water supply, transportation etc complete as directed by Engineer-in-Charge. and as directed by the Engineer including cost of required specials. Drilling charger, hydraulic testing, maintaining the same for the period under O&M.

The contractor shall supply the required compression fittings, lockable ball valve, at his cost. **The compression fittings, lockable ball valve shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC, the charges for the same shall be borne by the contractor**

6.23.74 ITEM NO-74 PROVIDING AND MAKING HSC ON HDPE PIPE

One Service connection means one tapping from a distribution main / sub- main including one Electrofusion saddles, coupler, double compression elbow, female threaded adopter with metal insert,

MDPE to metal pipe connector, UPVC/metal lockable ball Valves, GI casing pipe of 40/50 mm for road crossing, **(excluding the cost of service pipe, the service pipe cost will be paid separately as per Item no-72).**

Providing required size of HSC electrofusion tapping saddle confirming to relevant IS make hole by using tapping tee cutter provided on the top of tapping saddle on top of distribution mains, fixing the saddle making the connection water tight etc., as shown in the drawing **(excluding labour required for excavation, refilling, instead of open excavation Moling method will be used and the cost will be paid separately as per Item no-71)**, including closing water supply in that area, dewatering and restarting the water supply, transportation etc complete as directed by Engineer-in-Charge and as directed by the Engineer including cost of required specials, electrofusion machine, power/generator required for electro fusion, hydraulic testing, maintaining the same for the period under O&M.

The contractor shall supply the required compression fittings, lockable ball valve, electro fusion TEE and coupler at his cost. **The compression fittings, lockable ball valve, electro fusion TEE shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC**, the charges for the same shall be borne by the contractor

6.23.75 ITEM NO-75 PROVIDING, ERECTING ELECTRIC VALVE ACTUATORS

Actuators shall be suitable for the medium, climatic, environmental and pressure conditions of the system in which they are to be fitted. Actuators shall be provided with:

- (a) AC Electric Motor.
- (b) Reduction gear unit.
- (c) Torque switch mechanism.
- (d) Limit switch mechanism complete with set of limit switches and additional two spare sets for suitable position.
- (e) Hand wheel, for manual operation.
- (f) Valve position indicator.
- (g) Hand-auto lever with suitable locking arrangement.
- (h) 10 W single phase space heater in the switch compartment.
- (i) Blinking light throughout the valve operation.
- (j) Junction box for terminating power and control cables.
- (k) With additional accessories for integrating with PLC system.

The actuator shall be suitable for operation on 415V, 3 phase, 50 Hz power supply. The motor winding insulation shall conform to class B as per relevant BS and motor shall be protected by suitable thermal overload relays. The actuator shall be capable of producing not less than 1 1/2 times the required operator torque at the required time cycle of valve operation. The transmission shaft connecting the actuator to the valve shall be provided with 2 bearings one at actuator end and one at valve end with universal couplings at suitable places. The required numbers of switch/contacts meet requirements for PLC system. The electric motor shall be of the squirrel cage type as per IS 325 with insulation to IS 1271 Class B. The windings shall be impregnated to render them non-hygroscopic and oil resistant. All internal metal parts shall be painted. The motor shall be rated for 15 minutes. They shall also be suitable for operating on the specified electric supply and shall satisfactorily open and close the valve under variations of electric supply specified.

Motor shall be protected by suitable overload protection device. The reversing contactor starter and local controls shall be integral with the valve actuator. The starter shall comprise mechanically and electrically interlocked reversing contactors of appropriate rating fed from a 110 Volt control transformer. The common connection of the contactor coils at the transformer shall be grounded. HRC cartridge type primary and secondary fuses shall be provided.

Local control shall comprise pushbuttons for open, close and stop operations and a Lockable Local/Remote/off selector switch. The control schematics shall be subject to approval. Internal wiring shall be of 650/1100 volt grade PVC insulated stranded copper conductor of minimum 1.5 sq. mm for control circuits and of minimum 4 sqmm copper for the power circuit. Each wire shall be number identified at each end. The terminals shall be of stud type.

Cable entries shall be suitable for PVC insulated/ sheathed, armoured cables. A separate terminal box shall be provided for the heater. A separate terminal box shall be provided for cabling to control circuits.

The actuator enclosure shall be fully weatherproof and hose proof to IP 68 and shall be fitted with an anti-condensation heater, which shall be switched off when the motor is running. The torque switch mechanism shall function as follows to stop the motor on closing or opening of the valve, or upon actuation by the torque when the valve disc is restricted in its attempt to open or close.

The torque switch in the closing direction shall interrupt the control circuit if mechanical overload occurs during the closing cycle or when the valve is fully closed.

The torque switch in the opening direction shall interrupt the control circuit if mechanical overload occurs during the opening cycle or when the valve is fully open.

The mechanism shall facilitate adjustment of the torque at which the switches are required to operate. Non-adjustable limit switches shall stop the motor and give indication when the disc has attained the fully open or closed position.

The adjustable limit switches shall have control rated 2A, 48 V DC for specified system interlock, at the desired value position in both the opening and closing directions.

Motor operators shall be provided with clearly visible local valve position indicators mounted on the operator assembly to give an indication whether the valve is fully open, fully closed or in an intermediate position.

Settings and emergency operation shall be possible with the use of a hand wheel. The Hand wheel shall be of stainless steel and the drive mechanically independent of the motor drive and any gearing should limit the operating torque at the hand wheel to less than 15 kg and be such as to permit emergency manual operation in a reasonable time. During electric operation the hand wheel shall not rotate.

Actuators shall be adjusted at the manufacturer's works to ensure that they provide the correct, fully, open position and fully closed position. Mechanical adjustable stops shall be provided to prevent over-travel of the valve in the open and closed positions.

The contractor shall supply the required actuator at his cost. **The actuators shall be accepted after the third party inspection by SGS, RITES or any other agency authorized by PCMC**, the charges for the same shall be **borne** by the contractor.

6.23.76 ITEM NO-76 CABLES

1.1 KV Power Cables

Power cable used in 415 V systems shall be 1.1 kV grade copper conductor XLPE insulated PVC sheathed galvanized flat steel armoured type conforming to IS: 7098.

Cables shall be of sizes rated to carry full load current continuous at 0.85 PF or to withstand short circuit current of 35 kA for 1 second duration whichever is greater, but shall not be less than size specified in subsequent clause.

Cable Schedule

The successful bidder shall prepare a detailed Cable schedule indicating the type of cable used and length of cable including the size of the conductor. The sizes of the Cables indicated in the price bid are tentative and for reference only. It shall be Contractors responsibility to prepare a proper cable schedule and obtain approval to the schedule.

The cable lengths stated in the schedule are estimated quantity and shall form the base for comparison of the tender offers. However, for contract work, quantity of the cables as actually required shall be supplied at the tendered rates.

The sizes for the cables stated in the schedule are the minimum acceptable size and shall form the base for comparison of tender offers. The tenderer may offer alternative sizes and quote for such size separately, the prices for which shall however, not be considered for comparison and evaluation of tender offer. The Engineer-in-charge reserves the right to accept or reject such alternative size/ sizes.

Cabling Method

Cables shall be laid in trenches and ducts in ground and while passing along the wall, on perforated GI Cable trays of 2.5 mm thickness, in and out of the pump house. Every cable shall be neatly run vertically, horizontally or parallel to adjacent walls, beams or columns. At both ends for termination, the cable shall approach from 1 common direction and are individually terminated in an orderly and symmetrical fashion.

The cables shall be terminated in double compression cable glands which shall be suitable to provide adequate support by locking on the armour for additional earth continuity. Suitable compression type cable lugs shall be used for cable terminations.

Instrument signal cables shall not be run together with power cables. Minimum separation of 300mm shall be maintained between the power cables and the signal cables when laid together. A metallic separation shall be provided for the cables laid in Trays and by brick when laid in Trenches.

The point of entry, exit of the cables from the building shall be sealed from outside with an approved asbestos compound followed by about 40 mm thick bituminous compound or a weak mortar, care shall be taken not to damage sheathing of cable due to hot bituminous compound while sealing.

Cable route markers of approved design shall be installed at the following position.

- i) Entry and exit points of under ground duct / trench.
- ii) Exits from the building
- iii) At every 5 m distance of straight run
- iv) Any other position necessary to trace route

A metallic / plastic tag bearing cable reference number indicated in cable schedule at ever 5 m run or part therefore and at both ends shall be provided for ease of identification and route tracing. The schedule shall be prepared by the contractor and submitted for approval.

The cable routing and laying shall be such that sharp bends and links are avoided. The radius at bends for PVC insulated cables shall not be less than 15 D where D is overall diameter of the cable.

Equipments / Instrumentation/ Cables Shall be provided as per Approved Make specified at Annexure-1 of this document

6.23.77 ITEM NO-77 OPERATION & MAINTENANCE SERVICES

Contractors shall comply to the O & M services obligations specified in Section 6 : Employers Requirement. However, following are the minimum obligations covered under the scope of Operation and Maintenance of Contractor.

1. Maintaining the minimum personnel as specified in contract during the previous month.
2. Compliance with the obligations under the Contract.
3. Providing and maintain continuous pressurised water supply to the respective water districts or DMA's specified in the project area
 - a. Providing water supply to the Consumers at the minimum service levels as specified under Schedule-7 of PCC without further deterioration

- b. Water Demand Management in DMA's
- c. Emergency water supply
- d. Network Operations and Management
- e. O & M of assets within Established DMA's
- f. Flow and pressure monitoring
- g. Repair of leaks and bursts and valves
- h. New Connections as per directives and approval by PCMC
- i. Consumer Services including attending to complaints received through PCMC and their resolution
- j. O & M of SCADA and monitoring System of project area with web enabled facility
- k. O & M of PLCS , Flow Meters, Chlorine Analysers, level, pressure meters
- l. Information management and reporting
- m. O & M of existing and new instrumentation of project area
- n. Consumer services like complaint resolution, water awareness & conservation programmers, campaign, media co-ordination, and society meetings etc.

6.23.78 ITEM NO-78 PROVISIONAL PER MONTH METER READER & METER READING SUPERVISOR

For detailed specification please refer section -6 Employer requirement.

**ANNEXURE-1 OF APPROVED MAKE
LIST OF ACCEPTABLE MAKES OF EQUIPMENT / INSTRUMENTATION**

1. Electric Actuators

Marsh
Rotork
Auma
ABB

2. 415 V Switchgear Control gear

Siemens
Legrand
Schneider
ABB

3. Cables / Wires

Lapp
Polycab
Finolex
Top Cable

4. Battery

Exide – EL + Series

5. MCCB / MCB and LV Switchgear

MDS
Schneider
Siemens
Standard
Havells

6. Programmable Logic Controller

Allen Bradley
Siemens
Messung
Mitsubishi,
Schneider

7.HMI

Allen Bradley
Siemens
Messung
Mitsubishi
Rockwell
Schneider Electric India
Siemens India Ltd.
Messung

8. Ultra sonic /Electromagnetic flow meter

Krohne Marshall
Endress & Hauser (India) Pvt. Ltd.

Siemens
Emerson
Rittmeyer
Panametric

9. Level Sensor & Transmitter

Siemens
Endress & Hauser
Emerson
Krohne Marshall
Emerson

10. Online Analyser

E&H
Hach
Krohne Marshall
Emerson

11. DC Power Supply

Aplab
Phoenix Contact
IFM
Siemens,
Shavision
Canopus Instruments

12. Terminals (clip On type)

Connectwell
Phoenix Contact
Wago

13. SCADA Software

Intelution
Wonderware
Ellipse
Rockwell Automation
Schneider

14. Energy Meters with MODBUS

Conzerve
HPL Socomec
Schneider
L&T

15. Modem / Router

Siemens
Messung
Mitsubishi
Wave Com
ACTL

Viola
Cisco
Kalki

16. Panels, Cabinets

Rittal
BCH

any other fabricated on CNC machine, having 7 tank cleaning process and duly powder coated

17. UPS

APC
DB Electronics
Emerson

18. Pressure Dataloggers

Halma
Primayer
Siemens
Emerson

19. Ductile Iron Butterfly Valves, Sluice Valves

As per approved by MJP/PCMC

20. Pressure Reducing Valve & Altitude valve

Singer
AVk
VAG

21. Domestic Water meter

Itron
Zenner
ARAD
Belan

Pimpri Chinchwad Municipal Corporation

Part-II PRICE BID

BIDDING DOCUMENT

for the

Selection of Contractor for Implementation of Continuous (24 x 7) Pressurised Water Supply in 40% area of Pimpri-Chinchwad and Operation and Maintenance of the System for Five years

(Following single stage two envelope bidding procedure)

Letter of Price Bid

Date:

Tender No.: 15/01/2015-16

Invitation for Bid No.:

Joint City Engineer (Water Supply),
Pimpri-Chinchwad Municipal Corporation
Pune Mumbai highway Pimpri-18

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) 8;
- (b) We offer to execute in conformity with the Bidding Documents and the Technical Bid submitted for the following Works:
- (c) The total price of our Bid, excluding any discounts offered in item (d) below is:
- (d) The discounts offered and the methodology for their application are:
- (e) Our Bid shall be valid for a period of 180 days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (f) If our Bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents;
- (g) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract: *

Name of Recipient	Address	Reason	Amount
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.....
.....

- (h) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed; and
- (i) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.

Name

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date

* If none has been paid or is to be paid, indicate "none".

Preamble to Bill of Quantities

1. The Bill of Quantities (BOQ) shall be read in conjunction with the section 6.23 for particular item description and section 6 for specific requirements, section 7 GCC & section 8 PCC for payments terms & conditions.
2. The quantities given in the BOQ are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Employer's Representative, and valued at the rates and prices bid in the priced BOQ, where applicable, and otherwise at such rates and prices as the Employer's Representative may fix within the terms of the Contract.
3. The rates for specific material and goods falling under Excise Exemption as per Central Excise Notification no. 12/2012-CE dated 17-03-2012 issued & updated by Government of India time to time shall be without any excise duty. Excise Exemption on the materials like pipes, valves, specials, flow meter, instrument, etc. shall be availed under this project. Contractor shall be responsible to get the Exemption and liaison with concerned department. However, PCMC shall assist Contractor to obtain certification towards Exemption of Excise Duties. The responsibility for obtaining any such exemptions from the Competent Authority will remain with the Contractor and the Employer shall not in any way be responsible for admissibility of the claims or eligibility of the Contractor.
4. The rates and prices bid in the priced Bill of Quantities shall, except as otherwise provided under the Contract, include all construction equipment, labor, supervision, materials, surveying, setting out, erection, maintenance, all lead and lift, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.
5. General directions and descriptions of work and Materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the priced Bill of Quantities.
6. The method of execution and measurement of completed work for payment shall be in accordance to the respective procedures provided in the Technical Specifications or Particular Specifications under this Contract and in the absence of which shall be in accordance to the relevant BIS Standard and Standard Specification published by MJP / the Public Works Department, Government of India as the case may be.
7. Rock is defined as all material that, in the opinion of the Employer's Representative, require blasting, or the use of metal wedges and sledgehammers, or the use of compressed air drilling for their removal, and that cannot be extracted by ripping with a tractor of at least 150 brakehorsepower (BHP) with a single, rear-mounted, heavy-duty ripper.
8. All defective works are liable to be demolished, rebuilt and defective materials replaced by the contractor at his own cost and time
9. In view of the site location and their prevailing condition, it is mandatory to the Contractor to visit the site and make himself thoroughly familiar with the site conditions, access and account for all possible difficulties and other requirements mentioned elsewhere in his bid prior to submission. When a contractor submits his bid for this work, it will be considered that he has quoted for this work with full and complete knowledge of the site and prevailing conditions, and no claim for additional compensation shall be entertained on this account.
10. Description of items in this BOQ is by itself not complete, and for a full description the BOQ should be read together with the section 6.23 for respective items Technical Specifications. Rates quoted in the BOQ are deemed to have included all aspects covered in the Preamble and Technical Specifications.

11. The Bidder shall, in the course of studying the bid document, point out all his/her remarks on the documents and make all his/her queries to the Employer at the time of pre-bid meeting who will study these remarks and clarify any discrepancy between the Bidding Documents.
12. Submissions shall be strictly in accordance with the documents and shall not be qualified in any other way. The Bidder shall not alter the text of the BOQ.
13. Extra and excess items of work shall not vitiate the Contract. The Contractor shall be bound to execute extra items of work as directed by the Engineer. The rates for extra items will be as per rates decided under Contract Conditions.
14. For the evaluation process, if requested by the Evaluation Committee, the Bidder shall provide a sheet analysis for all priced items showing how the rate entered was derived. Successful bidder shall submit the same to the Employer.
15. The rates shall be deemed to include all the cost of Works described in the Bidding Documents to operate, maintain and manage the water supply with in the project area as per the scope of work.
16. The Bidder shall satisfy himself/herself as to the meaning of every item in the BOQ. The rates and prices inserted in the BOQ by the bidder shall be deemed to cover all costs, taxes, customs and import duties, levies, profits, risks, liabilities, insurance and obligations set forth or implied in the bid, as well as proper operation, maintenance and management of the Works including, but not limited to the following:
 - (i) All labor and Materials including consumables;
 - (ii) All temporary work of every description required including over ground pumping and other requirements to avoid disruption to the service whilst maintenance or repair work is carried out;
 - (iii) The provision and use of all equipment, tools and Plant of every kind, whether mechanical or non-mechanical, required for the expeditious carrying out of the Works in their proper sequence;
 - (iv) Provision for scaffolding, staging, guard rails, temporary stairs, temporary access during execution, approach roads up to the Site for the movement of vehicles, and heavy excavation machinery with supporting transport facility;
 - (v) Provision for excavation, back-filling, bringing to the Site extra fill for back-fill, making good and reinstating surfaces, disposing of surplus material, dealing with all ground water and wastewater flows, and for work in close proximity to other utility apparatus including protecting that apparatus;
 - (vi) Provision for work on pipe line corridors such as traffic control measures, safety barriers, obtaining any approvals and permits from authorities, and reinstatement of surfaces;
 - (vii) Cooperation and coordination of the work with related authorities, other contractors and utilities, including obtaining their permission before starting the related Works if required; and
 - (viii) Providing security arrangements to guard the Site and premises at all times and to maintain strict control on the movement of Materials and labor until the completion of the work.
17. Electricity costs and initial connection charges associated with operations shall be paid by PCMC directly to the electricity service provider. The power connections shall be obtained in the name of PCMC, the charges of which will be paid by PCMC directly to electricity department or reimbursed under provisional sum if paid by the Contractor.
18. The serviceable materials, recovered while shifting of utilities as ascertained by the Engineer, shall be deposited at designated store yards or as directed by the Engineer. No payment shall be made to the Contractor in this regard.

19. Works itemized in the BOQ will be subject to measurement. Such measurement will be in the unit of measurement shown the BOQ and payment shall be made on the measured quantities.
20. Any item of work which is specified and required for the construction works, but not included or itemized in the BOQ, shall be treated as an extra item and will be paid separately.
21. All rules and regulations of the labor department, contract labor Laws, provident fund and employee state insurance and connected Laws, and all other Laws of the land are to be complied with by the Bidder within the quoted rates.
22. PCMC will provide required space for construction of service centers, and stores may be in PCMC campuses or at suitable locations. No land will be provided by the Employer to the Contractor for constructing any structure for his labor, workman and supervisory camps, un-authorized hutments, at the Site or within the premises. The Contractor shall make his/her own arrangements for the same outside the premises/boundary. These, if any, shall be with the knowledge of and prior approval of the Employer's Representative.
23. Bidders shall quote the fees / rates as per following;
- i) DMA Establishment Cost shall be minimum 10% of total Contract Price (Evaluated Bid Price)
 - ii) Operation & Maintenance service fees shall be minimum 25% of total Contract Price as per BoQ
 - iii) The ratio of DMA Establishment Fees, Construction Works cost & Operation and maintenance fees shall be in the ratio of 1:6.5:2.5
- Any increase in Construction Works cost shall be subject to comparison to the ratio above. In that case, Construction works cost will be reduced and adjusted with DMA Establishment Fees and Operation and Maintenance Fees proportionately by keeping the total Bid Price unchanged.
24. Bill of quantity (BOQ) for House service connection (HSC):- There are two methods of HSC is considered in BOQ. Method-1 is open excavation & Method-2 is through Moling Method.
If work is executed through Method-1 payment shall be made as per item No. 36 & 37 as applicable and no additional payment for MDPE pipe will be made & item no-71, 72, 73 & 74 is not applicable.
If work is executed through Method-2 payment shall be made as per item No-71 (Moling) + item No-72 (MDPE pipe) + Item no 73 & 74 (HSC on C.I, D.I & HDPE pipe respectively for actual measurements Item no 36 & 37 is not applicable.
Kindly Note for any HSC the payment will be made for any one Method only.

25. Metric System and Abbreviations

Millilitre	ml
Million Litres per Day	mld
Million Litre	ML
Litre	ltr
Linear meter	m
Gram	gm
Square metre	m ²
Cubic metre	m ³
Number	No.
Kilogram	kg

Lump Sum	LS
Indian Rupees	Rs
Millimetre	mm
Square Centimetre	cm ²
Square Millimetre	mm ²

26. The abbreviations used in the Specification and BOQ shall be read as follows:

IS	Indian Standard
BHP	Brake Horsepower
BS	British Standard
Cm or CM or cm	Centimeter
Cum or CUM	Cubic Meter
MM or mm	Millimeter /s
Rm or RM or RMT	Running Meters
Sqm	Square Meters
SqKm	Square Kilometers
Qty.	Quantity
Drg.	Drawing
No. or Nos.	Number or Numbers
PCC	Plain Cement Concrete
RCC	Reinforced Cement Concrete
Rs.	Indian Rupees

BILL OF QUANTITIES

Schedule R-1: Price Bid Summary Sheet

Price Bid Summary Sheet

Sr. No.	Description	Total Amount		
		INR		
1	Establishment of District Meter Areas (Item no 1 & 2 As per Price bid Schedule R-2)			0.00
2	Construction works (Item no 3 to 76 As per Price bid Schedule R-3)			0.00
3	Total Design & Construction Cost (1+2)	In Figure		0.00
		In Words		
4	O & M Services Cost (Item no 77 & 78 As per Price bid Schedule R-4)	In Figure		0.00
		In Words		
5	Evaluated Bid Price (3+4)	In Figure		0.00
		In Words		

SCHEDULE-R 2 Establishment of District Meter Areas

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
1	<p>A. Establishment of District Meter Areas and submission of reports</p> <p>1. Formation OF DMA</p> <p>2. Baseline validation of project area , map updating , updating pipe line network of project areas. etc.</p> <p>3. Experts services-3 Nos , Simulation of Pure water transmission mains & Distribution network etc.</p> <p>4. Consumer survey of the project areas</p> <p>5. Revised Rehabilitation Plan for the project Area</p> <p>B. water loss reduction (NRW) and management services</p> <p>1. Water loss reduction study</p> <p>2. Leak detection surveys, investigations, pressure management, reports, inlet outlet flow loggers report etc. complete.</p>				
	<p>3. including leak detection, leak reduction with latest technologies like helium gas, smart ball, sahara, listening stick, leak noise correlators or as appropriate.</p> <p>C. achieving continuous (24 x 7) pressurized water supply in DMA</p>				
		54000.00	per connection		0
2	Carrying out internal water audit leak test of consumer premises for checking leakages in the existing piping system, leakages of u/g tank & over head storage tank of consumer concealed water piping, leaking taps, defective float valves etc (with all equipment's required to detect the test)	16200.00	Nos.		0
				Total Amount in INR	0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
SCHEDULE-R 3 Bill of Quantity					
Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
3	Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 M and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding back filling, etc. complete.				
	Lift 0 to 1.5	11302.39	Cum		0
4	Excavation for foundation/pipe trenches in hard murum and boulders, W.B.M. road including removing the excavated material upto a distance of 50 M beyond the area and lifts as below, stacking and spreading as directed by Engineer-in-charge, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete.				
	Lift 0 to 1.5	113023.92	Cum		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
5	Excavation for foundation/pipe trenches in soft rock and old cement and lime masonry foundation asphalt road including removing the excavated material upto a distance of 50 M beyond the area and lifts as below, stacking as directed by Engineer-in-charge, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete.				
	Lift 0 to 1.5	74837.28	Cum		0
6	Excavation for foundation / pipe trenches in hard rock by and concrete Road by chiselling, wedging,,line drilling , by mechanical means or by all means other than blasting, including trimming and leveling the bed, removing the excavated material upto a distance of 50 meters beyond the area and lifts as below, stacking as directed by Engineer in charge normal dewatering excluding backfilling etc complete by all means.				
6.1	Lift 0 to 1.5	64897.76	Cum		0
6.2	Lift 1.5 to 3.0 m	9873.12	Cum		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
7	Manufacturing, providing and supplying spirally welded/ERW/SAW fabricated MS pipes (commercial quality) including procurement of plates, gas cutting to required size, rolling, tack welding, assembling in suitable lengths to form pipes, welding on automatic welding machine and forming 'V' edge on both ends of pipes including all taxes (Central and local), railway freight, insurance, unloading from railway wagon, loading into truck, transport to stores/site, unloading, stacking etc. complete as per IS-3589 and IS 5504 as applicable as per specifications (No negative tolerance in thickness is permissible).				
	(Without excise duty)				
7.1	1300 mm dia (ID) MS pipes, 12.0 mm thick.	150.00	Rmt.		0
7.2	800 mm dia (ID) MS pipes, 10 mm thick.	150.00	Rmt.		0
8	Providing D.I.K-7 grade pipes with internal cement mortar lining including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores/site, unloading, stacking etc. complete.				
	(IS:8329-2000 Latest Version) (Without excise duty)				
8.1	1000 mm dia. DI K-7 Pipe	7584.72	Rmt.		0
8.2	700 mm dia. DI K-7 Pipe	824.34	Rmt.		0
8.3	600 mm dia. DI K-7 Pipe	2754.78	Rmt.		0
8.4	500 mm dia. DI K-7 Pipe	1646.66	Rmt.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
8.5	450 mm dia. DI K-7 Pipe	5352.38	Rmt.		0
8.6	400 mm dia. DI K-7 Pipe	7480.56	Rmt.		0
8.7	350 mm dia. DI K-7 Pipe	2874.04	Rmt.		0
8.8	300 mm dia. DI K-7 Pipe	12980.32	Rmt.		0
9	Providing and supplying ISI standard MS Specials of required thickness with 3 coats of approved make epoxy paint (Shalimar, Ciba or Mahindra & Mahindra make) from inside and outside including all taxes (Central and Local), octroi, inspection charges, transportation to stores/site and stacking etc. complete. (All types of specials)				
		24000.00	Kg		0
10	Providing and supplying ISI standard D.I. specials and fitting with sealing rubber gasket of S.B.R. complete with cast iron follower gland and M.S. bolts coated or otherwise protected from rusting and suitable for D.I. pipes including cost of labour, materials, and transportation to stores / site, loading and unloading including all taxes etc. complete as per I.S.-9523.				
10.1	80 to 300 mm dia.	6700.00	Kg		0
10.2	350 mm and above dia	115000.00	Kg		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
11	Providing and supplying at site of ductile iron / spheroidal graphite (S.G.) iron D/F double eccentric resilient seated short body butterfly valves with gear box & hand wheel, without bypass arrangement. Valves in accordance with. BS EN 593 of PN 10/16 rated, with body & disc of ductile iron confirming to EN 1563/IS 1865 Gr.500/7 or Gr.400/15, Body seat of intergral SG Iron/S.S. AISI 316, seal retaining ring of steel C45/S.S. 1.4436, Shaft of 8.S. 1.4021, Periferial disc seal and "O" rings of WRAS approved EPDM rubber (suitable for drinking water), Internal fasteners of stainless steel A2. Body & disc coated inside & outside with electrostatically applied epoxy powder coated blue colour. (suitable for drinking water.) as per DIN 30677- 2 & GSK guidelines with a coating thickness of min. 250 microns. Valves should be 100%tight shut-off				
	. Face to face is per IS 13095 short body. Flange drilling as per IS 1538 raised face & pressure testing at manufactures works shall be done as per IS 13095. Including all taxes and transportation charges etc. complete.				
	A) Manually operated				
	Butterfly valve P.N-1				
11.1	1000 mm dia.	2.00	No.		0
11.2	700 mm dia.	2.00	No.		0
11.3	600 mm dia.	52.00	No.		0
11.4	500 mm dia.	19.00	No.		0
11.5	450 mm dia.	15.00	No.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
11.6	400 mm dia.	23.00	No.		0
11.7	350 mm dia.	6.00	No.		0
12	Lowering, laying and jointing in position following C.I. D/F Reflux valves, Butterfly valves and Sluice valves including cost of all labour jointing material, including nut bolts and giving satisfactory hydraulic testing etc.complete. (Rate for all class of valves.)				
12.1	1000 mm dia.	2.00	No.		0
12.2	700 mm dia.	2.00	No.		0
12.3	600 mm dia.	52.00	No.		0
12.4	500 mm dia.	19.00	No.		0
12.5	450 mm dia.	15.00	No.		0
12.6	400 mm dia.	23.00	No.		0
12.7	350 mm dia.	6.00	No.		0
12.8	300 mm dia.	20.00	No.		0
12.9	250 mm dia.	16.00	No.		0
12.10	200 mm dia.	14.00	No.		0
12.11	150 mm dia.	38.00	No.		0
12.12	100 mm dia.	90.00	No.		0
13	Transporting within 500 meters, laying in position to correct line and level M.S. specials/pipes with/without any out coating, such as distance pieces, straps, bends, tapers, etc. on prepared bedding in trenches including marginal cutting wherever required, assembling tack welding the same. The rate to including loading, unloading, hoisting etc. complete as specified.				

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
13.1	1300 mm dia (ID) MS pipes, 12.0 mm thick.	150.00	Rmt.		0
13.2	800 mm dia (ID) MS pipes, 10 mm thick.	150.00	Rmt.		0
14	Lowering, laying and jointing with SBR rubber gaskets D.I. K-7 of various classes with CI/MS specials of following diameter in proper position, grade and alignment as directed by Engineer in charge including conveyance of material from stores to site of work, including cost of jointing materials and rubber rings labour, giving hydraulic testing etc. complete. (Without rubber ring)				
14.1	1000 mm dia. DI K-7 Pipe	7584.72	Rmt.		0
14.2	700 mm dia. DI K-7 Pipe	824.34	Rmt.		0
14.3	600 mm dia. DI K-7 Pipe	2754.78	Rmt.		0
14.4	500 mm dia. DI K-7 Pipe	1646.66	Rmt.		0
14.5	450 mm dia. DI K-7 Pipe	5352.38	Rmt.		0
14.6	400 mm dia. DI K-7 Pipe	7480.56	Rmt.		0
14.7	350 mm dia. DI K-7 Pipe	2874.04	Rmt.		0
14.8	300 mm dia. DI K-7 Pipe	12980.32	Rmt.		0
15	Providing and constructing B.B. masonry valve chamber with 15 cm thick 1:3:6 proportion PCC bedding, excluding excavation, B.B. masonry in C.M.1:5 Proportion precast RCC frame and cover, etc. complete as directed by Engineer-in-charge. Note: Wall thickness : 0.23 M for depth of 1.2 M and 0.35 M for balance depth exceeding 1.2 m.				
15.1	a) 1.5 m x 1.5 m x 1.5 m	125.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
15.2	b) 1.50 m x 1.50 m x 2.1 m	41.00	Nos.		0
15.3	c) 1.20 m x 1.20 m x 1.20 m	25.00	Nos.		0
15.4	d) 0.90 m x 0.60 m x 1.20 m	50.00	Nos.		0
16	Providing and laying in situ, following grade of plain cement concrete of trap granite /quartzite /gneiss metal for foundation and bedding including normal dewatering formwork compaction and curing etc. complete.				
		9517.15	cum		0
17	Providing and applying with mechanical arrangement 1:3 proportion cement sand gunite, 40 to 50 mm thick to M.S. pipe surface under 2.1 kg per sqcm to 2.80 kg. per sqcm pressure including removing the loose materials as directed by Engineer in charge and including scrapping the surface with wire brushes, degreasing, cleaning by compressed air and providing fixing BRC fabric no.14 as reinforcement, curing for 21 days, disposing off the rebound materials within a lead of 50 m. etc. complete as directed by Engineer in charge.				
	800 mm dia (ID) MS pipes, 10.0 mm thick.	386.47	Sqm		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
18	Providing and making inner cement mortar lining to M.S. pipes with mechanical devices in cement mortar 1:1 proportion, including cost of all materials, labour, equipments and taking necessary access openings and manholes, cuts at suitable intervals as directed by Engineer in charge and rewelding the same after done with doubler plates pipes including necessary excavation, refilling concrete breaking and remaking if any, breaking guniting and remaking the same, repainting wherever required with epoxy paint in 3 coats, all dewatering including emptying the pipeline and refilling the same after done with (water to be supplied by department free of cost within 5 km lead at fixed point and all other arrangements to be done by agency), including carrying out "C" value performance test of pipeline, complete job as per the directions of the Engineer in charge.				
	800 mm dia (ID) MS pipes, 10 mm thick.	377.04	Sqm		0
19	Welding in all positions with required number of runs, for M.S. pipes internally and / or externally including gauging wherever necessary, fixing appurtenances and other accessories in connection with pi pe laying work as per specification.				
	Butt joints				
	12 mm thick				
19.1	1300 mm dia (ID) MS pipes, 12.0 mm thick.	104.00	Rmt.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
	8 mm thick				
19.2	800 mm dia (ID) MS pipes, 8.0 mm thick.	64.10	Rmt.		0
	Lap joints				
19.3	12 mm thick	5.00	m		0
19.4	8 mm thick	5.00	m		0
20	Gas cutting (either square cut or 'V' cut) pipes, plates, etc. of thickness.				
20.1	5 to 10 mm	50.00	Cum		0
20.2	10 to 12 mm	15.00	Cum		0
21	Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire)				
		32.00	MT		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
22	Pushing of M.S. pipe of following dia. For road crossing and railway crossing by push through method in all types of strata by using hydraulic jack and drilling machine of required diameter, below 3.0 m depth including lowering, laying, jointing of M.S. casing pipe including cost of all labour, fuel and material required welding machinery, tripod, chain pulley block, crane, blower etc. transportation and dewatering etc. complete as directed by Engineer in charge but excluding cost of M.S. pipes.				
	500 mm to 1300 mm dia.	150.00	Rmt.		0
23	Reinstating the road surfaces with excavation, by providing & laying , spreading graded course aggregate conforming with table 400-13 to wet mix macadam specification including premixing the material with water at OMC in mechanical plant carriage of mixed material by tipper to site laying in uniform layers with paver finisher in sub-base/base course on well prepared surface and compacting with vibratory roller , 25 mm thick premixed bitumen carpet with hot mixed seal coat including compacting etc. complete.				
		48964.60	sqm		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
24	Refilling the trenches with available excavated stuff with soft material first over pipeline and then hard material in 15 cm layers with all leads and lifts including consolidation, surcharging, etc. complete.				
		237998.45	Cum		0
25	Disposing off the surplus excavated stuff upto 5 km range beyond initial lead included in the excavation item				
25.1	upto 5 km	14805.00	Cum		0
25.2	upto 10 km	6345.00	Cum		0
26	Making interconnection to existing transmission main of any type including excavation, breaking and removing existing pipes, lowering laying of specials and pipes in their position, refilling closing w/s in that area, dewatering and restarting the w/s etc complete.				
26.1	1000 mm	8.00	No		0
26.2	700 mm	25.00	No		0
26.3	600 mm	57.00	No		0
26.4	500 mm	19.00	No		0
26.5	450mm	115.00	No		0
26.6	400 mm	240.00	No		0
26.7	350 mm	105.00	No		0
26.8	300mm	372.00	No		0
26.9	250 mm	22.00	No		0
26.10	200 mm	140.00	No		0
26.11	150 mm	350.00	No		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
26.12	100 mm	750.00	No		0
27	Providing erecting and commissioning MS dismantling joint as per requirement and departments approved drawing and specifications, including machining and rubber ring and suitable for 16 kg/cm ² working pressure with required flanges of suitable side with nut and bolt etc. complete. The joint should have long bolts so that during normal working pressure there should be no sliding movement of sliding flanges LOF (length over flange) should not be less than 75% of dia.				
27.1	200 mm	14.00	Nos.		0
27.2	250 mm	16.00	Nos.		0
27.3	300 mm	20.00	Nos.		0
27.4	400 mm	23.00	Nos.		0
27.5	500 mm	19.00	Nos.		0
27.6	600 mm	52.00	Nos.		0
27.7	700 mm	10.00	Nos.		0
27.8	1000 mm	5.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
28	Lowering, laying and jointing of HDPE pipes by heating to the ends of pipes with the help of teflon coated electric mirror/heater to the required temperature and then pressing the ends together against each other, to form a monolithic and leak proof joint by thermosetting process. The pressing may be required to be done with hydraulic jacks/butt fusion machine etc. complete with all materials, labours as directed by Engineer in charge including giving satisfactory hydraulic test.				
28.1	110 mm dia.	70200.00	m		0
28.2	160 mm dia	31980.00	m		0
28.3	180 mm dia	297.00	m		0
28.4	200 mm dia	403.00	m		0
28.5	225 mm dia	11656.00	m		0
28.6	250 mm dia	316.00	m		0
28.7	280 mm dia	8127.00	m		0
28.8	315 mm dia	3867.00	m		0
29	Providing and supplying ISI standard CI flanged S&S specials including all taxes (Central & Local), railway freight, insurance, unloading from railway wagon, loading into truck, transport to departmental store/site, unloading stacking etc. complete.				
	D/F Specials				
29.1	80 to 300 mm dia.	1400.00	kg		0
	S/S Specials/Socketted Br.Flanged Specials				
29.2	80 to 300 mm dia.	1000.00	kg		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
30	Providing and supplying in standard lengths Polyethylene Pipes, confirming to IS-4984/ 14151/12786/13488 with necessary jointing material like mechanical connectors i.e. thread/insert joint/quick release coupler joint/compression fitting joint or flanged joint, including all local & central taxes, transportation & freight charges, inspection charges, loading/ unloading charges, conveyance to the departmental stores/ site and stacking the same enclosed shade duly protecting from sunrays and rains, etc. complete. (P.E-100 grade)				
30.1	110 mm dia.	70200.00	m		0
30.2	160 mm dia	31980.00	m		0
30.3	180 mm dia	297.00	m		0
30.4	200 mm dia	403.00	m		0
30.5	225 mm dia	11656.00	m		0
30.6	250 mm dia	316.00	m		0
30.7	280 mm dia	8127.00	m		0
30.8	315 mm dia	3867.00	m		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
31	Providing and supply of electro fusion fittings in accordance with BS EN 12201:Part-3 suitable for drinking water with in black/blue colour manufactured from compounded PE100 virgin polymer and compatible with PE100 pipes, in pressure rating SDR11 with min PN 12.5 rated for water application and shall be inclusive of all cost such as testing, all taxes related to central, state and municipal, inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc. complete.				
	A) Fabricated Bends 90 / 45 degree				
31.1	110 mm dia.	597.00	Nos.		0
31.2	160 mm dia	306.00	Nos.		0
31.3	180 mm dia.	5.00	Nos.		0
31.4	200 mm dia	79.00	Nos.		0
31.5	225 mm dia	17.00	Nos.		0
31.6	250 mm dia	8.00	Nos.		0
31.7	280 mm dia	399.00	Nos.		0
31.8	315 mm dia	185.00	Nos.		0
	B (Couplers)				
31.9	110 mm dia.	25.00	Nos.		0
31.10	160 mm dia	12.00	Nos.		0
31.11	180 mm dia.	6.00	Nos.		0
31.12	200 mm dia	390.00	Nos.		0
31.13	225 mm dia	191.00	Nos.		0
31.14	250 mm dia	10.00	Nos.		0
31.15	280 mm dia	17.00	Nos.		0
31.16	315 mm dia	219.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
	C) TEE				
31.17	110 mm dia.	188.00	Nos.		0
31.18	160 mm dia	8.00	Nos.		0
31.19	180 mm dia.	18.00	Nos.		0
31.20	200 mm dia	6.00	Nos.		0
31.21	225 mm dia	8.00	Nos.		0
31.22	250 mm dia	25.00	Nos.		0
31.23	280 mm dia	702.00	Nos.		0
31.24	315 mm dia	98.00	Nos.		0
	D) Reducers				
31.25	160 x 110	40.00	Nos.		0
31.26	200 x 160	8.00	Nos.		0
31.27	225 x 160	10.00	Nos.		0
31.28	250 x 160	20.00	Nos.		0
31.29	250 x 200	30.00	Nos.		0
	D) END CAP				
31.30	110 mm dia.	42.00	Nos.		0
31.31	160 mm dia	4.00	Nos.		0
31.32	180 mm dia.	6.00	Nos.		0
31.33	200 mm dia	41.00	Nos.		0
31.34	225 mm dia	31.00	Nos.		0
31.35	250 mm dia	13.00	Nos.		0
31.36	280 mm dia	6.00	Nos.		0
31.37	315 mm dia	5.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
32	Providing and supplying at site of ductile iron / spheroidal graphite (S.G.) iron D/F double non -rising spindle resilient seated glandless sluice valves with hand wheel, without bypass arrangement. Valves in accordance with. BS EN 5163 of PN 10/16 rated, with body'& disc of ductile iron confirming to EN 1563/IS 1865 Gr.500/7 or Gr.400/15, wedge fully encapsulated WRAS approved EPDM rubber (suitable for drinking water), Wedge Nut of brass, shaft of stainless steel 11.4021/1.4101 stem seals min. 3 nos. of NBR. internal fastners of stainless steel A2. Body & bonnet coated inside & outside with electrostactically applied epoxy powder coated blue colour. (suitable for drinking water.) as per DIN 30677- 2 & GSK guidelines with a coating				
	thickness. of min. 250 microns. Valves should be full bore & tight shutoff. flange drilling as per IS 1538 raised face & pressure				
	Sluice valves - PN -1				
32.1	100 mm dia	90.00	Nos.		0
32.2	150 mm dia	38.00	Nos.		0
32.3	200 mm dia	14.00	Nos.		0
32.4	250 mm dia	16.00	Nos.		0
32.5	300 mm dia	20.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
33	Providing and supplying, lowering laying & jointing at site ductile iron/spheroidal Graphite (S.G) iron single/ double chamber tamper proof air valve without isolating sluice valve . Valves in accordance with BSEN 1074-4 of PN 10/16 rated with body and bonnet of ductile iron confirming to EN 1563/IS 1865 Gr. 500/7 or Gr 400/15 floats, Float guide , seat ring of stainless steel 1.4436/1.4306, seat ring gasket of WRAS approved EPDM rubber (suitable for drinking water), internal fasteners of stainless steel A2 body and bonnet coated inside and outside with electrostatically applied epoxy powder coated blue colour (suitable for drinking water) as per DIN 30677-2 & GSK guidelines with a coating thickness of min. 250 microns. Flange connections as per IS 1538 raised face & pressure testing at manufactures works shall be done as per IS 14845. Including all taxes and transportation charges etc. complete				
33.1	80 mm dia	2.00	Nos.		0
33.2	100 mm dia	5.00	Nos.		0
33.3	150 mm dia	5.00	Nos.		0
33.4	200 mm dia	20.00	Nos.		0
34	Providing and installation Pipe ends and slip on flange (PE 100, HDPE) to connect HDPE to metal pipe including all local and central taxes etc.				
34.1	110 mm dia.	200.00	Nos.		0
34.2	160 mm dia	150.00	Nos.		0
34.3	180 mm dia	80.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
34.4	200 mm dia	120.00	Nos.		0
34.5	225 mm dia	50.00	Nos.		0
34.6	250 mm dia	50.00	Nos.		0
34.7	280 mm dia.	50.00	Nos.		0
34.8	315 mm dia.	50.00	Nos.		0
35	Providing and fixing water meter box of HDPE/GRP material , including necessary excavation, cost of locking arrangement etc complete of suitable size for 15 to 40 mm dia.	54000.00	Nos		0
36	Providing and making MDPE pipe consumer service connection on CI/DI pipes with the help of Ratchet and dye drill including all labour, MDPE pipe 10 m length, MDPE specials like double compression elbow, female threaded adopter with metal insert, UPVC/metal lockable ball Valves (as approved by Engineer-in-charge, GI casing pipe of 40/50 mm for road crossing. The rate to include labour required, excavation, fitting, refilling, closing water supply in that area, dewatering and restarting the water supply, transportation etc complete as directed by Engineer-in-Charge.				
	On Existing D.I/C.I pipe				
36.1	a) For connection on CI/DI/GI pipe with road crossing (15mm)	15421.00	Nos.		0
36.2	b) For connection on CI/DI/GI pipe without road crossing (15mm)	15421.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
36.3	c) For connection on CI/DI/GI pipe with road crossing (20mm)	144.00	Nos.		0
36.4	d) For connection on CI/DI/GI pipe without road crossing (20mm)	144.00	Nos.		0
36.5	e) For connection on CI/DI/GI pipe with road crossing (25mm)	533.00	Nos.		0
36.6	f) For connection on CI/DI/GI pipe without road crossing (25mm)	533.00	Nos.		0
37	Providing and making MDPE pipe consumer service connection on HDPE pipes with the help of electro fusion machine or Ratchet and dye drill including all labour, MDPE pipe 10 m length, MDPE specials like electro fusion tee, Coupler, double compression elbow, female threaded adopter with metal insert, UPVC/metal lockable ball Valves (as approved by Engineer-in-charge, GI casing pipe of 40/50 mm for road crossing. The rate to include labour required, excavation, fitting, refilling, closing water supply in that area, dewatering and restarting the water supply, transportation etc complete as directed by Engineer-in-Charge.				
	On HDPE pipe				
37.1	a) For connection on HDPE pipe with road crossing (15mm)	5140.00	Nos.		0
37.2	b) For connection on HDPE pipe without road crossing (15mm)	5140.00	Nos.		0
37.3	c) For connection on HDPE pipe with road crossing (20mm)	48.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
37.4	d) For connection on HDPE pipe without road crossing (20mm)	48.00	Nos.		0
37.5	e) For connection on HDPE pipe with road crossing (25mm)	178.00	Nos.		0
37.6	f) For connection on HDPE pipe without road crossing (25mm)	178.00	Nos.		0
	42928.00				
38	Providing, lowering, laying and fixing D.I saddle strap of following bore size and pipe diameter including all taxes(central, state and municipal), insurance, freight, loading, unloading, stacking, etc complete as directed by Engineer in Charge				
38.1	a)100 mm dia. pipe	19318.00	Nos.		0
38.2	b)150 mm dia. pipe	9659.00	Nos.		0
38.3	c)200 mm dia. pipe	3220.00	Nos.		0
39	Providing ISI mark G.I Pipe of following class and dia. including all local and central taxes, octroi, inspection charges, transportation to stores, etc. complete as per I.S 1239/2004				
	Medium Duty				
39.1	15 mm	33320.00	RMT		0
39.2	20 mm	250.00	RMT		0
39.3	25 mm	650.00	RMT		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
40	Electro - magnetic flow meter Design , supply, installation, testing , interfacing to PLC and commissioning of full bore magnetic flow transmitter at ESRs and DMA's at various location. The rate is inclusive of taxes, installation , Integration, testing etc. Complete. As per directed by Engineer-in-charge.				
40.1	200 mm dia	3.00	Nos.		0
40.2	300 mm dia	2.00	Nos.		0
40.3	400 mm dia	1.00	Nos.		0
40.4	450 mm dia	2.00	Nos.		0
40.5	500 mm dia	2.00	Nos.		0
40.6	600 mm dia	59.00	Nos.		0
40.7	800 mm dia	1.00	Nos.		0
41	Electro - magnetic full bore Battery operated flow meter Design , supply, installation, testing , interfacing to PLC and commissioning of full bore magnetic flow transmitter at ESRs and DMA's at various location. The rate is inclusive of taxes installation , Integration, testing etc. Complete. As per directed by Engineer-in-charge.(battery life of 10 years)				
41.1	200 mm dia	57.00	Nos.		0
41.2	300 mm dia	38.00	Nos.		0
41.3	400 mm dia	12.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
41.4	450 mm dia	1.00	Nos.		0
41.5	500 mm dia	1.00	Nos.		0
41.6	600 mm dia	1.00	Nos.		0
42	Providing, installing and giving satisfactory trial of flange ends bulk meter of EEC mark removable mechanism type without remote reading facility as per ISO 4064				
42.1	80 mm dia	10	Nos.		0
42.2	100 mm dia	12	Nos.		0
42.3	150 mm dia	15	Nos.		0
43	SENSOR / TRANSMITTER CABLE :-Providing, laying and jointing with test and trial of sensor / Transmitter cable 4 x 0.38 mm PVC cable common, braided copper shield etc. as per detailed specification.				
		1300.00	RMT		0
44	COIL CABLE :-Providing, laying and jointing with test and trial of COIL cable 3 x 0.75 mm PVC cable common, braided copper shield etc. as per detailed specification.				
		1300.00	RMT		0
45	GI DUCT :-Providing and laying GI duct of 100 mm with all the necessary fittings, joints etc, for housing the cables between sensor and transmitter etc. complete as per detailed specification.				
		1300.00	RMT		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
46	PANEL CABINET :-Fixing of flow meter transmitter to internal walls of building / inside suitable designed panel cabinet with proper locking arrangement with glass window on front door for seeing reading of flow transmitter and data logger without opening of panel cabinet. It should house complete ancillaries and including the provision of connection of electrical power supply from nearby apartments. The panel cabinet shall be pre wired and suitable gland entries etc. as per detailed specification.				
		324.00	Nos		0
47	CUTTING OF EXISTING PIPELINE :-Cutting and champhering of pipes of following diameter including cost of all materials and labour involved etc., competed as directed by in Engineer in charge (For all class of pipes)				
47.1	100 mm dia.	20.00	Nos.		0
47.2	150 mm dia.	21.00	Nos.		0
47.3	200 mm dia.	22.00	Nos.		0
47.4	250 mm dia.	23.00	Nos.		0
47.5	300 mm dia.	24.00	Nos.		0
47.6	350 mm dia.	25.00	Nos.		0
47.7	400 mm dia.	26.00	Nos.		0
47.8	450 mm dia.	27.00	Nos.		0
47.9	500 mm dia.	28.00	Nos.		0
44.10	600 mm dia.	29.00	Nos.		0
44.11	700 mm dia.	30.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
48	MECHANICAL JOINTS AND FITTINGS :- Mechanical compression collar couplings (Popularly known as Jiffy TM collar coupling) suitable for C.I. Spun pipes (As per IS 1536-2001) and D.I. Pipes (As per IS 8329-2000) complete with sealing rubber gasket of S.B.R., cast iron follower glands and mild steel nut bolts. The whole assembly should be mechanically and hydraulically tested to the provision as laid down in IS 1538/1993. The rates are including cost of material, forwarding charges, sale tax, loading, transportation and unloading at departmental store etc. complete.				
48.1	1000 mm dia	4.00	Nos.		0
48.2	600 mm dia	140.00	Nos.		0
48.3	500 mm dia	60.00	Nos.		0
48.4	450 mm dia	60.00	Nos.		0
48.5	400 mm dia	100.00	Nos.		0
48.6	300 mm dia	100.00	Nos.		0
48.7	80 mm dia	200.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
49	Supply of C.I. mechanical compression flanged/socket tail pieces (Popularly known as I-TM flanged/socket tail piece) suitable for making flanged connection with the plain barrel of C.I. spun pipes (As per IS 1536/2001) AND d.i. PIPES (As per IS 8320/2000). the tail piece to be supplied complete with sealing rubber gasket of S.B.R. cast iron follower glands and mild steel nut bolts. The whole assembly should be mechanically and hydraulically tested as per provisions laid down in IS 1538/1993)				
49.1	1000 mm dia	4.00	Nos		0
49.2	600 mm dia	140.00	Nos		0
49.3	500 mm dia	60.00	Nos		0
49.4	450 mm dia	60.00	Nos		0
49.5	400 mm dia	100.00	Nos		0
49.6	300 mm dia	100.00	Nos		0
49.7	80 mm dia	200.00	Nos		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
50	RCC VALVE CHAMBERS :-Providing and constructing R.C.C. chamber for Electromagnetic / Mechanical Flow Meter with 15 cm thick M - 100 PCC bedding, 15 cm thick bottom slab, walls and precast RCC covers on chamber in RCC M - 200 as per detailed drawing and design including normal dewatering, centering, formwork, bully / steel prop. - UPS, compaction, finishing the formed surface with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface finish with curing including providing and fixing in position steel bar reinforcement of various diameter for RCC slabs, walls etc. including cutting, bending, hooking the bars, binding with wires etc. complete as directed by Engineer - in - charge for following size.				
	Size 2.0 x 1.2 x 1.5 m Depth	38.00	Nos.		0
51	Providing and fixing CI strainer "T" (Basket) type flange end and stainless steel or Brass mesh wire opening of 2.5 mm to 3 mm and suitable for operating pressure of 16 Kg/cm ²				
	(For mechanical meters)				
51.1	80 mm dia	10	Nos.		0
51.2	100 mm dia	12	Nos.		0
51.3	150 mm dia	15	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
52	Providing, installing and giving satisfactory field testing of domestic water meter, horizontal inferential single or multi jet type with magnetic drive and dry dial suitable for ambient 50 degree C temperature duly sealed against tampering complete with couplings at both ends and conforming to class B as per IS 779/ 1994 (6th revision) with ISI mark along with manufacturers test certificate and guarantee certificate including cost of all materials and labour.operating pressure of 16 Kg/cm2.				
	E E C/MID / OIML mark (without remote reading facility) (Multi jet)				
	EEC mark 15 mm	49000	Nos.		0
53	Supply of Domestic water meter, brass body, horizontal inferential multijet type , magnetic drive with anti-fraud shield and dry dial with IP 68 (Totalizer of meter made of copper can /suitable anti corrosive metallic material required to maintain IP68 protection class) suitable for ambient 50° C Temperature duly sealed against tampering complete with couplings at both ends and confirming to ISO 4064 : 2005 with valid CE mark mentioning notified body number along with MID / OIML / ISO certification from a recognized International laboratory				
	Fully AMR meter				
53.1	15 mm Dia	2403.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
53.2	20 mm Dia	481.00	Nos.		0
53.3	25 mm Dia	1776.00	Nos.		0
54	Supply of Woltman type AMR bulk water meter, Cast Iron Body (FG 260) magnetic drive, dry dial, hermetically sealed register of IP68 (Totalizer of meter made of copper can /suitable anti corrosive metallic material required to maintain IP68 protection class) protection class with removable mechanism and be fitted with a low mass rotor which is parallel to the direction of water flow and exhibits dynamic thrust relief, conforming to ISO 4064:2005 with valid CE mark mentioning notified body number on meter dial for each size, along with MID / OIML certification from a recognized International laboratory				
	Fully AMR meter				
54.1	40 mm	165.00	Nos.		0
54.2	50 mm	155.00	Nos.		0
54.3	80 mm	10.00	Nos.		0
54.4	100 mm	6.00	Nos.		0
54.5	150 mm	4.00	Nos.		0
	54000				
55	Reading equipment :-Supply of Hand Held Unit along with license copy of HHU Software for data collection complete with RF transceiver	2.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
56	Supply & install of License copy of web based AMR Software and One time implementation charges for maximum 1 Lakh end points Basic set of features including the Mobile software and the web application. It gives the water utilities access to collect their meters and store collected data in the cloud and export them to the billing system with a pre-defined file format.	1.00	Nos.		0
57	Providing PRV with straight type body and rolling diaphragm 150 mm and above as per quotation				
57.1	100 mm dia.	2.00	Nos.		0
57.2	150 mm dia.	14.00	Nos.		0
57.3	200 mm dia.	1.00	Nos.		0
57.4	300 mm dia.	7.00	Nos.		0
57.5	400 mm dia.	1.00	Nos.		0
58	Designing, manufacturing, providing, erecting and fixing altitude control valve for maintaining water level in the service reservoir and reducing NRW on account of overflowing. (Singer/Equivalent makes 106-A-Type 4- One-Way flow with adjustable differential, altitude control valve fully mechanically operated). including 2 isolation DI Valve on upstream & downstream of Altitude Valve				
58.1	100 mm dia.	1.00	Nos.		0
58.2	150 mm dia.	1.00	Nos.		0
58.3	200 mm dia.	8.00	Nos.		0
58.4	250 mm dia.	8.00	Nos.		0
58.5	300 mm dia.	2.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
58.6	400 mm dia.	7.00	Nos.		0
59	SCADA Software System:- Design, supply, installation, testing, interfacing, integration to PLC and commissioning of SCADA software along with suitable OPC server and client for exchange of data with the existing SCADA system and also the cloud server to facilitate the use of web based interface as well as the App : Run time+ development version with unlimited Tags . Interfacing mechanism to link the new SCADA software with the existing software inclusive of the drivers, databases utilities etc so as to access data of the existing SCADA system without disturbing the functionality of the existing system.commissioning of web pages hosting of relevant data including charges of hosting, cloud services etc . And reporting utility, SMS and Email utility/modules as per the requirement .commissioning of Android and IOS based Apps with minimum 25 screens designed as per the requirement. The apps to be developed on the latest platform of the OS using state of the art development tools including upgrades and APIs as and when required for the entire duration of the project. including IT hardware like server, peripherals . The rate is inclusive of all taxes installation , integration, testing etc. complete or as r directed by the Engineer-in-charge.				
		1.00	Job		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
60	Providing supplying, fixing and commissioning GPRS enabled Data logger with internal battery having (3 years battery life) additional battery packs to ensure data transmission frequency of every 30 mins , dual channel for flow and pressure logging with internal pressure transducer, one PDA for local download , PC software, PC connection cable, Infra-red reading head, pressure hose, instruction manual etc. complete as directed by the Engineer-in-charge.The rate is inclusive of all taxes installation , integration, testing etc. complete. or as directed by Engineer-in-charge.	324.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
61	Pressure Transmitter Design, supply, installation, testing , programming, interfacing, integration to PLC and commissioning of Pressure transmitter at at ESRs / DMA. The rate is inclusive of E.D, P&F, VAT, Octroi, Installation, Integration, Testing etc. complete as per directed by Engineer-In charge he rate is inclusive of all taxes installation , integration, testing etc. complete. As per directed by Engineer-in-charge.	30.00	Nos.		0
62	Chlorine Analyser:- Design, supply, installation, testing, interfacing to PLC and commissioning of chlorine Analyser for ESRs . complete as directed by the Engineer-in-charge. he rate is inclusive of all taxes installation , integration, testing etc. complete. As per directed by Engineer-in-charge.	30.00	Nos.		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
63	Design, supply, installation, testing , and commissioning of PLC with control panel at each ESR / DMA Location with Modem to have pressure, flow, residual chlorine monitoring with actuator control facility. The PLC to be housed in Panel with related accessories (Communication on GPRS). The rate is inclusive of all taxes installation , programming, integration, testing etc. complete as per directed by Engineer-in-charge.	84.00	Nos.		0
64	Supply, delivery, erection, installation, testing and commissioning of Instrumentation Cable with all required accessories for all field instruments & controls i.e. for GPRS telemetry & SCADA system as per the General Specifications described in Section 6.23 Technical Specifications for Instrumentation of this document. Consisting of all peripherals and structure required for mounting viz: furniture's, platforms, railings etc. with all required hardware complete and as directed by Engineer-in -charge. The rate is inclusive of all taxes installation , integration, testing etc. complete. As per directed by Engineer-in-charge.	2000.00	Mtrs		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
65	<p>Designing, providing and constructing control room of required size and shape with RCC framed structure including excavation in all strata, 15 cm thick, PCC bedding in M-150 below foundation, providing M-200 RCC footing, columns, beams, lintels, chajjas and roof slab as per requirements and design. Providing and constructing B.B. masonry wall of 23 cm thickness in CM 1:6 together with providing and applying 20 mm thick cement plaster in CM 1:3 externally and internally including gray cement base marble mosaic tile flooring 25 cm x 25 cm x 20 mm thick, providing and fixing one steel door, fully glazed steel windows (the area of these windows shall be 20% of the floor area of building) together with proper spacing of windows as directed, including providing and applying three coats of oil paint to</p>	20.00	Sqm		0
	<p>doors including two coats of snowcem paint of approved shade and make to external surfaces and one coat primer and two coats plastic immersion paint of approved quality and shade be provided to internal surfaces of building including electrification to control room as per detailed specification and as directed by Engineer-in -charge</p>				

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
66	Design and Implementation of interfacing mechanism of new PLC based panels with existing PLC based panels to collect the data of existing instrumentation using required communication protocol inclusive of additional hardware like communication port and drivers to be added to the existing PLCs.	30.00	Nos.		0
67	Installation of steel product pipe by HDD method including preparing and setting up the plant and equipment, preparing new pipe work material, installing new pipe-work and commissioning system or making the system ready for commissioning by HDD operation including , all related civil and mechanical works like excavation, shoring/strutting etc. drilling, stringing, reaming, and pulling back the new pipe- work on the designed bore path alignment, proper disposal of drilling fluid and restoration of site after completion all inclusive as per InSTT:101-2007: code of practice for horizontal directional Technique suiting Indian Condition.The above rate are inclusive of all taxes etc complete				
	In all kind of soil				
67.1	a) 100 mm & upto 150 mm dia	30864.00	RMT		0
67.2	b) 200 mm & upto 300 mm dia	7190.00	RMT		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
68	Providing, lowering, laying and fixing DI Joint (bell joint) leak repair clamp including all taxes (Central, state and municipal), insurance, freight, loading, unloading, stacking, etc complete as directed by Engineer in Charge.The above rate are inclusive of all taxes etc complete				
	Joint Repair Clamp Make : Multimould Casting				
68.1	100 mm	714.00	Nos.		0
68.2	150 mm	651.00	Nos.		0
68.3	200 mm	294.00	Nos.		0
68.4	250 mm	260.00	Nos.		0
68.5	300 mm	371.00	Nos.		0
69	Providing, lowering, laying and fixing Stainless steel single/double/tripple band leak repair clamp of following sizes including all taxes (Central, state and municipal), insurance, freight, loading, unloading, stacking, etc complete as directed by Engineer in Charge.The above rate are inclusive of all taxes etc complete				
	Crack Repair Clamp Make: AVK, Viking Johnson, Georg Fischer				
69.1	100 mm	476.00	Nos		0
69.2	150 mm	620.00	Nos		0
69.3	200 mm	280.00	Nos		0
69.4	250 mm	170.00	Nos		0
69.5	300 mm	200.00	Nos		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
70	Dewatering the excavated trenches and pools of water in the building trenches/ pipeline trenches, well works by using pumps and other devices including disposing off water to safe distance as directed by Engineer-in-charge (including cost of machinery, labour, fuel) etc complete	24840.00	HP/Hr		0
71	Installation of LDPE/MDPE duct/pipe by Moling method including making of entry and exit pits , all related civil works like excavation, shoring/strutting, maintaining the pits, backfilling the pits after pipe installation etc. and restoration of site after completion but excluding the cost of the duct/pipe.The above rate are inclusive of all taxes etc complete				
	For ducts/MDPE pipe 20 mm to 63 mm in mixed soil	53825.00	RMT		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
72	Providing ,Supplying, laying & jointing Blue MDPE pipes conforming to ISO 4427:1996 manufactured from virgin resin PE 80 Food grade compounded Raw Material having Blue Colour only assurance certificate from quality agencies like WRC / CIPET (India) / DVGM / KIWA / SPGN etc. for usage in Drinking Water with quality system The cost shall include testing of all materials, all taxes Central,Sate, Municipal, Inspection charges, transportation up to site, transit insurance, loading, as specified and directed. unloading, stacking etc. complete as specified and directed.(the pipe should be suitable for Moling method)				
72.1	i) 20 mm O.D	51403.00	RMT		0
72.2	ii) 25 mm O.D	481.00	RMT		0
72.3	iii) 32 mm O.D	1776.00	RMT		0
72.4	iv) 63 mm O.D	165.00	RMT		0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
73	Providing and making MDPE pipe consumer service connection on CI/DI pipes with the help of Ratchet and dye drill including all labour, MDPE specials like double compression elbow, female threaded adopter with metal insert, UPVC/metal lockable ball Valves (as approved by Engineer-in-charge, The rate to include labour required, fitting, closing water supply in that area, dewatering and restarting the water supply, transportation etc complete as directed by Engineer-in-Charge.(excluding the cost of excavation & MDPE pipe (Item only used for moling Method for HSC)				
	On Existing D.I/C.I pipe				
73.1	a) For connection on CI/DI/GI pipe with (15mm)	3855.00	Nos.		0
73.2	b) For connection on CI/DI/GI pipe (20mm)	36.00	Nos.		0
73.3	c) For connection on CI/DI/GI pipe (25mm)	133.00	Nos.		0
74	Providing and making MDPE pipe consumer service connection on HDPE pipes with the help of electro fusion machine or Ratchet and dye drill including all labour, MDPE specials like electro fusion tee, double compression elbow, female threaded adopter with metal insert, UPVC/metal lockable ball Valves (as approved by Engineer-in-charge, The rate to include labour required, fitting, closing water supply in that area, dewatering and restarting the water supply, transportation etc complete as directed by Engineer-in-Charge.(excluding the cost of excavation & MDPE pipe (Item only used for moling Method for HSC)				
	On HDPE pipe				

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
74.1	a) For connection on HDPE pipe (15mm)	1285.00	Nos.		0
74.2	b) For connection on HDPE pipe (20mm)	12.00	Nos.		0
74.3	c) For connection on HDPE pipe (25mm)	44.00	Nos.		0
75	Providing, erecting electric Valve actuators totally enclosed, weather-proof and dust proof construction with IP-67, protection class suitable for installation in any position without lubrication, leakage or other operational difficulty with special grease filled gear box and hand wheel for emergency manual operation which will automatically dis-engage on restoration of power to motor and with 10 watt single phase space heater and continuous local mechanical position indicator and individually replaceable counter gear assembly and with two torque and four limit switches with S.S. flap and operated with gear driven cams and of rating 250 Volt, 5 Amp, AC/DC, torque switch dial and with TEFC squirrel cage induction motor working on 440 Volts +/-10%,				

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
	3 phase, 50 Hz AC of intermittent duty rating S-2, insulation class "F" and temp rise restricted to class "B" with IP - 67 protection class suitable for DOL starting and with three thermostat and 30% over load margin. The torque rating of reduction gear box shall be at least 1.5 times max. torque required for opening and closing.				
75.1	200 mm dia.	7.00	each		0
75.2	250 mm dia.	8.00	each		0
75.3	300 mm dia.	10.00	each		0
75.4	350 mm dia.	3.00	each		0
75.5	400 mm dia.	12.00	each		0
75.6	450 mm dia.	8.00	each		0
75.7	500 mm dia.	10.00	each		0
75.8	600 mm dia.	26.00	each		0
75.9	700 mm dia.	1.00	each		0
76	Cabling Design, supply, installation, testing ,of cabling within DMA and ESR(various locations): Including supply, glands etc & Communication cables. The rate is inclusive of taxes, Installation, Integration, Testing etc. complete. As per directed by Engineer-In charge				
76.1	A) 7 X 1.5 Sqmm Copper, Armoured and screened cable	850.00	RMT		0
76.2	B) 3 x 1.5 Sqmm Copper Armoured cable	425.00	RMT		0
76.3	C) 4 X 1.5 sqmm Copper armoured cable	850.00	RMT		0
				Total Amount in Rs.	0

Item no.	Particulars of item	Quantity	Unit	Rate in Figure	Amount (INR)
77	SCHEDULE-R 4 Operation & Maintenance Cost				
77.1	From date of commissioning of DMAs	3612000	Connections Month		-
	54000*5*12 = 3240000 + 3,72,000 connection months				
78	Provisional O & M cost (Day sheet)				
78.1	Meter reader	600	month		-
78.2	Meter Reading Supervisor	60	month		-
	Sum of Table			Total Amount in Rs.	0