

**OFFICE OF THE MUNICIPAL CORPORATION BHOPAL, DIST-BHOPAL**

**APPENDIX 2.18**

**TENDER DOCUMENT**

**(FORM 'F' LUMPSUM TENDER FOR WATER SUPPLY WORKS)**

**NIT Number and Date** : \_\_\_\_\_

**Agreement Number and Date** : \_\_\_\_\_

**Name of Work** : **Water Supply Scheme of Municipal Corporation,  
Bhopal (Bhauri)**

**Name of the Contractor** : \_\_\_\_\_

**Probable Amount of Contract**  
**(Rs. In Figure)** : **Rs2031.04Lacs**

**(Rs. In Words)** : **Rupees Twenty CroresThirty One Lacs and  
FourThousand only**

**Contract Amount**  
**(Rs. In Figure)** : \_\_\_\_\_

**(Rs. In Words)** : \_\_\_\_\_

**Stipulated Period of Completion** : **18 months including rainy season**

# Tender Document

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OFFICE OF THE MUNICIPAL CORPORATION BHOPAL, DIST- BHOPAL

(FIRST CALL)

Section – 1

**Notice Inviting e-Tenders**

NIT No. \_\_\_\_\_/e-tendering

Date: \_\_\_\_\_

Online Lumpsum bids for the following works under “AMRUT” are invited from registered contractors and firms of repute fulfilling eligibility criteria:

S.No.	Work	Probable Amount (In Lacs)	Completion Period (months)
1.0	<p><b>Investigation</b>, Survey, Design, Construction and commissioning of water supply system based on upper lake in Bhauri area under Bhopal Municipal Corporation, including, Providing and laying of 3 nos. vertical turbine Raw water pumps at existing pump house and Intake well including 1 no. 400 mm dia Electromagnetic Bulk flow meters. Providing, laying and jointing of Raw water rising main comprising of 400 mm diameter DI K9 class pipe having total length of 10700m from intake to WTP including 13 nos. RCC chambers. Construction of WTP having capacity of 10.00 MLD including clear water reservoir having capacity of 4000 KL at WTP. Providing and installation of 2 nos. 100KVA transformer. Providing, Laying and Jointing of Distribution network comprising of 110 mm to 250 mm diameter HDPE pipe and DI K7 pipe 100 mm to 500 mm diameter having total length of 29008 m for water distribution network including 1 no. 250mm Electromagnetic Bulk flow meters and 25 nos. 80 mm dia Woltman turbine bulk meters. Supply and installation of domestic water meters (AMR compatible) for 1000 House service Connections The work shall also include 1 no. Railway crossing and 1 no. NH crossing with access road for maintenance</p>	Rs2031.04	18 months including rainy season

1. Interested Bidder can view the NIT on website <http://www.mpeproc.gov.in> and [www.mpurban.gov.in](http://www.mpurban.gov.in)
2. The Bid Document can be purchased only Online from 10:00 AM, 30.07.2016 to 17:30 PM, 29.08.2016.
3. Amendment to NIT, if any, would be published on website only, and not in Newspaper.

The Bidder shall operate and maintain the water supply system for 5 years after successful completion of the works as per Tender. The initial period of 2 years after completion shall be treated as Defect Liability Period (DLP).

**COMMISSIONER**  
**MUNICIPAL CORPORATION, BHOPAL**

## Notice Inviting e-Tenders

### OFFICE OF THE MUNICIPAL CORPORATION BHOPAL (Bhauri), DIST- BHOPAL

N.I.T. No...../e-tender

dated .....

Online lump-sum bids for the following works under “AMRUT” (estimated on UADD SOR w.e.f. 10/05/2012) on Form “F” are invited from registered contractors and firms of repute fulfilling eligibility criteria:

S.No.	Name of the work	Probable amount of contract (Rs. In Lacs)	Earnest Money Deposit (EMD) (In Rs)	Cost of Bid Document (In Rupees)	Category of Contractor	Time of Completion
1.0	<p><b>Investigation, Survey, Design, Construction and commissioning of water supply system based on upper lake in Bhauri area under Bhopal Municipal Corporation, including,</b></p> <p>Providing and laying of 3 nos. vertical turbine Raw water pumps at existing pumphouse and Intake well including 1 no. 400 mm dia Electromagnetic Bulk flow meters.</p> <p>Providing, laying and jointing of Raw water rising main comprising of 400 mm diameter DI K9 class pipe having total length of 10700m from intake to WTP including 13 nos. RCC chambers.</p> <p>Construction of WTP having capacity of 10.00 MLD including clear water reservoir having capacity of 4000 KL at WTP.</p> <p>Providing and installation of 2 nos. 100KVA transformer.</p> <p>Providing, Laying and Jointing of Distribution network comprising of 110 mm to 250 mm diameter HDPE pipe and DI K7 pipe 100 mm to 500 mm diameter having total length of 29008 m for water distribution network including 1 no. 250mm Electromagnetic Bulk flow meters and 25 nos. 80 mm dia Woltman turbine bulk meters.</p> <p>Supply and installation of domestic water meters (AMR compatible) for 1000 House service Connections</p> <p>The work shall also include 1 no. Railway crossing and 1 no. NH crossing with access road for maintenance</p>	Rs 2031.04	Rs 10,15,500	Rs50,000	Suitable class A of GoMP or equivalent in any State/Central Govt./PSU	18 months including rainy season.

1. All details relating to the Bid Document(s) can be viewed and downloaded free of cost from the website mentioned in NIT.
2. Bid document can be purchased after making online payment of portal fees through Credit/Debit/Cash Card/internet banking.

3. At the time of submission of the Bid the eligible bidder shall be required to:
  - i) pay the cost of Bid Document;
  - ii) deposit the Earnest Money;
  - iii) Submit an affidavit as per Annexure 'B'Details can be seen in the Bid Data Sheet
4. **ELIGIBILITY FOR BIDDERS:**
  - (a) At the time of submission of the Bid the bidder should have valid registration with the Government of Madhya Pradesh, PWD in appropriate class. However, such bidders who are not registered with the Government of Madhya Pradesh and are registered with Central Government, State Government, PSUs are eligible for submission of Bids.
  - (b) The bidder would be required to have valid registration with MPPWD in appropriate class at the time of signing of the Contract.
  - (c) Failure to sign the contract by the selected bidder, for whatsoever reason, shall result in forfeiture of the earnest money deposit.
5. **Pre-qualification** – Prequalification conditions, wherever applicable, are given in the Bid Data Sheet.
6. **Special Eligibility** - Special Eligibility Conditions, if any, are given in the Bid Data Sheet.
7. The Bid Document can be Purchased only Online from 10:00 (time) 30.07.2016 (date) to 17:30 (time) 29.08.2016 (date). Other key dates may be seen in Bid data sheet.
8. The Bidder shall operate and maintain the water supply system for 5 years after successful completion of the works as per Tender
9. Amendment to NIT, if any, would be published on website only, and not in Newspaper.

**COMMISSIONER  
MUNICIPAL CORPORATION, BHOPAL**

**SECTION 2**  
**INSTRUCTIONS TO BIDDERS (ITB)**

**A. GENERAL**

**1. SCOPE OF BID**

Survey, Design, Construction and commissioning of water supply system of Bhauri area based on Upper lake under Bhopal Municipal Corporation, including, Construction of water treatment plant, raw water pumps, Rising main, distribution system complete.

**Background**

The population of Bhauri area under Municipal Corporation, Bhopal is approximately 45000. As per the notification of MP Govt. Bhauri is now part of Municipal Corporation Bhopal under ward no. 3. There is no water supply system in Bhauri. Accordingly it is proposed to develop an integrated water supply system for Bhauri area based on existing intake well located at the upper lake for Bairagarh W/S scheme the same will be used for installation of pump for pumping the raw water to Bhauri area.

**Project**

The proposed project envisage,

- i) Survey, Design, Construction and commissioning of water distribution network in Bhopal Municipal area including, Providing, Laying and Jointing of Distribution network comprising of 110 mm to 250 mm diameter HDPE pipe and DI K7 pipe 100 mm to 500 mm diameter having total length of 29008 m for water distribution network including 1 no. 250mm Electromagnetic Bulk flow meters and 25 nos. 80 mm dia Woltman turbine bulk meters.
- ii) Providing and laying of 3 nos. vertical turbine Raw water pumps at Intake well including 1 no. 400 mm dia Electromagnetic Bulk flow meters.
- iii) Providing, laying and jointing of Raw water rising main comprising of 400 mm diameter DI K9 class pipe having total length of 10700m from intake to WTP including 13 nos. RCC chambers.
- iv) Construction of WTP having capacity of 10.00 MLD including clear water reservoir having capacity of 4000 KL at WTP. Providing and installation of 2 nos. 100KVA transformer.
- v) Supply and installation of domestic water meters (AMR compatible) for 1000 House service Connections.
- vi) Crossing of 1 no. Railway line crossing and 1 no. NH crossing with access road for maintenance
- vii) Road restoration after laying of pipelines as per the original condition of road.

Accordingly the essence of the project is.

- a) Augmenting the existing water supply system of the town upto 10.00 MLD.
- b) Supplying potable water @135 lpcd to the entire municipal area at a residual head of 7m.
- c) Providing domestic and bulk flow meters so as to keep the UFW upto 15%.

Therefore,

- i) The bidder shall ensure connections to each Bulk and retail consumer till the completion of construction works. For making the individual water connection due considerations shall be given to the access to the consumer point and accordingly side lanes and back lanes are to be identified and used if possible. Also existing useful water lines if found shall be suitably integrated with the proposed **water supply** system.
- ii) Bidder shall be examining the detail design and drawings and shall revalidate the same for preparation of detailed construction drawings as per actual working conditions including usage of ROW (right of way) and minimum obstruction to existing utilities and road ways.

On successful completion of the project as per best engineering practices the bidder shall operate and maintain the system for next 5 years. Therefore strict adherence to the best design practice, quality construction and timely implementation is most important.

The Detailed Project Report (DPR) for the work is available for viewing by the Bidder. However, it is clarified that the data and detailing of project in the DPR could be taken as base data only. The bidder is required to make his own assessment of work before bidding & the bidder shall not be entitled for claim on account of any deficiency / discrepancy in the data /information available in DPR.

**2. General Quality of Work:**

The work shall have to be executed in accordance with the drawings (prepared by Contractor and approved by the competent authority), technical specifications specified in the **Bid Data Sheet/Contract Data**, and shall have to meet high standards of workmanship, safety and security of workmen and works.

**3. PROCEDURE FOR PARTICIPATION IN E-TENDERING**

The procedure for participation in e-tendering is given in the **Bid Data Sheet**.

**4. ONE BID PER BIDDER**

4.1 The bidder can be an individual entity or a joint venture (if permitted as per Bid Data sheet). In case the J.V. is permitted, the requirement of joint venture shall be as per the Bid Data Sheet.

4.2 No bidder shall be entitled to submit more than one bid whether jointly or severally. If he does so, all bids wherein the bidder has participated shall stand disqualified.

4.3 In case of Bid submitted by the Joint Venture (Consortium of Bidders) only lead member should be essentially registered in appropriate class of Registration with the Government of Madhya Pradesh or are registered with Central Government, State Government, PSUs

**5. Cost of Bidding**

The bidder shall bear all costs associated with the preparation and submission of his bid, and no claim whatsoever for the same shall lie on the ULB.

**6. Site Visit and examination of works**

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 work. All costs shall have to be borne by the bidder.

**B. BID DOCUMENTS**

**7. CONTENT OF BID DOCUMENTS**

The Bid Document comprises of the following documents:

1. NIT with all amendments.
2. Instructions to Bidders,
3. Conditions of Contract:
  - i. Part I General Conditions of Contract and Contract Data; and
  - ii. Part II Special Conditions of Contract.
4. Specifications
5. Drawings,
6. Priced Bill of Quantities
7. Technical and Financial Bid
8. Letter of Acceptance
9. Agreement and
10. Any other document(s), as specified.

8. The bidder is expected to examine carefully all instructions, conditions of contract, the contract data, forms, terms and specifications, bill of quantities, forms and drawings in the Bid Document. Bidder shall be solely responsible for his failure to do so.

9. **Pre-Bid Meeting (where applicable)**

Wherever the **Bid Data Sheet** provides for pre-bid meeting:

9.1 Details of venue, date and time would be mentioned in the **Bid Data Sheet**. Any change in the schedule of pre-bid meeting would be communicated on the website only, and intimation to bidders would not be given separately.

9.2 Any prospective bidder may raise his queries and/or seek clarifications in writing before or during the pre-bid meeting. The purpose of such meeting is to clarify issues and answer questions on any matter that may be raised at that stage. The Employer may, at his option, give such clarifications as are felt necessary.

9.3 Minutes of the pre-bid meeting including the gist of the questions raised and the responses given together with any response prepared after the meeting will be hosted on the website.

9.4 Pursuant to the pre-bid meeting if the Employer deems it necessary to amend the Bid Document, it shall be done by issuing amendment to the online NIT.

10. **Amendment of Bid Documents**

10.1 Before the deadline for submission of bids, the Employer may amend or modify the Bid Documents by publication of the same on the website.

10.2 All amendments shall form part of the Bid Document.

10.3 The Employer may, at its discretion, extend the last date for submission of bids by publication of the same on the website.

**C. PREPARATION OF BID**

11. The bidders have to prepare their bids online, encrypt their Bid Data in the Bid Forms and submit Bid Seals (Hashes) of all the envelopes and documents related to the Bid required to be uploaded as per the time schedule mentioned in the key dates of the Notice Inviting e-Tenders after signing of the same by the Digital Signature of their authorized representative.

12. **DOCUMENTS COMPRISING THE BID**

The bid submitted online by the bidder shall be in the following parts:

**Part 1** – This shall be known as **Envelope A** and would apply for all bids. **Envelope A** shall contain the following as per details given in the **Bid Data Sheet**:

- a. Registration number or proof of application for registration and organizational details in format given in the Bid Data sheet.
- b. Payment of the cost of Bid Document;
- c. Earnest Money; and
- d. An affidavit duly notarized.

**Part 2** – This shall be known as **Envelope B** and required to be submitted only in works where pre-qualification conditions and/or special eligibility conditions are stipulated in the **Bid Data Sheet**. Online **Envelope B** shall contain a **self-certified sheet** duly supported by documents to demonstrate fulfillment of pre-qualification conditions.

**Part 3** – This shall be known as **Envelope C** and would apply to all bids. **Envelope C** shall contain financial offer in the **format** prescribed enclosed with the **Bid Data Sheet**.

13. **LANGUAGE**



The bid as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer shall be in English or Hindi. 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 English. In such case, for the purposes of interpretation of the bid, such translation shall govern.

#### **14. TECHNICAL PROPOSAL**

- 14.1 Only, in case of bids with pre-qualification conditions defined in the Bid data sheet, the Technical Proposal shall comprise of formats and requirements given in the **Bid Data Sheet**.
- 14.2 All the documents / information enclosed with the technical proposals should be self-attested and certified by the Bidder. The Bidder shall be liable for forfeiture of his earnest money deposit, if any document / information are found false/fake/untrue before acceptance of Bid. If it is found after acceptance of the Bid, the sanctioning authority may at his discretion forfeit his performance security/guarantee, security deposit, enlistment deposit and take any other suitable action.

#### **15. FINANCIAL BID**

- i. The bidder shall have to quote rates in format referred in Bid Data sheet, in Lumpsum, and not item wise. If the bid is in absolute amount, overall percentage would be arrived at in relation to the NIT amount. The overall percentage rate would apply for all items of work.
- ii. Lumpsum offer shall be quoted in figures as well as in words. If any difference in figures and words found, lower of the two shall be taken as valid and correct.
- iii. The bidder shall have to quote rates inclusive of all duties, taxes, royalties and other levies; and the Employer shall not be liable for the same. Excise exemption on pipe shall be available as per norms.
- iv. The material alongwith the units and rates, which shall be issued, if any, by the department to the contractor, is mentioned in the Bid Data Sheet.

#### **16. PERIOD OF VALIDITY OF BIDS**

The bids shall remain valid for a period specified in **Bid Data Sheet** after the date of “close for bidding” as prescribed by the Employer. The validity of the bid can be extended by mutual consent in writing.

#### **17. EARNEST MONEY DEPOSIT (EMD)**

- 17.1 The Bidder shall furnish, as part of the Bid, Earnest Money Deposit (EMD), of the amount specified in the **Bid Data Sheet**.
- 17.2 The EMD shall be in the form of Demand Draft/Fixed Deposit Receipt of a scheduled commercial bank, issued in favour of the name given in the **Bid Data Sheet**. The Fixed Deposit Receipt shall be valid for six months or more after the last date of receipt of bids. However, other forms of EMD may be allowed by the employer by mentioning it in the Bid Data sheet.
- 17.3 Bid not accompanied by EMD shall be liable for rejection as non-responsive.
- 17.4 EMD of bidders whose bids are not accepted will be returned within ten working days of the decision on the bid.
- 17.5 EMD of the successful Bidder will be discharged when the Bidder has signed the Agreement and furnished the Bank Guarantee of required value for Performance Security.
- 17.6 Failure to sign the contract by the selected bidder, for whatsoever reason, shall result in forfeiture of the earnest money deposit.

#### **D. SUBMISSION OF BID**

18. The bidder is required to submit online bid duly signed digitally, and Envelop 'A' in physical form also at the place prescribed in the **Bid Data Sheet**.

## **E. OPENING AND EVALUATION OF BID**

### **19 PROCEDURE**

- 19.1 Envelope 'A' shall be opened first online at the time and date notified and it's contents shall be checked. In cases where Envelop 'A' does not contain all requisite documents, such bid shall be treated as non-responsive, and Envelop B and/or C of such bid shall not be opened.
- 19.2 Wherever Envelop 'B' (Technical Bid) is required to be submitted, the same shall be opened online at the time and date notified. The bidder shall have freedom to witness opening of the Envelop 'B'. Envelop 'C' (Financial Bid) of bidders who are not qualified in Technical Bid (Envelop 'B') shall not be opened.
- 19.3 Envelope 'C' (Financial Bid) of the qualified bidders shall be opened online at the time and date notified. The bidder shall have freedom to witness opening of the Envelop 'C'.
- 19.4 After opening Envelop 'C' all responsive bids shall be compared to determine the lowest evaluated bid.
- 19.5 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all the bids at any time prior to contract award, without incurring any liability. In all such cases reasons shall be recorded.
- 19.6 The Employer reserves the right of accepting the bid for the whole work or for a distinct part of it.

### **20. Confidentiality**

- 20.1 Information relating to examination, evaluation, comparison and recommendation of contract award shall not be disclosed to bidders or any other person not officially concerned with such process until final decision on the bid.
- 20.2 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.

## **F. AWARD OF CONTRACT**

### **21. Award of Contract**

The Employer shall notify the successful bidder by issuing a 'Letter of Acceptance' that his bid has been accepted.

### **22. Performance Security**

- 22.1 Prior to signing of the Contract the bidder to whom LOA has been issued shall have to furnish performance security of the amount, form and duration, etc. as specified in the **Bid Data Sheet**.
- 22.2 Additional performance security, if applicable, is mentioned in the **Bid Data Sheet**.

### **23. Signing of Contract Agreement**

- 23.1 The successful bidder shall have to furnish Performance security and sign the contract agreement within 15 days of issue of LOA.
- 23.2 The signing of contract agreement shall be reckoned as intimation to commencement of work. No separate work order shall be issued by the Employer to the contractor for commencement of work.
- 23.3 In the event of failure of the successful bidder to submit Performance Security and additional performance security if any or sign the Contract Agreement, his EMD shall stand forfeited without prejudice to the right of the employer for taking action against the bidder.

### **24. CORRUPT PRACTICES**

The Employer requires that bidders observe the highest standard of ethics during the procurement and execution of contracts. In pursuance of this policy, the Employer:

- i. may reject the bid 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
- ii. may debar the bidder if he is being blacklisted by any Department of State Government or GOI for non-performance / sub-standard execution or any other reason what so ever in similar type of works.
- iii. may debar the bidder declaring ineligible, either indefinitely or for a stated period of time, to participate in bids, if it at any time determines that the bidder has, directly or through an agent,

engaged in corrupt, fraudulent, collusive, or coercive practices in competing for, or in executing, a contract.

For the purposes of this provision, the terms set forth above are defined as follows:

- a. "corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party;
- b. "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;
- c. "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;
- d. "Collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party.

**[End of ITB]**

## Bid Data Sheet

### General

S.No.	Particulars	Data	
1	Office inviting Tender	Commissioner, <i>Municipal Corporation Bhopal</i>	
2	NIT No		
3	Date of NIT		
4	Bid document download available from date & time	From 30.07.2016 10:00 Hrs	To 29.08.2016. 17:30 Hrs
5	Website link	<a href="http://uadd.mpeprocurement.gov.in">http://uadd.mpeprocurement.gov.in</a>	

### For Section 1 - NIT

Clause reference	Particulars	Data	
2	Portal fees	Rs. 610	
3	Cost of bid document ( in the form of Demand Draft)	Rs. 50,000	
	Cost of bid document payable to	<i>Municipal Corporation, Bhopal</i>	
	Cost of bid document in favour of	Commissioner <i>Municipal Corporation, Bhopal</i>	
4	Affidavit	Annexure B	
5	Pre-qualifications required	Yes	
	If Yes, details	Annexure C	
6	Special Eligibility		NO
	If Yes, details	Annexure D (Not applicable)	
7	Key Dates	Annexure A	

### For Section 2 - ITB

Clause reference	Particulars	Data	
1	Name of work	Water supply scheme, Bhopal	
2	Specifications	Annexure E	
3	Procedure for participation in e-tendering	Annexure F	
4	Whether Joint-venture is allowed	YES	
	If yes, requirement for Joint venture	Annexure G	
9	Pre bid meeting to held	YES	
	If Yes, Date, Time & Place	Date :12/08/2016 Time from : 11:00 AM Place : Directorate, Urban Administration and Development, Bhopal	
12	<b>Envelope –A</b> containing : i. Registration number or proof of application for registration and organizational details as per Annexure 'H' ii. Cost of Bid Document	At the office of the Commissioner, Municipal Corporation, <i>Bhopal</i>  Before -17:30 hrs(30/08/2016)	

	iii. EMD iv. An affidavit duly notarized as per Annexure –B Should reach in physical form	
14	Envelope-B Technical Proposal	Annexure – I and Annexure – I (Format I-1 to I-5)
15	Envelope-C Financial Bid	Annexure – J
	Materials to be issued by the department	
16	Period of Validity of Bid	120 Days
17	Earnest Money Deposit	Rs. 10,15,500
	Forms of Earnest Money Deposit	EMD to be submitted through NEFT/RTGS to the account of commissioner, Bhopal Municipal Corporation
	NEFT/RTGS must be drawn in favour of	Commissioner <i>Municipal Corporation, Bhopal</i>
21	Letter of Acceptance (LoA)	<b>Annexure L</b>
22	Amount of Performance Security	<b>5% of the accepted cost</b>
	Additional Performance Security, if any	<b>5% of the accepted cost</b>
	Performance security in the format	Annexure K
	Performance security in favour of	Commissioner <i>Municipal Corporation, Bhopal</i>
	Performance security valid up to	Valid contract period plus 3 months

**Key Dates**

S.No	Works Department Stage	Bidder's Stage	Start		Expiry		Envelopes
			Date	Time	Date	Time	
1		Purchase of Tender-Online	30/07/2016	10:00	29/08/2016	17:30	
2		Bid Submission-Online	30/07/2016	10:31	30/08/2016	17:30	
3	Mandatory submission Open (Envelope -A)		31/08/2016	11:00	31/08/2016	17:30	Envelope A
4	Technical proposal open (PQ Envelope-B)		31/08/2016	10:30	31/08/2016	17:30	Envelope B
5	Financial Bid Open (Envelope C)		03/09/2016	15:00			Envelope C

*Original term deposit receipt of earnest money deposit, demand draft for the cost of bid document and affidavit shall be submitted by the bidder so as to reach the office as prescribed in Bid Data Sheet, at least one calendar day before specified start time and date in key dates for opening of technical proposal as per key dates in Bid Data Sheet.*

**|| AFFIDAVIT ||**

**(To be contained in Envelope A)**

*(On Non Judicial Stamp of Rs. 1000)*

I/we \_\_\_\_\_ who is/ are \_\_\_\_\_ (status in the firm/ company) and competent for submission of the affidavit on behalf of M/S \_\_\_\_\_ (contractor) do solemnly affirm an oath and state that:

I/we are fully satisfied for the correctness of the certificates/records submitted in support of the following information in bid documents which are being submitted in response to notice inviting e-tender No. \_\_\_\_\_ for \_\_\_\_\_ (name of work) dated \_\_\_\_\_ issued by the \_\_\_\_\_ (name of the ULB).

I/we are fully responsible for the correctness of following self certified information/ documents and certificates:

1. That the self certified information given in the bid document is fully true and authentic.
2. That:
  - a. Term deposit receipt deposited as earnest money, demand draft for cost of bid document and other relevant documents provided by the Bank are authentic.
  - b. Information regarding financial qualification and annual turn-over is correct.
  - c. Information regarding various physical qualifications is correct.
3. No close relative of the undersigned and our firm/company is working in the department.

OR

Following close relatives are working in the department:

Name \_\_\_\_\_ Post \_\_\_\_\_ Present Posting \_\_\_\_\_

**Signature with Seal of the Deponent (bidder)**

I/ We, \_\_\_\_\_ above deponent do hereby certify that the facts mentioned in above paras 1 to 3 are correct to the best of my knowledge and belief.

Verified today \_\_\_\_\_ (dated) at \_\_\_\_\_ (place).

**Signature with Seal of the Deponent (bidder)**

**PRE-QUALIFICATIONS CRITERIA**

**The bidder should have:**

**A. Financial**

- i. Experience of having successfully executed<sup>1</sup>,
  - i. three similar works each costing not less than the amount equal to 20% of the probable amount of contract during the last 5 financial years; or
  - ii. two similar works each costing not less than the amount equal to 30% of the probable amount of contract during the last 5 financial years; or
  - iii. one similar work of aggregate cost not less than the amount equal to 50% of the probable amount of during the last 5 financial years;

In case of **water supply** related works similar works means work related to water supply comprising of following component,

- i. Providing, laying, jointing of water pipeline of any material or nature like rising, feeder or distribution lines.
  - ii. Construction of water treatment plant (WTP).
- ii. Average annual construction turnover on the construction works not less than 50% of the probable amount of contract during the last 5 financial years.
- iii. The Bidder shall have positive net-worth as per the audited Balance Sheets.
- iv. Bid-Capacity – **DELETED**

**B. Physical**

(i) Physical qualifications for the work in case of water supply related works shall be as below,**(Deleted)**

Minimum Physical Requirement		
S. No.	Item of Work	Quantity
I	II	III
1		-
2		-
3		-

a. Successful Bidder shall employ 'A' Class Registered Electrical Contractor for electrical works.

1. Successfully executed would mean successfully completion and commissioning of the project.



**SPECIAL ELIGIBILITY CRITERIA**

**Specifications**

**(Enclosed)**

## **Procedure for participation in e-Tendering**

### **1. Registration of Bidders on e-Tendering System**

All the PWD registered bidders are already registered on the new e-procurement portal <https://www.mpeproc.gov.in>. The user id will be the contractor ID provided to them from MP Online. The password for the new portal has been sent to the bidders registered email ID. For more details may contact M/s \_\_\_\_\_ Tata consultancy Services Corporate Block, 5<sup>th</sup> floor, DB city Bhopal-462011, email id: [eproc\\_helpdesk@mpsdc.gov.in](mailto:eproc_helpdesk@mpsdc.gov.in). Helpdesk phone numbers are available on website.

### **2. Digital Certificate:**

The bids submitted online should be signed electronically with a class III Digital Certificate to establish the identity of the bidder submitting the bid online. The bidders may obtain class III Certificate issued by an approved certifying Authority authorized by the controller of certifying Authorities, government of India. A class III digital Certificate is issued upon receipt of the required proofs along with an application. Only upon the receipt of the required documents, a digital certificate can be issued. For details please visit [cca.gov.in](http://cca.gov.in).

Note:

- i. It may take upto 7 working days for issuance of class III digital certificate; hence the bidders are advised to obtain the certificate at the earliest. Those bidders who already have valid class III digital certificate need not obtain another Digital Certificate for the same.

The bidders may obtain more information and the APPLICATION FORM REQUIRED TO BE SUBMITTED FOR THE ISSUANCE OF DIGITAL CERTIFICATE FROM [cca.gov.in](http://cca.gov.in).

- ii Bids can be submitted till bid submission end date. Bidder will require digital signature while bid submission. The digital certificate issued to the authorized user of a partnership firm/Private limited company/Public Limited Company and user for online bidding will be considered as equivalent to a no-objection certificate/power of attorney to that user.

In case of Partnership firm, majority of the partners have to authorize a specific individual through authority letter signed by majority of partners o the firm.

In case of Private Limited company, Public Limited company, the Managing Director has to authorize a specific individual through Authority Letter. Unless the certificate is revoked, it will be assumed to represent adequate authority of the specific individual to bid on behalf of the organization for online bids as per Information Technology Act 2000. This Authorized User will be required to obtain a digital certificate. The Digital Signature executed though the use of the responsibility of Management/Partners of the concerned firm to inform the Certifying Authority, if the authorized user changes, and apply for a fresh Digital Certificate for the new Authorized user.

### **3. Set Up of Bidder's Computer System:**

In order for a bidder to operate on the e-tendering System, the Computer system of the bidder is required to be set up for Operating System, Internet Connectivity, Utilities, Fonts, etc. The details are available at <https://www.mpeproc.gov.in>.

**4. Key Dates:**

The bidders are strictly advised to follow the time schedule (Key dates) of the bid of their side for tasks and responsibilities to participate in the bid, as all the stages of each bid are locked before the start time and date and after the end time and date for the relevant stage if the bid as set by the Department.

**5. Preparation and Submission of Bids**

The bidders have to prepare their online, encrypt their bid data in the Bid forms and submit Bid of all the envelopes and documents related to the Bid required to be uploaded as per the time schedule mentioned in the key dates of the notice inviting e- Tenders after signing of the same by the Digital Signature of their authorized representatives.

**6. Purchase of Bid Document**

For purchasing of the bid document bidders have to pay Service Charge online ONLY which is Rs. [as per Bid Data Sheet]. Cost of Bid document is separately mentioned in the detailed NIT. The Bid Document shall be available for purchase to concerned eligible bidders immediately after online release of the bids and upto scheduled time and date as set in the key dates. The payment for the cost of bid document shall be made online through Debit/Credit card. Net banking or NeFT Challan through the payment gateway provided on the portal.

**7. Withdrawal, Substitution and Modification of Bids**

Bidder can withdraw and modify the bid before submission end date.

**JOINT VENTURE (J.V.)**

If J.V. is allowed following conditions and requirements must be fulfilled –

1. Number of partners in a Joint Venture shall not exceed 3 (three). The partners shall comply with the following requirements :
  - a. One of the partners shall be nominated as being Lead Partner, and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners;
  - b. The bid and, in case of successful bid, the Agreement, shall be signed so as to be legally binding on all partners;
  - c. The partner in charge shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture and the entire execution of the contract, including payment, shall be done exclusively with the partner in charge;
  - d. All the partners of the joint venture shall be liable jointly and severally for the execution of the contract in accordance with the contract terms, and a statement to this effect shall be included in the authorization mentioned under [c] above, as well as in the bid and in the Agreement [in case of successful bid];
  - e. Bidder shall submit the joint venture agreement indicating precisely the role and responsibilities of all the members of JV in respect of planning, design, construction equipment, key personnel, work execution, and financing of the project including operation and maintenance of the works. All members of JV should have active participation in execution during the currency of the contract. This should not be varied/modified subsequently without prior approval of the employer;
  - f. a copy of the Joint Venture Agreement entered into by the partners shall be submitted with the bid.
  - g. The joint venture agreement shall be registered at the time of agreement, so as to be legally valid and binding on all partners.
2. All the partners should meet out the minimum qualifying criteria required for the bid and collectively must meet the criteria specified in full. Failure to comply with this requirement will result in rejection of the joint venture's bid.
3. The performance security of joint venture shall be in the name of the partner Lead partner/joint venture.
4. Attach the power of attorney of the partners authorizing the Bid signatory(ies) on behalf of the joint venture
5. An individual Bidder cannot at the same time be member of a Joint Venture applying for this Bid. Further, a member of a particular Bidder Joint Venture cannot be member of any other Bidder Joint Venture applying for this bid.
6. A copy of the Joint Venture agreement entered into by the partners made on Rs 500/- Non-judicial stamp duly notarized shall be submitted with the bid. However at the time of agreement bidder shall get the joint venture agreement registered, so as to be legally valid and binding on all partners.
7. Furnish details of participation proposed in the joint venture as below:

PARTICIPATION DETAILS	FIRM 'A' (Lead partner)	FIRM 'B'	FIRM 'C'
Financial			
Name of the Banker(s)			
Planning			
Construction Equipment			
Key personnel			
Execution of Work (Give details on contribution of each)			

8. The partners of J.V. should satisfy the qualification criteria as below,
  - a. The Lead Partner must have the share of 51% in the J.V.
  - b. The other partner(s) must have a share of minimum 25% in the J.V.
  - c. The lead partner and the other partners must also meet 51% and 26% of the all qualification criteria respectively except for the requirement of work experience described in Annexure 'C'. However both the partners must satisfy the full (100%)qualification criteria jointly. For this purpose the qualification of individual partners shall be added (for annual average turnover, net worth and for Bid Capacity Only).
9. For the meeting the minimum qualification criteria of experience of similar nature work,
  - i. Out of 3 similar works of value more than 20% of PAC, at least 2 works must be done by lead partner and one work to be done by other partner,  
Or
  - ii. Out of 2 similar works of value more than 30% of PAC, at least 1(one) work must be done by lead partner and 1 (one) work to be done by other partner,  
Or
  - iii. In case of one similar work of value more than 50% of PAC the lead partner must have executed one work of value more than 25.50% of PAC (51% of 50%). However, the other partner must satisfy the criteria in (i) above i.e., atleast one work of 20% of PAC, together the value of works executed by both the partners shall be more than 50% of PAC.

**ORGANIZATIONAL DETAILS**  
(To be enclosed with technical proposal)

S.No.	Particulars	Details
1.	Registration No. issued by centralized registration system of Govt. of MP or proof of application for registration	(If applicable, scanned copy of proof of application for registration to be uploaded)
2.	Valid registration of Bidder in appropriate class through centralized registration of Govt. of MP	Registration no..... date..... (Scanned copy of Registration to be uploaded)
3.	Name of Organization/ Individual	
4.	Entity of Organization Individual/ Proprietary Firm/ Partnership Firm (Registered under Partnership Act)/ Limited Company (Registered under the Companies Act-1956)/ Corporation	
5.	Address of Communication	
6.	Telephone Number with STD Code	
7.	Fax Number with STD Code	
8.	Mobile Number	
9.	E-mail Address for all communications	
	<b>Details of Authorized Representative</b>	
10.	Name	
11.	Designation	
12.	Postal Address	
13.	Telephone Number with STD Code	
14.	Fax Number with STD Code	
15.	Mobile Number	
16.	E-mail Address	

Note: *In case of partnership firm and limited company certified copy of partnership deed/ Articles of Association and Memorandum of Association alongwith registration certificate of the company shall have to be enclosed.*

Signature of Bidder with Seal  
Date: \_\_\_\_\_

**Annexure – I**

(See clause 14 of Section 2 of

ITB)

**Envelope – B, Technical Proposal**

**Technical Proposal shall comprise the following documents:**

<b>S.No.</b>	<b>Particulars</b>	<b>Details to be submitted</b>
1	Experience - Financial and Physical	Annexure – I (Format : I - 1)
2	Annual Turnover	Annexure – I (Format : I - 2)
3	List of technical personnel for the key positions	Annexure – I (Format: I - 3)
4	List of Key equipments/ machines for quality control labs	Annexure – I (Format: I - 4)
5	List of Key equipments/ machines for construction work	Annexure – I (Format: I – 5)

**Note:**

1. *Technical Proposal should be uploaded duly page numbered and indexed.*
2. *Technical Proposal uploaded otherwise will not be considered.*

**FINANCIAL & PHYSICAL EXPERIENCE DETAILS****A. Financial Requirement**

The bidder should have completed either of the below:

- a) three similar works each costing not less than the amount equal to 20% of the probable amount of contract during the last 5 financial years; or
- b) two similar works each costing not less than the amount equal to 30% of the probable amount of contract during the last 5 financial years; or
- c) one similar work of aggregate cost not less than the amount equal to 50% of the probable amount of contract during the last 5 financial years;

**To be filled in by the contractor:**

- i. Details of successfully completed similar works shall be furnished in the following format.
- ii. Certificate duly signed by the employer shall also be enclosed for each completed similar work.

Agreement Number & Year	Name of Work	Date of Work Order	Date of Completion	Amount of Contract	Employer's Name and Address

**Existing commitments – (Value of 'C' for Bid Capacity formula) (deleted)**

Agreement Number & Year	Name of Work	Date of Work Order	Date of Completion	Amount of Contract	Amount	Employer's Name and Address

**B. Physical Requirement:**

Execution of similar items of work in any one financial year during the last 3 financial years should not be less than the minimum physical requirement fixed for the work.

S.No.	Particulars	Actual Quantity Executed (To be filled in by the contractor)		
		Year – 1	Year – 2	Year – 3
1	Physical qualification requirement	No		
2				
3				

Note: 1. Similar works: **As described and detailed in Clause 'A' of Annexure 'C'**



**ANNUAL TURN OVER****Requirement:**

Average annual construction turnover on the construction works not less than 50% of the probable amount of contract during the last 5 financial years;

**To be filled in by the contractor:**

Financial Year	Payments received for contracts in progress or completed
1	
2	
3	
4	
5	

**Note:**

- i. Annual turnover of construction should be certified by the Chartered Accountant.
- ii. Audited balance sheet including all related notes, and income statements for the above financial years to be enclosed.

**Bid Capacity (Deleted)**

~~Applicants who meet the minimum qualifying criteria in the evaluation as stated above are to be evaluated further for bid capacity as under:~~

~~$$\text{Bid Capacity} = (2.0 - A \times B) - C$$~~

~~Where,~~

~~A = Maximum value of civil engineering works executed in any one year during the last five year (10% weightage per year shall be given to bring the value of work executed at present price level)~~

~~B = Proposed contract period in years.~~

~~C = Amount if work in hand at present.~~

**Annexure – I**  
**(Format: I-3)**

**(See clause 14 of Section 2 of ITB  
& Clause 6 of ITB)**

**LIST OF TECHNICAL PERSONNEL FOR THE KEY POSITIONS**

Minimum Requirement							Available with the bidder						
S.No.	Key Position	Minimum requirement	Qualification	Age	Similar work experience	Total Work Experience	S.No.	Name of Personnel	Key Position	Qualification	Age	Similar work experience	Total Work Experience

### List of Key Equipments/ Machines for Quality Control Labs

The pipes to be procured under this contract shall be as per relevant IS codes of practice and inspected by 3<sup>rd</sup> party. The certificate in this regard shall be furnished by the Contractor.

For monitoring the quality of treated water the Laboratory as per Appendix 15.7 and 15.8 of Manual on Water supply and Treatment (CPHEEO) with upto date amendments if any.

Apart from above for the various civil works following **Equipments/ Machines shall be required for quality control.**

Minimum requirement			Available with the Bidder	
S. No.	Name of Equipment/ Machinery	Quantity	Name of Equipment/ Machinery	Quantity
1	Digging tools like pick axe, shovel, etc.	One set		
2	IS Sieves Nos. with lid and pan (90 mm, 80 mm, 63 mm, 53 mm, 45 mm, 37.5 mm, 26.5 mm, 19 mm, 13.2 mm, 11.2 mm, 9.5 mm, 4.75 mm, 2.8 mm, 5.6 mm, 3.35 mm, 2.36 mm, 600 Micron, 425 Micron, 300 Micron, 150 Micron, 180 Micron, 90 Micron and 75 Micron)	ONE SET		
3	Sand Pouring Cylinder with tray complete for field Density test	One set		
4	Speedy moisture meter complete with chemicals	One set		
5	Straight Edges 3.00 metre width	Two set		
6	Liquid Limit and plastic limit testing apparatus complete with water bottle and glass wares	One set		
7	Electronic/digital balance 5 kg	One no.		
8	Pan balance with weight box, 5 kg.	One no.		
9	Slump cone	Two no.		
10	Concrete cube moulds (150 mm X 150mm)	Twelve no.		
11	Free swelling index test Apparatus	Six no.		
12	Flakiness and elongation testing gauges	Two no.		
13	Water absorption test apparatus	One no.		
14	Specific gravity test apparatus	One no.		
15	B.S. compaction apparatus	One no.		
16	Proving rings	One each		
17	Glass ware	One set		
18	Auto level and staff	Three nos.		
19	Rapid moisture meter	One no.		
20	Post Hole Auger with extensions	One set		
21	Measuring tape, spatula, glassware,	One set		

	porcelain dish, pestle mortar			
22	Standard Proctor Density Test Apparatus with rammer	One set		
23	Electronic/digital balance 1 kg with the least count of 0.01 gm	One set		
24	Camber Board	Two no.		
25	Core Cutter (10 cm dia) 10cm/15cm height complete with dolly and hummer.	One set		
26	CBR Testing machine	One no.		
27	Oven (ambient to 200°C)	One no.		
28	Digital Thermometers	Three no.		
	Aggregate Soundness test apparatus	One no.		
30	Concrete cube testing machine	One no.		
31	First aid box	One no.		
32	Sampling Pipette	One no.		
33	Balance	One no.		
34	Dial Gauges	Six No.		
35	Thickness gauge	One set		
36	Water still (4 ft.)	One no.		
37	A.I.V. testing equipment	One no.		

*The above list of essential equipment for quality control is for guidance and is not complete. Other apparatus and equipment as desired/required by the Engineer-in-Charge shall be procured by the Contractor*

**LIST OF EQUIPMENTS / MACHINES FOR CONSTRUCTION WORK**

<b>Minimum requirement</b>			<b>Available with the Bidder</b>	
S. No.	Name of Equipment/ Machinery	Quantity	Name of Equipment/ Machinery	Quantity

**FINANCIAL BID  
(TO BE CONTAINED IN ENVELOPE C)**

**APPENDIX : 2.18**

(See Paragraph 2.091)

**TENDER FOR A LUMP SUM CONTRACT:**

I/We do hereby TENDER to execute the whole of the work described in the drawing and according to the annexed specification for the sum of Rs (*To be quoted in lumpsum online*) and should this TENDER be accepted I/We do hereby agree and bind myself/ourselves to a Tender by and fulfill all the conditions annexed to the said specification or in default thereof to forfeit and pay to the (Name of ULB) the penalties of sums of money mentioned in the said conditions viz.

Dated \_\_\_\_\_

Bidder's Signature \_\_\_\_\_

Address \_\_\_\_\_

Witnesses : \_\_\_\_\_

Address: \_\_\_\_\_

The above said TENDER is hereby accepted by me on behalf of the (Name of ULB)

The \_\_\_\_\_ 2016 \_\_\_\_\_

-----  
\* To be expressed in words and figure)

SECURITIES

Name	Address	Occupation or Profession	Remarks

The above bid is hereby accepted by me on behalf of the (Name of ULB) on dated the \_\_\_\_\_ day of \_\_\_\_\_ 2016

**Commissioner  
Municipal Corporation, Bhopal**

**District -Bhopal(M.P.)**

**Note:**

- i. Only Lumpsum cost for the scope of work given therein shall be quoted.*
- ii. Lumpsum offer shall be quoted in figures as well as in words. If any difference in figures and words found lower of the two shall be taken as valid and correct rate. If the bidder is not ready to accept such valid and correct rate and declines to furnish performance security and sign the agreement his earnest money deposit shall be forfeited.*
- iii. In case the price is not given by a bidder, his bid shall be treated as non responsive.*
- iv. All duties, taxes, and other levies payable by the bidder shall be included in the lumpsum offer given by the bidder. Only Exemption in Excise duty shall be available as per norms.*

**MATERIALS TO BE ISSUED BY THE DEPARTMENT  
(Deleted)**

**LETTER OF ACCEPTANCE (LOA)**

No. \_\_\_\_\_  
\_\_\_\_\_

Dated:

To,

M/s. \_\_\_\_\_  
(Name and address of the contractor)

Subject: \_\_\_\_\_  
(Name of the work as appearing in the bid for the work)

Dear Sir (s),

Your bid for the work mentioned above has been accepted on behalf of the (Name of ULB) at your bided lumpsum offer as per scope of work given therein.

You are requested to submit within **15** (Fifteen) days from the date of issue of this letter:

2. The performance security/ performance guarantee of Rs. \_\_\_\_\_ (in figures) (Rupees \_\_\_\_\_ in words only). The performance security shall be in the shape of term deposit receipt/ bank guarantee of any nationalized / schedule commercial bank valid upto three months after the expiry of defects liability period.
3. Sign the contract agreement.

Please note that the time allowed for carrying out the work as entered in the bid is \_\_\_\_\_ months including/excluding rainy season, shall be reckoned from the date of signing the contract agreement.

Signing the contract agreement shall be reckoned as intimation to commencement of work and no separate letter for commencement of work is required. Therefore, after signing of the agreement, you are directed to contact Engineer-in-charge for taking the possession of site and necessary instructions to start the work.

Yours faithfully,

**Commissioner**  
**Municipal Corporation, Bhopal**



**PERFORMANCE SECURITY**

To

\_\_\_\_\_ [Name of Employer]

\_\_\_\_\_

\_\_\_\_\_ [Address of Employer]

\_\_\_\_\_

WHEREAS \_\_\_\_\_ [name and Address of Contractor]

(Hereinafter called "the Contractor") has undertaken, in pursuance of Letter of Acceptance No. \_\_\_\_\_

Dated \_\_\_\_\_ to execute \_\_\_\_\_ [Name of Contract and brief description of Works] (herein after called "the Contract").

AND WHEREAS it has been stipulated by you in the said Contract that the contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligation in accordance with the contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor, up to a total of \_\_\_\_\_ [amount of Guarantee]\* \_\_\_\_\_ (in words), such sum being payable in the types and proportions of currencies in which the contract price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of \_\_\_\_\_ [ amount of Guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this Guarantee, and we hereby waive notice of any such change, addition or modification.

This Guarantee shall be valid until 3(three) months from the date of expiry of the Defect Liability Period.

Signature, Name and Seal of the Guarantor \_\_\_\_\_

Name of Bank \_\_\_\_\_

Address \_\_\_\_\_

—

Phone No., Fax No., E-mail Address, of Signing Authority \_\_\_\_\_

Date \_\_\_\_\_

—

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

**SECTION 3**  
**Conditions of Contract**  
**Part – I General Conditions of Contract [GCC]**

**Table of Clauses of GCC**

<b>Sno</b>	<b>Particulars</b>	<b>Sno</b>	<b>Particulars</b>
	<b>A. General</b>	21	Payments for Variations and / or Extra Quantities
1	Definitions	22	No compensation for alterations in or restriction of work to be carried out.
2	Interpretations and Documents	23	No Interest payable
3	Language and Law	24	Recovery from Contractors
4	Communications	25	Tax
5	Subcontracting	26	Check Measurements
6	Personnel	27	Termination by Engineer in charge
7	Force Majeure	28	Payment upon Termination
8	Contractor's Risks	29	Performance Security
9	Liability For Accidents To Person	30	Security Deposit
10	Contractor to Construct the Works	31	Price Adjustment
11	Discoveries	32	Mobilization and Construction Machinery Advance
12	Dispute Resolution System	33	Secured Advance
	<b>B. Time Control</b>	34	Payment certificates
13	Programme		<b>E. Finishing the Contract</b>
14	Extension of Time	35	Completion of Certificate
15	Compensation for Delay	36	Final Account
16	Contractor's quoted percentage		<b>F. Other Conditions of Contract</b>
	<b>C. Quality Control</b>	37	Currencies
17	Tests	38	Labour
18	Correction of Defects noticed during the Defect liability Period	39	Compliance with Labour Regulations
	<b>D. Cost Control</b>	40	Audit and Technical Examination
19	Variations - Change in original Specifications, Designs, Drawings etc.	41	Death and Permanent Invalidity of Contractor
20	Extra Items	42	Jurisdiction
		43	Monthly RA bills

## A. General

### 1. DEFINITIONS

- 1.1 **Bill of Quantities:** means the priced and completed Bill of Quantities forming part of the Bid.
- 1.2 **Chief Engineer:** means Chief Engineer of UADD.
- 1.3 **Completion:** means completion of the work as certified by the Engineer-in-Charge, in accordance with provisions of agreement.
- 1.4 **Contract:** means the Contract between the Employer and the Contractor to execute, complete and/or maintain the work. Agreement is synonym of Contract and carry the same meaning wherever used.
- 1.5 **Contract Data Sheet:** means the documents and other information which comprise of the Contract.
- 1.6 **Contractor:** means a person or legal entity whose bid to carry out the work has been accepted by the Employer.
- 1.7 **Contractor's bid :** means the completed bid document submitted by the Contractor to the Employer.
- 1.8 **Contract amount :** means the amount of contract worked out on the basis of accepted bid.
- 1.9 **Completion of work :** means completion of the entire contracted work. Exhaustion of quantity of any particular item mentioned in the bid document shall not imply completion of work or any component thereof.
- 1.10 **Day:** means the calendar day.
- 1.11 **Defect :** means any part of the work not completed in accordance with the specifications included in the contract.
- 1.13 **Department:** means department of urban administration and development, Madhya Pradesh and Municipal Corporation, Bhopal as the case may be.
- 1.14 **Drawings :** means drawings including calculations and other information provided or approved by the Engineer-in-Charge.
- 1.15 **Employer :** means the party as defined in the Contract Data, who employs the Contractor to carry out the work. The employer may delegate any or all functions to a person or body nominated by him for specified functions. The word Employer/Government/Department wherever used denote the Employer
- 1.16 **Engineer:** means the person named in contract data sheet.
- 1.17 **Engineer in charge:** means the person named in the contract data.
- 1.18 **Engineer In Chief :** Engineer In Chief of Directorate, Urban Administration and Development
- 1.19 **Equipment :** means the Contractor's machinery and vehicles brought temporarily to the Site for execution of work.
- 1.20 **Government:** means Government of Madhya Pradesh.
- 1.21 **In Writing:** means communicated in written form and delivered against receipt.
- 1.22 **Material :** means all supplies, including consumables, used by the Contractor for incorporation in the work.
- 1.23 **Schedule of Rates :** means, Schedule of Rates of Urban Administration and Development and Department, Government of Madhya Pradesh w.e.f. 10<sup>th</sup> May 2012 with upto date amendments.
- 1.24 **Superintending engineer:** means superintending engineer of the concerned division of the mp urban administration & development department as the case may be.
- 1.25 **Stipulated date of completion :** means the date on which the Contractor is required to complete the work. The stipulated date is specified in the Contract Data.
- 1.26 **Specification :** means the specification of the work included in the Contract and any modification or addition made or approved by the Engineer-in-Charge.
- 1.27 **Start Date :** means the date 14 days after the signing of agreement for the work. However, the employer may extend this time limit by another 14 days, as and when required.

- 1.28 Sub-Contractor** : means a person or corporate body who has a Contract (duly authorized by the employer) with the Contractor to carry out a part of the construction work under the Contract.
- 1.29 Temporary Work** : means work designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the work.
- 1.30 Tender / Bid, Tenderer /Bidder** : are the synonyms and carry the same meaning where ever used.
- 1.31 UADD:** Urban Administration and Development Department
- 1.32 Variation** : means any change in the work which is instructed or approved as variation under this contract.
- 1.33 Work:** the expression "work" or "works" where used in these conditions shall unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean the work by virtue of contract, contracted to be executed, whether temporary or permanent and whether original, altered, substituted or additional.

## **2. INTERPRETATIONS AND DOCUMENTS**

### **2.1 Interpretations**

In the contract, except where the context requires otherwise:

- a. words indicating one gender include all genders;
- b. words indicating the singular also include the plural and vice versa.
- c. provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing;
- d. written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record;

### **2.2 Documents Forming Part of Contract:**

1. NIT with all amendments.
2. Instructions to Bidders
3. Conditions of Contract:
  - i. Part I General Conditions of Contract and Contract Data; with all Annexures
  - ii. Part II Special Conditions of Contract.
4. Specifications
5. Drawings
6. Bill of Quantities
7. Technical and Financial Bid
8. Agreement
9. Any other document (s), as specified.

### **3. Language and Law**

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

### **4. Communications**

All certificates, notice or instruction to be given to the Contractor by Employer/Engineer shall be sent on the address or contact details given by the Contractor in [Annexure H of ITB]. The address and contract details for communication with the Employer/Engineer shall be as per the details given in Contract Data Sheet. Communication between parties that are referred to in the conditions shall be in writing. The notice sent by facsimile (fax) or other electronic means (email) shall also be effective on confirmation of the transmission. The notice sent by registered post or speed post shall be effective on delivery or at the expiry of the normal delivery period as undertaken by the postal service. In case of any change in address for communication, the same shall be immediately notified to Engineer-in-Charge

### **5. Subcontracting**

Subcontracting shall be permitted for contracts value more than amount specified in the Contract Data with following conditions.

- a. The Contractor may subcontract up to 25 percent of the contract price, only with and after the approval of the Employer in writing, but will not assign the Contract. Subcontracting shall not alter the Contractor's obligations.
- b. The following shall not form part of the sub-contracting:
  - i. hiring of labour through a labour contractor,
  - ii. the purchase of Materials to be incorporated in the works,

- iii. hiring of plant & machinery
- c. The sub-contractor will have to be registered in the **appropriate category** in the centralised registration system for contractors of the GoMP.

## **6. Personnel**

- 6.1** The Contractor shall employ for the construction work and routine maintenance the technical personnel as provided in the **Annexure I-3 of Bid Data sheet, if applicable**. If the Contractor fails to deploy required number of technical staff, recovery as specified in the **Contract Data** will be made from the Contractor.
- 6.2** If the Engineer asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within three days and has no further connection with the Works in the Contract.

## **7. Force Majeure**

- 7.1** The term "Force Majeure" means an exceptional event or circumstance:

- a) Which is beyond a party's control,
- b) Which such party could not reasonably have provided against before entering into the contract,
- c) Which, having arisen, such party could not reasonably have avoided or overcome, and
- d) Which is not substantially attributed to the other Party

Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

- (i) War, hostilities (whether war be declared or not), invasion, act of foreign enemies),
  - (ii) Rebellion, terrorism, sabotage by persons other than the contractor's Personnel, revolution, insurrection, military or usurped power, or civil war,
  - (iii) Riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel,
  - (iv) Munitions of war, explosive materials, ionising radiation or contamination by radio activity, except as may be attributed to the Contractor's use of such munitions, explosives, radiation or radio activity, and
  - (v) Natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity,
- 7.2** In the event of either party being rendered unable by force majeure to perform any duty or discharge any responsibility arising out of the contract, the relative obligation of the party affected by such force majeure shall upon notification to the other party be suspended for the period during which force majeure event lasts. The cost and loss sustained by either party shall be borne by respective parties.
  - 7.3** For the period of extension granted to the Contractor due to Force Majeure the price adjustment clause shall apply but the penalty clause shall not apply. It is clarified that this sub clause shall not give eligibility for price adjustment to contracts which are otherwise not subject to the benefit of Price adjustment clause.
  - 7.4** The time for performance of the relative obligation suspended by the force majeure shall stand extended by the period for which such cause lasts. Should the delay caused by force majeure exceed twelve months, the parties to the contract shall be at liberty to foreclose the contract after holding mutual discussions.

## **8. Contractor's Risks**

- 8.1** All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract are the responsibility of the Contractor.
- 8.2** All risks and consequences arising from the inaccuracies or falseness of the documents and/or information submitted by the contractor shall be the responsibility of the Contractor alone, notwithstanding the fact that designs/drawings or other documents have been approved by the department.

## **9. Liability for Accidents to Person**

The contractor shall be deemed to have indemnified and saved harmless the Government and/or the employer, against all action, suits, claims, demands, costs etc. arising in connection with injuries suffered by any persons employed by the contractor or his subcontractor for the works whether under the General law or under workman's compensation Act, or any other statute in force at the time of dealing with the question of the liability of employees for the injuries suffered by employees and to have taken steps properly to ensure against any claim there under.

## **10. Contractor to Construct the Works**

- 10.1** The Contractor shall construct, install and maintain the Works in accordance with the Specifications and Drawings as specified in the Contract Data

- 10.2** In the case of any class of work for which there is no such specification as is mentioned in contract Data, such work shall be carried out in accordance with the instructions and requirement of the Engineer-in-charge.
- 10.3** The contractor shall supply and take upon himself the entire responsibility of the sufficiency of the scaffolding, timbering, Machinery, tools implements and generally of all means used for the fulfilment of this contract whether such means may or may not approved of or recommended by the Engineer.

#### **11. Discoveries**

Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Engineer of such discoveries and carry out the Engineer's instructions for dealing with them.

#### **12. Dispute Resolution System**

- 12.1** No dispute can be raised except before the Competent Authority as defined in Contract data in writing giving full description and grounds of Dispute. It is clarified that merely recording protest while accepting measurement and/or payment shall not be taken as raising a dispute.
- 12.2** No issue of dispute can be raised after **45 days** of its occurrence. Any dispute raised after expiry of 45 days of its first occurrence shall not be entertained and the Employer shall not be liable for claims arising out of such disputes.
- 12.3** The Competent Authority shall decide the matter **within 45 days**.
- 12.4** Appeal against the order of the Competent Authority can be preferred within 30 days to the Appellate Authority as defined in the Contract data. The Appellate Authority shall decide the dispute within 45 days.
- 12.5** Appeal against the order of the Appellate Authority can be preferred before the Madhya Pradesh Arbitration Tribunal constituted under Madhya Pradesh MadhyasthamAdhikaranAdhiniyam, 1983.
- 12.6** The contractor shall have to continue execution of the works with due diligence notwithstanding pendency of a dispute before any authority or forum.

### **B. Time Control**

#### **13. Programme**

- 13.1** Within the time stated in the Contract Data, the Contractor shall submit to the Engineer for approval a Programme showing the general methods, arrangements, order, and timing for all the activities in the Works for the construction of works.
- 13.2** The program shall be supported with all the details regarding key personnel, equipment and machinery proposed to be deployed on the works for its execution. The contractor shall submit the list of equipment and machinery being brought to site, the list of key personnel being deployed, the list of machinery/equipments being placed in field laboratory and the location of field laboratory along with the Programme
- 13.3** An update of the Programme shall be a programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining Works, including any changes to the sequence of the activities.
- 13.4** The Contractor shall submit to the Engineer for approval an updated Programme at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Programme within this period, the Engineer may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Programme has been submitted.
- 13.5** The Engineer's approval of the Programme shall not alter the Contractor's obligations

#### **14. Extension of Time**

- 14.1** If the Contractor desires an extension of time for completion of the work on the ground of his having been unavoidably hindered in its execution or on any other grounds, he shall apply, in writing, to the Engineer-in-charge, on account of which he desires such extension. Engineer-in-charge shall forward the aforesaid application to the competent authority as prescribed.
- 14.2** The competent authority shall grant such extension at each such occasion within a period of 30 days of receipt of application from contractor and shall not wait for finality of work. Such extensions shall be granted in accordance with provisions under **clause -7 or clause- 15** of this agreement.
- 14.3** In case of the work already in progress, the contractor shall proceed with the execution of the works, including maintenance thereof, pending receipt of the decision of the competent authority as aforesaid with all due diligence.

## **15. Compensation for delay**

- 15.1** The time allowed for carrying out the work, as entered in the agreement, shall be strictly observed by the Contractor.
- 15.2** The time allowed for execution of the contract shall commence from the date of signing of the agreement. It is clarified that the need for issue of work order is dispensed with.
- 15.3** In the event milestones are laid down in the Contract Data for execution of the works, the contractor shall have to ensure strict adherence to the same.
- 15.4** Failure of the Contractor to adhere to the timelines and/or milestones shall attract such liquidated damages as is laid down in the Contract Data
- 15.5** In the event of delay in execution of the works as per the timelines mentioned in the contract data the Engineer-in-charge shall retain from the bills of the Contractor Amount equal to the liquidated damages liveable until the contractor makes such delays good. However, the Engineer-in-charge shall accept bankable security in lieu of retaining such amount.
- 15.6** If the contractor is given extension of time after liquidated damages have been paid, the engineer in charge shall correct any over payment of liquidated damages by the Contractor in the next payment certificate.
- 15.7** In the event the contractor fails to make good the delay until completion of the stipulated contract period (including extension of time) the sum so retained shall be adjusted against liquidated damages levied.

## **16. Contractor's quoted offer : NA**

~~The contractor's quoted lump sum offer referred to in the "Bid for works" will be deducted/ added from/to the net amount of the bill after deducting the cost of material supplied by the department.~~

## **C. Quality Control**

### **17. Tests**

- 17.1** The Contractor shall be responsible for:
- Carrying out the tests prescribed in specifications, and
  - For the correctness of the test results, whether performed in his laboratory or elsewhere.
- 17.2** The contractor shall have to establish field laboratory within the time specified and having such equipments as are specified in the Contract Data.
- 17.3** Failure of the contractor to establish laboratory shall attract such penalty as is specified in the Contract Data.
- 17.4** Ten percent of the mandatory tests prescribed under the specifications shall be got carried out through Laboratories accredited by National Accreditation Board of Laboratories (NABL) by the Engineer-In –Charge and the cost of the such testing shall be deducted from the payments due to Contractor.
- ### **18. Correction of Defects noticed during the Defect Liability Period**
- 18.1** The defect liability period of work in the contract shall be the Contract Data
- 18.2** The Contractor shall promptly rectify all defects pointed out by the Engineer well before the end of the Defect Liability Period. The Defect Liability Period shall automatically stand extended until the defect is rectified.
- 18.3** If the Contractor has not corrected a Defect pertaining to the Defect Liability Period to the satisfaction of the Engineer, within the time specified by the Engineer, the Engineer will assess the cost of having the Defect corrected, and the cost of correction of the Defect shall be recovered from the Performance Security or any amount due or that may become due to the contractor and other available securities.

## **D. Cost Control**

### **19. Variations - Change in original Specifications, Designs, Drawingsetc.**

- 19.1** The Engineer in charge shall have power to make any alterations, omissions or additions to or substitutions for the original specifications, drawings, designs and instructions, that may appear to him to be necessary during the progress of the work and the contractor shall carry out the work in accordance with any instructions which may be given to him in writing signed by the Employer, and such alterations, omission, additions or substitutions shall not invalidate the contract and any altered, additional or substituted work, which the contractor may be directed to do in the manner above specified, as part of the work, shall be carried out by the contractor on the same conditions in all respects on which he agree to do the main work.
- 19.2** The time for the completion of the work shall be extended in the proportion that the altered, additional or substituted work bears to the original contract work and the certificate of the Engineer in charge shall be conclusive as to such proportion.

**20. Extra items**

**20.1** All such items which are not in the priced BOQ shall be treated as extra items.

**21. Payments for Variations and / or Extra Quantities**

**21.1** The rates for the additional (Extra Quantities), altered or substituted work/ extra items under this clause shall be worked out in accordance with the following provisions in their respective order:-

- a. The contractor is bound to carry out the additional (Extra quantity), work at the same rates as are specified in the contract for the work.
- b. If the item is not in the priced BOQ and is included in the SOR of the department, the rate shall be arrived at by applying the quoted tender percentage on the SOR rate.
- c. If the rates of the altered or substituted work are not provided in applicable SOR-such rates will be derived from the rates for a similar class (type) of work as is provided in the contract (priced BOQ) for the work.
- d. If the rates are for the altered, substituted work cannot be determined in the manner specified in the sub clause (c) above-then the rates for such composite work item shall be worked out on the basis of the concerned schedule of rates minus/plus the percentage quoted by the contractor.
- e. If the rates of a particular part or parts of the item is not in the schedule of rates and the rates for the altered, or substituted work item cannot be determined in the manner specified in sub clause (b) to (d) above, the rate for such part or parts will be determined by the Competent Authority as defined in the Contract data on the basis of the rate analysis derived out of prevailing market rates when the work was done.
- f. But under no circumstances, the contractor shall suspend the work on the plea of non acceptability of rates on items falling under sub clause (a) to (d). In case the contractor does not accept the rate approved by Engineer in charge for a particular item, the contractor shall continue to carry out the item at the rates determined by the Competent Authority. The decision on the final rates payable shall be arrived at through the dispute settlement procedure.

**22. No compensation for alterations in or restriction of work to be carried out.**

**22.1** If at any time after the commencement of the work, the Government, for any reason whatsoever, not require the whole or any part of the work as specified in the bid to be carried out, the Engineer in charge shall give notice in writing of the fact to the Contractor and withdraw that whole or any part of the work.

**22.2** The Contractor shall have no claim to any payments or compensation whatsoever, on account of any profit or advantage which he might have derived from the execution of work in full or on account of any loss incurred for idle men and machinery due to any alteration or restriction of work for whatsoever reason.

**22.3** The Engineer in charge may supplement the work by engaging another agency to execute such portion of the work, without prejudice to his rights.

**23. No Interest Payable**

No interest shall be payable to the Contractor on any payment due or awarded by any authority.

**24. Recovery from Contractors**

Whenever any claim against the Contractor for the payment arises under the contract, the Department shall be entitled to recover such sum by:

- (a) Appropriating, in part or whole of the Performance Security and additional Performance Security , if any; and/or Security deposit and/or any sums payable under the contract to the contractor..
- (b) If the amount recovered in accordance with (a) above is not sufficient, the balance sum may be recovered from any payment due to the contractor under any other contractor of the department, including the securities which become due for release.
- (c) The department shall, further have an additional right to effect recoveries as arrears of land revenue under the M.P. Land revenue Code.

**25. Tax**

**25.1** The rates quoted by the Contractor shall be deemed to be inclusive of the sales and other levies, duties, cess, toll, taxes of Central and State Governments, local bodies and authorities. But the rates shall be excluding excise duty exemption on pipes as per Norms

**25.2** The liability, if any, on account of quarry fees, royalties, octroi and any other taxes and duties in respect of materials actually consumed on public work, shall be borne by the Contractor.

**25.3** Any Changes in the taxes due to change in legislation or for any other reason shall not be payable to the contractor.



## **26. Check Measurements**

- 26.1** The department reserves to itself the right to prescribe a scale of check measurement of work in general or specific scale for specific works or by other special orders.
- 26.2** Checking of measurement by superior officer shall supersede measurements by subordinate officer(s), and the former will become the basis of the payment.
- 26.3.** Any over/excess payments detected, as a result of such check measurement or otherwise at any stage upto the date of completion of the defect liability period specified in this contract, shall be recoverable from the Contractor, as per clause 24 above.

## **27. Termination by Engineer in Charge**

- 27.1** If the contractor fails to carry out any obligation under the Contract, the Engineer in charge may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time.
- 27.2** The Engineer in charge shall be entitled to terminate the contract if the Contractor
- a) Abandons the works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the contract;
  - b) the Contractor is declared as bankrupt or goes into liquidation other than for approved reconstruction or amalgamation;
  - c) without reasonable excuse fails to comply with the notice to correct a particular defect within a reasonable period of time;
  - d) the Contractor does not maintain a valid instrument of financial Security, as prescribed;
  - e) the Contractor has delayed the completion of the Works by such duration for which the maximum amount of liquidated damages is recoverable;
  - f) If the Contractor fails to deploy machinery and equipment or personnel or set up a field laboratory as specified in the Contract Data.
  - g) if the Contractor, in judgemental of the engineer in charge has engaged in corrupt or fraudulent practices in competing for or in executing the contract;
  - h) Any other fundamental breaches as specified in the Contract Data.
- 27.3** In any of these events or circumstances, the engineer in charge may, upon giving 14 days' notice to the contractor, terminate the contract and expel the Contractor from the site. However, in the case of sub paragraph (b) or (g) of clause 27.2, the Engineer in charge may terminate the contract immediately.
- 27.4** Notwithstanding the above, the Engineer in charge may terminate the contract for convenience by giving notice to the contractor.

## **28. Payment upon Termination**

- 28.1** If the contract is terminated under clause 27.3, the Engineer shall issue a certificate for value of the work accepted on final measurements, less advance payments and penalty as indicated in the Contract Data. The amount so arrived at shall be determined by the Engineer-in-charge and shall be final and binding on both the parties.
- 28.2** payment on termination under clause 27.4 above, the Engineer shall issue a certificate for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the contractor's personnel employed solely on the works, and the contractor's costs of protecting and securing the works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law.
- 28.3** If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be recovered as per clause 24 above.

## **29. Performance Security**

The Contractor shall have to submit performance security and additional performance security, if any, as specified in Bid data sheet at the time of signing of the contract. The contractor shall have to ensure that such performance security and Additional performance, if an, security remains valid for the period as specified in the Contract data.

## **30. Security Deposit**

- 30.1** Security deposit shall be deducted from the each running bill at the rate as specified in the contract data. The total amount of security deposit so deducted shall not exceed the percentage of contract price specified in the Contract data.
- 30.2** The Security may be replaced by equivalent amount of bank guarantee or fixed deposit receipt assigned to the Employer, with validity up to 3(three) months beyond the completion of defect Liability PERIOD/ extended Defect Liability.
- 30.3** The Security deposit shall be refunded on completion of defect liability period.

### **31. Price Adjustment (deleted)**

### **32. Mobilization and Construction Machinery Advance**

- 32.1** Payment of advances shall be applicable if provided in the Contract Data.
- 32.2** If applicable, the Engineer in charge shall make interest bearing advance payment to the contractor of the amounts stated in the Contract Data, against provision by the contractor of an unconditional Bank Guarantee in a form and by nationalized/Scheduled banks, in the name as stated in the Contract data, in amounts 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.
- 32.3** The rate of interest chargeable shall be as per Contract data.
- 32.4** The construction machinery advance, if applicable, shall be limited to 80% of the cost of construction machinery and admissible only for new construction machinery.
- 32.5** The advance payment shall be recovered as stated in the Contract data by deducting proportionate amounts from payment otherwise due to the Contractor. No account shall be taken of the advance payment or its recovery in assessing valuations of work done, variations, price adjustments, compensation events, or liquidated damages.

### **33. Secured Advance (deleted)**

### **34. Payment Certificates**

The payment to the contractor will be as follows for construction work:

- (a) The contractor shall submit to the engineer monthly statement of the value of the work executed less the cumulative amount certified previously, supported with detailed measurement of the items of work executed as per the Billing Break-up in section 6.
- (b) The engineer shall check the Contractor's monthly statement and certify the amount to be paid to the contractor.
- (c) The value of work executed shall be determined, based on the measurements approved by the Engineer/Engineer in charge.
- (d) The value of work executed shall comprise the value of the quantities of the items in the Billing Breakup given in Section 6.
- (e) The value of work executed shall also include the valuation of variations and compensation events.
- (f) All payments shall be adjusted for deductions for advance payment, security deposit, other recoveries in terms of contract and taxes at source as applicable under the law.
- (g) The Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.
- (h) Payment of intermediate certificate shall be regarded as payments by way of advance against the final payment and not as payments for work actually done and completed.
- (i) Intermediate payment shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or be considered as an admission of the due performance of the contractor any part thereof, in any respect or the occurring of any claim.
- (j) The payment of final bill shall be governed by the provisions of clause 36 of GCC.

## **E. Finishing the Contract**

### **35. Completion Certificate**

- 35.1** A completion certificate in the prescribed format in Contract data shall be issued by the Engineer in charge after physical completion of the work.
- 35.2** After final payment to the contractor, a final completion certificate in the prescribed format in the contract data shall be issued by the Engineer in charge.

### **36. Final Account**

- 36.1** The Contractor shall supply the Engineer with a detailed account of the total amount that the Contractor considers payable for works under the Contract within 21 days of issue of certificate of physical completion of works. The Engineer shall issue a letter for start of Defects Liability period/O&M period and certify any payment that is due to the Contractor within 45 days of receiving the Contractor's account if it is correct and complete. If the account is not correct or complete, the Engineer shall issue within 45 days a schedule that states the scope of the corrections or additions that are necessary. If the Account is still unsatisfactory after it has been resubmitted, the matter shall be referred to the competent authority as defined in the Contract

data, who shall decide on the amount payable to the contractor after hearing the Contractor and the Engineer in Charge.

- 36.2** In case the account is not received within 21 days of issue of Certificate of Completion as provided in clause 35.2 above, the Engineer shall proceed to finalize the account and issue a payment certificate within 28 days.

### **G. Other Conditions of Contract**

**37. Currencies**

All payments will be made in Indian Rupees.

**38. Labour**

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

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

**39. COMPLIANCE WITH LABOUR REGULATIONS**

- 39.1** During continuance of the Contract, the Contractor and his sub Contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given in the Contract data. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/byelaws/Acts/Rules/ regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer. The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

**40. Audit and Technical examination**

Government shall have the right to cause an audit and technical examination of the works and the final bill of the contract including all supporting vouchers, abstract etc. To be made after payment of the final bill and if as a result of such audit and technical examination nay sum is found to have been overpaid in respect of any work done by the contractor under the contract or nay work claimed by him to have been done under the contract and found not to, have been executed, the contractor shall be liable to refund the amount of overpayment and it shall be lawful for government to recover the same from him in the manner prescribed in clause 24 above and if it is found that the contractor was paid less than what was due to him, under the contract in respect of any work executed by him under it, the amount of such under payment shall be duly paid by government to the Contractor.

**41. Death or permanent invalidity of contractor**

During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications, and bye laws of the state or central government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the state or the major labour laws that are applicable to construction industry are given in the contract data. The contractor shall keep the employer indemnified in case any action is taken against the employer by the competent authority on account of contravention of any of the provisions of any Act or rules made their under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules regulations including amendments, if any, on the part of the contractor, the engineer/employer shall have the right to deduct from any money due to the contractor including his amount of performance of security. The employer/engineer shall also have right to recover

from the contractor any sum required or estimated to be required for making good the loss or damage suffered by the employer. The employees of the contractor and the sub contractor in no case shall be treated as the employees of the employer at any point of time.

**42. Jurisdiction**

This contract has been entered into the State of Madhya Pradesh and its validity, construction, interpretation and legal effect shall be subjected to the exclusive jurisdiction of the courts in Bhopal or of the courts at the place where this agreement is entered into. No other jurisdiction shall be applicable.

**43. Monthly RA Bills**

The payment certificates shall be regulated as per the provisions of clause 34 of the contract.

43.1 Upon the signing of agreement the Engineer shall decide the date of submission of monthly statement (RA Bills) as mentioned in clause 34 (a)

43.2 The Engineer shall check the Contractor's monthly statement (RA Bills) & certify the amount to be paid to the contractor within 7 days of submission of monthly statement(RA Bills).

43.3 The employer shall ensure the payment to the Contractor as per clause 34 (d), (e), (f) & (g) within 10 days of submission of monthly statement(RA Bills).

[End of GCC]

**Contract Data**

<b>Clause reference</b>	<b>Particulars</b>	<b>Data</b>
1.14	Employer	MUNICIPAL Corporation, Bhopal
1.15	Engineer	Assistant Resident Engineer of Project Development and Monitoring Consultants (PDMC)
1.16	Engineer in charge	Resident Engineer of Project Development and Monitoring Consultants (PDMC)
1.24	Stipulated period of completion	24 months
3	Language & Law of Contract	English & Indian Contract Act 1872
4	Address & contact details of the Contractor	As per Annexure H
	Address & contact details of the Employer/Engineer-phone, Fax, e-mail.	_____
5	Subcontracting permitted for contract value	25% of the Contract value
6	Technical Personnel to be provided by the contractor – requirement &	As per Annexure I (Format I-3)
	Penalty, if required Technical personal not employed	Rs. 20,000/- per month
10	Specifications	Annexure E
	Drawings	As per Annexure N
12	Component authority for deciding dispute under Dispute resolution system	Superintending Engineer of UADD in charge of Concerned Division
	Appellate Authority for deciding dispute under Dispute resolution system	Engineer –In-Chief /Chief Engineer UADD
13	Period of submission of updated construction program	30 days upon signing the agreement
	Amount to be withheld or not submitting construction program in the prescribed period	0.20% of the Contract Amount
14	Competent Authority for granting Time Extension	Appropriate authority within the Urban Local Body after scrutiny and recommendation by Chief Engineer/Engineer-in-Chief UADD
15	Milestones laid down for the contract	YES
	If Yes, details of milestones	As per Annexure O
	Liquidated damage	As per Annexure P
17	List of equipments for lab	As per Annexure Q
	Time to establish lab	2 months of signing the agreement
	Penalty for not establishing field Laboratory	0.20% of the Contract amount till the establishment of Lab
18	Defect Liability Period	24 Months after physical completion of work
21	Competent authority for determining the rate	Engineer-In-Chief
27	Any other conditions for breach of contract	_____

Clause reference	Particulars	Data
28	Penalty	Penalty shall include (a) Security deposit as per clause 30 of General conditions of contract and (b) Liquidated damages imposed as per clause 15 or performance security (Guarantee) including additional performance security (Guarantee), if any, as per clause 29 of General conditions of contract, whichever is higher.
29	Performance Guarantee (security) shall be valid up to	Till issue of physical completion certificate as per clause 35.1
30	Security deposit to be deducted from each running bill	As the rate of 5 %
	Maximum limit of deduction of security deposit	Up to 5 % of Final contract amount.
31	Price adjustment formula and procedure to calculate	As per Annexure R <b>(NOT APPLICABLE)</b>
31.1(1)	Price adjustment shall be applicable	<b>(NOT APPLICABLE)</b>
32	32.1 Mobilization and Construction Machinery Advance applicable	Yes
	32.2 If yes, unconditional Bank Guarantee	In the format prescribed in Annexure - S
	32.3 If yes, Rate of interest chargeable on advance	Interest rate as per notified bank rate on the date of inviting tender
	32.4 If yes, Type & Amount payment that can be paid	Mobilization advance- Upto 10% of contract amount Construction Machinery Advance – Not Applicable
	32.5 If yes, Recovery of Advance payment	Recovery of Mobilization and/or Construction Machinery advance shall commence when 10% of the contract amount is executed and recovery of total advance shall be done on pro-rata basis and shall be completed by the time work equivalent to 80% of the contract amount is executed.  In addition to the recovery of principal amount, recovery of interest shall be carried out as calculated on the outstanding amount of principal at the close of each month. The interest shall be accrued from the day of payment of advance and the recovery of interest shall commence when 10% of the contract amount is executed and shall be completed by the time work equivalent to 80% of the contract amount is executed.
33	33.1 Secured Advance applicable	No Secured Advance payable
	33.2 If yes, Unconditional bank Guarantee	In the format prescribed in Annexure-T

Clause reference	Particulars	Data
	33.3 If yes, Conditions for secured Advance	<p>a) The materials are in accordance with the specification of works,</p> <p>b) Such materials have been delivered to site, and are properly stored and protected against damage or deterioration to the satisfaction of the engineer. The contractor shall store the bulk material in measurable stacks,</p> <p>c) The Contractor's records of the requirements, ordered, receipt and use of materials are kept in a form approved by the Engineer and such records shall be available for inspection by the Engineer;</p> <p>d) The contractor has submitted with his monthly statement the estimated value of the materials on site together with such documents as may be required by the engineer for the purpose of valuation of the materials and providing evidence of ownership and payment thereof;</p> <p>f) The quantity of materials are not excessive and shall be used within a reasonable time as determined by the engineer.</p>
	33.4 If yes, recovery of secured advance	The advance shall be repaid from each succeeding monthly payments to the extent materials [for which advance was previously paid] have been incorporated into the works.
35	Completion certificate- After physical completion of the work	As per Annexure - U
	Final Completion Certificate – after final payment on completion of the work	As per Annexure - V
36	Competent Authority	Chief Engineer/Engineer-in-Chief, UADD
39	Salient features of some of the major labour laws that are applicable	As per Annexure - W
41	Competent Authority	Appropriate authority within the Urban Local Body

**DRAWINGS**



### **DETAILS OF MILESTONES**

The time allowed for the carrying out the work, as entered in the tender form shall be strictly observed by the contractor and shall be deemed to be essence of the contract and shall be reckoned immediately from the date of issue of the order to commence the work issued to the contractor.

The work shall throughout the stipulated period of contract be proceeded with all due diligence keeping in view that time is the essence of the contract. The contractor shall be bound in all cases, to complete

- 1/8th of the whole work before 1/4th of the whole time allowed under the contract has elapsed,
- 3/8th of the work before 1/2 of such time has elapsed
- 3/4th of the work before 3/4 of such time has elapsed.

**COMPENSATION FOR DELAY**

If the contractor fails to achieve the milestones, and the delay in execution of work is attributable to the contractor, the Employer shall retain an amount from the sums payable and due to the contractor as per following scale –

- i. Slippage up to 25% in financial target during the milestone under consideration – 2.5% of the work remained unexecuted in the related time span.
- ii. Slippage exceeding 25% but up to 50% in financial target during the milestone under consideration – 5% of the work remained unexecuted in the related time span.
- iii. Slippage exceeding 50% but up to 75% in financial target during the milestone under construction – 7.5% of the work remained unexecuted in the related time span.
- iv. Slippage exceeding 75% in financial target during the milestone under consideration – 10% of the work remained unexecuted in the related time span.

Note: For arriving at the dates of completion of time span related to different milestones, delays which are not attributable to the Contractor shall be considered. The slippage on any milestone is if made good in subsequent milestones or at the time of stipulated period of completion, the amount retained as above shall be refunded. In case the work is not completed within the stipulated period of completion along with all such extensions which are granted to the Contractor for either Employer's default or Force Majeure, the compensation shall be levied on the contractor at the rate of 0.05% per day of delay limited to maximum of 10% of contract price.

The decision of appropriate authority within the Urban Local Body after scrutiny and recommendation by Chief Engineer/Engineer-in-Chief UADD shall be final and binding upon both the parties.

**LIST OF EQUIPMENT FOR QUALITY CONTROL LAB**

**(As per Annexure I-4)**

**PRICE ADJUSTMENT (deleted)**

**BANK GUARANTEE FORM' FOR MOBILIZATION AND CONSTRUCTION MACHINERY ADVANCE**

To,

\_\_\_\_\_ [name of Employer]  
\_\_\_\_\_ [address of Employer]  
\_\_\_\_\_ [name of Contractor]

In accordance with the provisions of the General Conditions of Contract, clause 31 ("Mobilization and Construction Machinery Advance") of the above-mentioned Contract \_\_\_\_\_ [name and address of Contractor] (hereinafter called "the Contractor") shall deposit with \_\_\_\_\_ [name of Employer] a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of [amount of Guarantee\* [in words]].

We, the \_\_\_\_\_ [bank of financial institution] as instructed 'by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as surety merely, the payment to \_\_\_\_\_ [name of Employer] on his first demand without whatsoever right of obligation on our part and without his first claim to the Contractor, in the amount not exceeding [amount of guarantee]\*[in words].

We further agree that no change or addition to or other modification of the terms of the Contractor or Works to be performed there under or of any of the Contract documents which may be made between [name of Employer] and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until \_\_\_\_\_ [name of Employer] receives full repayment of the same amount from the Contractor.

Yours truly,

Signature and Seal :

Name of Bank/Financial Institution:

Address : '

Date :

\* An amount shall be inserted by the Bank or Financial Institution representing the amount of the Advance Payment, and denominated in Indian Rupees.

**Bank Guarantee Form for Secured Advance (Deleted)**

### Physical Completion Certificate

Name of Work:

\_\_\_\_\_

—

\_\_\_\_\_

—

\_\_\_\_\_

—

Agreement No. \_\_\_\_\_ Date \_\_\_\_\_

Amount of Contract Rs \_\_\_\_\_

Name of Agency: \_\_\_\_\_

Used MB No.: \_\_\_\_\_

Last measurement recorded

a. Page No. & MB No.: \_\_\_\_\_

b. Date: \_\_\_\_\_

Certified that the above mentioned work was physically completed on..... (Date) and taken over on..... (Date) and that I have satisfied myself to best of my ability that the work has been done properly.

Date of issue

Executive Engineer

\_\_\_\_\_

\_\_\_\_\_

### Final Completion Certificate

Name of Work:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Agreement No. \_\_\_\_\_ Date: \_\_\_\_\_

Name of Agency: \_\_\_\_\_

Used MB No. \_\_\_\_\_

Last Measurement recorded

b. Page No. & MB No. \_\_\_\_\_

c. Date \_\_\_\_\_

Certified that the above mentioned work was physically completed on \_\_\_\_\_ (date)

And taken over on \_\_\_\_\_ (date).

Agreement amount Rs. \_\_\_\_\_

Final amount paid to contractor Rs. \_\_\_\_\_

Incumbency of officers for the work

I have satisfied myself to best of my ability that the work has been done properly.

Date of Issue

Executive Engineer

\_\_\_\_\_  
\_\_\_\_\_



**Salient Features of Some Major Labour Laws Applicable**

- (a) Workmen Compensation Act 1923: - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- (b) Payment of Gratuity Act 1972: - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed the prescribed minimum years (say, five years) of service or more or on death the rate of prescribed minimum days' (say, 15 days) wages for every completed year of service. The Act is applicable to all establishments employing the prescribed minimum number (say, 10) or more employees.
- (c) Employees P.F. and Miscellaneous Provision Act 1952: The Act Provides for monthly contributions by the Employer plus workers at the rate prescribed (say, 10% or 8.33%). The benefits payable under the Act are:
- i. Pension or family pension on retirement or death as the case may be. '
  - ii. Deposit linked insurance on the death in harness of the worker.
  - iii. Payment of P.F. accumulation on retirement/death etc.
- (d) Maternity Benefit Act 1951: - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- (e) Contract Labour (Regulation & Abolition) Act 1970: - The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The principal Employer is required to take Certificate of Registration and the Contractor is, required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ prescribed minimum (say 20) or more contract labour.
- (f) Minimum Wages Act 1948: - The Employer is to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads, runways is scheduled employment.
- (g) Payment of Wages Act 1936: - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- (h) Equal Remuneration Act 1979: - The Act provides for payment of equal wages for work of equal nature to male and female workers and for not making discrimination against female employees in the matters of transfers, training and promotions etc.
- (i) Payment of Bonus Act 1965: - The Act is applicable to all establishments employing prescribed minimum (say, 20) or more workmen. The Act provides for payments of annual bonus 'within the prescribed range of percentage of wages to employees drawing up to the prescribed amount of wages, calculated in the prescribed manner. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. States may have different number of employment size.
- (j) Industrial Disputes Act 1947: - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- (k) Industrial Employment (Standing Orders) Act 1946: - It is applicable to all establishments employing prescribed minimum (say, 100, or 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and gets these certified by the designated Authority.
- (l) Trade Unions Act 1926: - The Act lays down the procedure for registration of trade unions of workmen and Employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.
- (m) Child Labour (Prohibition & Regulation) Act 1986: - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulations o employment of

children in all other occupations and processes. Employment of child labour is prohibited in building and construction industry.

- (n) Inter-State Migrant Workmen's (Regulation of Employment & Conditions of Service) Act 1979: - The Act is applicable to an establishment which employs prescribed minimum (say, five) or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as Housing, Medical-Aid, Travelling expenses from home up to the establishment and back etc.
- (o) The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: - All the establishments who carry on any building or other construction work and employs the prescribed minimum (say, 10) or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as. may be modified by the Government., The Employer of the establishment- is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodations for workers near the-work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.
- (p) Factories Act 1948: - The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. it is applicable to premises employing the prescribed minimum (say, 10) persons or more with aid of power or another prescribed minimum (say, 20) or more persons without the aid of power engaged in manufacturing process.

**Section 3**  
**Conditions of Contract**  
**Part-II Special Conditions of Contract [SCC]**

**1. GENERAL:**

The special conditions are supplementary conditions to the TENDER and shall form the part of the contract.

- 1.1 It shall be the responsibility of BIDDER to co-ordinate with traffic authority, Railways, MPRDC, M.P. Electricity Board, Telephone authority, various authorities including Public Health Engineering, Water resource Department for obtaining necessary permissions regarding crossing of road/railway tracks, shift of various types of public utilities like existing pipe line, sewer line, cable etc. as may be required for the due fulfillment of the obligations under this contract. Municipal Corporation, Bhopal shall deposit all charges including charges for Electric Connection, Crossing of Railway and Road way etc. as may be necessary for seeking required permissions from different authorities but it shall be the primary responsibility of the contractor/firm to pursue with various authorities and obtain the permissions at the earliest. If as a result of excavation of trenches the underground services such as water main electric telephones cable, sewer lines become naked and unsupported it shall be the responsibility of the contractor to make suitable and necessary arrangement as per direction of the Engineer-in-Charge for their protection and no extra payment on this account will be made to the contractor. Any damages caused to the above mentioned underground services due to negligence of the contractor or otherwise the same shall be made good by the contractor at his own cost.

**2.0 Accuracy of Lines, Levels and Grades**

- 2.1 The various works shall be done true to line, level and grade. The periodical checking of these by the Engineer or Engineer's representative shall not absolve the Contractor of his responsibility regarding their accuracy. In case of any deviation or discrepancy in line, level or grade at the meeting faces, the contractor shall make good the discrepancy at his own cost and without any compensation for the additional work if any involved. Whenever such a discrepancy is found to arise at the junction of works being carried out by different Contractors the responsibility to set right their respective discrepancies shall be fixed by the Engineer whose decision shall be final and binding on the Contractors concerned. Engineer shall further have the unquestioned right if need be to rectify the discrepancies and recover the cost from the Contractor or Contractors according to proportions as he May consider reasonable.
- 2.2 The details of location and the nearest permanent bench marks. Reference Grid Marks shall be obtained by the Contractor in writing from the Engineer. Temporary bench mark for day to day use shall be fixed with reference to above permanent bench marks with double leveling. The Grid Co-ordinates and its references May be obtained from the Engineer.

**3.0 Arrangements of Water and Electric Power**

Arrangement for water and electric power required by the Contractor for the works shall be made by him at his own cost. Employer will however recommend to the State Electricity Board for giving the connection and power to the Contractor. However the Employer will bear no responsibility in this respect.

**4.0 Measures for Prevention of Fire**

- 4.1 The Contractor shall not set fire to any standing Jungle, trees, brush wood or grass without a written permission from the Engineer.
- 4.2 When such permission is given and also in all cases when destroying out of dug trees, brush wood, grass etc. by fire, the Contractor shall take necessary measures to prevent such fire spreading to or otherwise damaging surrounding property.
- 4.3 Any damage caused by the spreading of such fire, whether in or beyond limits of the Employer's property, the amount of the damage shall be recovered by the Engineer from the Contractor's Bills as damages or deducted by any other duly authorized officer from any sums that May be due or become due from the Employer to the Contractor under the contractor otherwise.
- 4.4 The Contractor shall bear the expenses of defending any action or law proceedings that May be brought by any person by injury sustained owing to neglect of precautions to prevent the spread of fire and shall pay any damage and cost that May be awarded in consequence.

## **5.0 Site Order Book**

A site order book shall be kept at the Employer's office on the site of the work. As far as possible all orders regarding the works are to be entered in this book. All entries therein shall be signed by the Engineer on his representative and the contractor or his authorized representative. In important cases the Engineer will countersign the entries which have been made. The site order book shall not be removed from the work site except with written permission of the Engineer and the Contractor or his representative shall be bound to take note of all instructions and directions meant for the Contractor as entered in the site order book without having to be called on separately to note them. The Engineer shall submit periodically copies of the remarks in the site order book to the Employer for record and to the contractor for submitting compliance report.

## **6.0 Foundations Depth/Levels.**

The drawings indicate the general foundation levels to be adopted for the different conditions of the structures. During execution these levels May be modified to suit the site conditions. The Contractor shall not be liable to any compensation for any minor delays on this account. However this May be considered for granting suitable extension in the completion period if necessitated by such events.

## **7.0 Approach Road**

Necessary approach roads for various construction of components of the work like Intake, WTP, OHT etc. shall be satisfactorily constructed and maintained by the Contractor at his own cost.

## **8.0 Regulation and Bye-Laws**

The contractor shall conform to the regulations, bye laws or any other statutory rules made by any local authorities or by the Government and shall protect and indemnify the Employer against any claims or liability arising from or based on the violations of any such laws, ordinance, regulations, orders and decrees etc.

## **9.0 Contractor to use Excavated Hard Rock**

All useful materials like hard rock etc. excavated by the Contractor at site shall be the property of Employer and shall be issued to the Contractor at the issue rate of Rs. 200/- per cum. It shall be binding on the Contractor to use it as rubble, metal aggregate etc. after breaking into the required size for concrete work and as directed by the Engineer.

## **10.0 Income Tax**

During the course of contract period, deductions of Income Tax shall be made at the prevailing rate of Department of Income Tax Government of India and as revised from time to time as per the advice of Income Tax authorities.

## **11.0 Supply and Arrangement of Materials**

- (1) The contractor shall make his own arrangement for supply of materials including cement and steel. The contractor shall be responsible for all transportation and storage of the materials at site and shall bear all the related costs. The Engineer shall be entitled at any time to inspect or examine all such materials. The contractor shall provide reasonable assistance for such inspection or examination as May be required.
- (2) The contractor shall keep an accurate record of use of materials like cement and steel used in the works in a manner prescribed by the Engineers.

## **12.0 Cement**

- (a) The Contractor shall stock his requirement so as to ensure utilization of cement within 60 days but in no case later than 90 days Cement older than the period aforesaid shall not be used on any work except with the written permission of the Engineer, and after satisfactorily passing such test as he May specify. The Contractor shall forthwith remove from the work such cement that Engineer has not allowed. The final disposal of such cement shall comply with the rules in force at the time and as the Engineer May approve
- (b) Large stocks of cement shall not be kept at the works but only sufficient quantities shall be kept to assure continuity of the work. The Contractor shall provided and maintain efficient water proof storage sheds for cement on the site of work. It shall be stacked on the platform 30 cms. above the floor level and shall be covered with tarpaulin or any other impervious covering materials in order to protect the cement bags from moisture. The cement shall be neatly stacked in an orderly manner so as to allow an easy access and count. The arrangement of storage and utilization shall be such as to ensure the utilization of cement in the order of its arrival at the stores and the Contractor shall maintain satisfactory records which would at any time show the date of receipt and proposed utilization of cement laying in the stores at site.
- (c) The Engineer shall at all time have access to the stores at sites of the Contractor. He shall have authority to check and examine the method of storage, record accounting and security provided by the Contractor. The Contractor shall comply with instructions that May be issued by the Engineer

in this connection. The Contractor shall further at all times satisfy the Engineer on demand and by the production of records and books or submission of returns and proforma or by other proofs that May be demanded that the cement brought from the approved manufacturer with date of receipt & consumption etc. The Contractor shall at all times keep his records up to date to enable the Engineer to apply such checks as he May desire to impose.

The contractor shall provide a double locking arrangement to the store the key of one of the locks being with the Engineer or his representative at site. The Engineer or his authorized agent will have the authority to verify the stocks and check the consumption in any manner he thinks proper.

### **13.0 Special Condition Regarding Conditional TENDER**

The BIDDER will have to give an under taking with the instrument of Earnest Money to the effect that there are no conditions in the TENDER and if any conditions are found the same shall be ignored.

If such an under taking is not found with the Earnest Money the TENDER will not be opened and not taken into consideration. However in case the contractor gives such an undertaking at the time of opening of TENDER the same May be considered.

### **14.0 Design and Drawings**

- (1) The Detailed project report prepared by Municipal Corporation, Bhopal will be basic data for guidance of Contractor. The contractor will not claim whatsoever on account of deficiency in the data of Detailed project report.
- (2) Bidder shall carryout detail survey and investigations (including soil test) as may be required for preparation of detail designs and drawings.
- (3) The detailed design and drawing shall be prepared by Contractor and submitted to Government Engineering College for examination through COMMISSIONER and the observations made by the examining institute shall be duly incorporated by Contractor without any claims what so ever in this regard. Thereafter the drawing duly vetted by engineering college shall be submitted to chief engineer for final approvals.
- (4) The approved drawings shall remain in the sole custody of the Engineer. The Contractor shall obtain and make at his own expense any further copies required by him. At the completion of the contract the Contractor shall return to the Engineer all Drawings provided under the Contract.

#### **One copy of the Drawings to be kept on Site.**

- (4) One copy of the Drawings furnished to the Contractor as aforesaid, shall be kept by the Contractor on the site and the same shall at all reasonable times be available for inspection and use by the Engineer and the Engineer's Representative and by any other person authorized by the Engineer in writing.

#### **Disruption of Progress**

- (5) The Contractor shall give written notice to the Engineer whenever planning or progress of the works is likely to be delayed or disrupted unless any further drawing or order, including a direction, instruction or approval is issued by the Engineer within a reasonable time. The notice shall include details of the drawing or order required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late.

#### **Delay and Cost of delay of Drawings**

- (6) If, by reason of any failure or inability of the Engineer to issue within a time reasonable in all the circumstances any drawing or order required by the Contractor in accordance with sub-clause (3) of this Clause, the Contractor suffers delay then the Engineer shall take such delay into account in determining any extension of time to which the Contractor is entitled under Clause 44 hereof. However the Contractor shall not be entitled to any compensation for such delay, except extension of time.

#### **Further Drawings and Instructions**

- (7) The Engineer shall have full power and authority to supply to the Contractor from time to time during the progress of the Works such further drawings and instructions as shall be necessary for the purpose of the proper and adequate execution and maintenance of the Works The Contractor shall carry out and be bound by the same.

### **15.0 Operation and Maintenance**

Contractor shall operate and maintain the water supply project of Municipal Corporation, Bhopal for 5 years after successful completion of works, for which Contractor shall be paid separately. The details of the operation and maintenance alongwith the payment is given on annexure Y and Z.

### **16.0 Sufficiency of TENDER**

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his TENDER for the Works and of the rates and prices of various Quantities and

the Schedule of Rates and Prices, if any, which TENDER rates and prices shall, except in so far as it is otherwise provide in the Contract, cover all his obligations under the Contract and all matters and things necessary for the proper execution and maintenance of the Works. If, however, during the execution of the Works the Contractor shall encounter physical conditions, other than climatic conditions on the Site, or artificial obstructions, which conditions or obstruction could, in his opinion, not have been reasonable foreseen by an experienced contractor the Contractor shall forthwith give written notice thereof to the Engineer's Representative and if in the opinion of the Engineer, such conditions or artificial obstructions could not have been reasonably foreseen by an experienced contractor, than the Engineer shall certify and the Employer shall pay the additional cost to which the Contractor shall have been put by reason of such conditions, including the proper and reasonable cost. However the Engineer in charge decision shall be final & binding.

**17.0 Planned reconstruction of roads damaged by project elements, laying of pipeline**

- (1) The laying of pipes or other structures under the road is likely to involve public inconvenience such as interruption to traffic or interference in normal right of way. The Contractor shall ensure that because of the execution of work minimum possible public inconvenience is caused. For ensuring this, pipeline laying and road reconstruction work shall be carried out and completed in lengths specified by Employer (not more than 250 mtr. in one defined stretch of road).The further excavation, dismantling of road and laying of pipes in the same stretch of road shall not be started unless the earlier work of laying has been completed with full reconstruction of roads. The scheduling of work shall be got approved by the Engineer In Charge.
- (2) In case the pipelines are to be laid under the existing roads/lanes/Bye-lanes, the dismantling of existing roads/lanes/Bye-lanes shall be made in such a way that after laying of pipes or other such structures that are requires to be constructed/placed under the road, the roads/lanes/Bye-lanes shall be restored to the original position. This mean that if prior to proposed construction, the road was black topped with specific composition of the pavement than after construction, the road shall be constructed by the contractor with the same composition and specifications. This will aslw apply for concrete road or any other surface if roads.

**COMMISSIONER  
MUNICIPAL CORPORATION, BHOPAL**

**Section 4**  
**Price Break-Up Schedule**

SI No	Particular	Unit	QTY	Rate	Pro-rata Share %
<b>1.0</b>	<b>Providing and installing Raw water pumps along with transformer at Intake Well including bulk flow meter</b>				
(a)	Providing, erecting, testing and commissioning of 3 nos Vertical Turbine pumps with motor with CI casing and SS 410 casing ring, SS 316 impeller, SS 410 shaft sleeve, coupling with guard, common base plate of each of 263 m3/hr Capacity 102m Head with Electromechanical works and all allied accessories including LT panels	No	3	1260000	2.75
(b)	Providing, Laying & Jointing of welded double flanged centrifugal cast (spun) ductile Iron pressure pipes conforming to IS:8329/2000 in the length of 1m. for class K-9 with inside cement mortar lining for the sizes/dia pipes. (laying conforming to IS 12288 : 1987)				
(i)	250 mm	No.	6	15135	
(ii)	400 mm	No.	3	34597	
(c)	Providing & fixing cast iron double flanged single door reflux (non return) valves including jointing & testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS :5312 (Part I)				
	250 mm (PN1)	No.	3	10930	
(d)	Providing & fixing of Cast iron double flanged sluice valves as per I.S.:14846-2000 fitted with cast iron cap including jointing & testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete				
	250 mm (PN1.6)	No.	3	17702	
(e)	Providing & fixing cast iron butterfly valves including jointing & testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS :13095-1991				
(i)	250mm (PN1.6)	No.	3	13085	
(ii)	400 mm (PN 1.6)	No.	1	23000	
(f)	Providing, laying, Jointing & field testing of following Ductile Iron <b>Mechanical Joint Collar / Dismantling Joint</b> with follower glands conforming to IS-9523/2000 having dimension as per table 24 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying conforming to IS 12288 : 1987)				
(i)	250 mm	No.	3	4605	
(ii)	400 mm	No.	1	11400	
(g)	Providing & Laying Ductile Iron Double Socket branch flange Tee conforming to IS-9523/2000 having dimension as per table 21 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying conforming to IS 12288 : 1987) (All sizes in mm)				
	400 x 250	No.	3	11222	

(h)	Electromagnetic Bulk Flow Meters Supply of Electromagnetic full bore meter complete as per specification including transportation to site, storage, safety, installation, testing, commissioning, making connections with existing pipe line, including excavation at site, cuts in the existing pipe system, dewatering and reinstating the same after completion of installation as per specification and drawings including all taxes. Accuracy of meter + 0.3% of measured value, Flange connection as per AWWA & IS, Liner: Hard Rubber, Fully welded sensor housing complying to IP 68 standard, Electrodes SS 316, Sensor housing SS 304, Cable gland 1/2" NPT, Sensor housing fully welded SS 304 housing with protective Polyurethane paint, Flow Transmitter/Converter : Microprocessor based, modular design display 2 line back lit LCD for indication of actual flow rate, forward, reverse, sumtotalizer, Perfection category : IP 65 Dia in mm				
(i)	400 mm	No	1	211387	
(ii)	MS Panel with Transmitter, Totalizer, etc as per specifications	No	1	12552	
(iii)	Uninterruptible Power Supply [6hr Battery Backup (500 VA) ]	No	1	25105	
(i)	Provision for water hammer device on raw water rising main at Intake well	LS		500000	
(j)	Supply, erection, testing, commissioning of one no. 315 KVA of 11/0.440KV transformer sub station with poles etc. all complete, including supervision fee	LS		650000	
<b>2.0 Raw water rising mains along with Thrust blocks and chambers</b>					
(a)	Providing, laying and jointing socket & spigot centrifugally cast (Spun) Ductile Iron pressure pipes with inside cement mortar lining (class K-9) conforming to IS 8329/2000 with suitable Rubber Gasket (Push on) joints as per IS:5382/85 including testing of joint (laying conforming to IS 12288 : 1987)				31.80
	400 mm diameter	M	10700	5498	
(b)	Earth work in Excavation for pipe trench in all kinds of soil and WBM in areas including dressing, watering and ramming and disposal of Excavated earth lead upto 50 meters and lift upto 1.5m, disposal earth to be leveled, neatly dressed.	Cum	8881	129	
(c)	Earth work in Excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable on upto to 50 m lead and lift upto 1.5 m				
(i)	a) Soft rock (without blasting) or bituminous pavement.	Cum	2664	206	
(ii)	b) Hard rock requiring Chieseling/where blasting is prohibited.	Cum	2487	408	
(d)	Filling with moorum for pipe bedding including supply of moorum	Cum	1332	625	
(e)	Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. in depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils	Cum	10405	29	



(f)	Providing, laying Ductile Iron Double Socket 90° Bends conforming to IS-9523/2000 having dimension as per table 16 of IS-9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining.			
	400 mm	No	7	10932
(g)	Providing, laying Ductile Iron Double Socket 45° Bends conforming to IS-9523/2000 having dimension as per table 16 of IS-9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining.			
	400 mm	No	4	7882
(h)	Providing & Laying Ductile Iron Double Socket 22.5° Bends conforming to IS-9523/2000 having dimension as per table 17 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying conforming to IS 12288 : 1987)			
	400 mm	No	7	6503
(i)	Providing & Laying Ductile Iron Double Socket 11.25° bends conforming to IS-9523/2000 having dimension as per table 18 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying conforming to IS 12288 : 1987)			
	400 mm	No	8	5708
(j)	Providing & fixing of Cast iron double flanged sluice valves (1no.) / Scour Valves (2nos) as per I.S.:14846-2000 fitted with cast iron cap including jointing & testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete			
	400 mm PN 1.6	No	3	28000
(k)	Providing and Laying ductile iron PN-16 type flanged sockets conforming to IS-9523/2000 having dimension as per table 23 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying conforming to IS 12288 :1987)			
	400 mm	No	3	5622
(l)	Providing and Laying ductile PN-16 type iron flanged spigot conforming to IS-9523/2000 having dimension as per table 24 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying conforming to IS 12288 :1987)			
	400mm	No.	3	7211
(m)	Providing & fixing cast iron double air valves, flanged without in-built isolating valve as per IS : 14845-2000 including jointing & testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991			
	40 mm (PN1.6)	No.	10	1689
(n)	Providing & laying mechanically mixed cement concrete 20mm maximum size graded crushed stone including cost of centering & shuttering. <b>For Thrust Block</b>			
	M20	Cum	114	4778
(o)	Providing and placing in position cold twisted or un-coated HYSD steel bar and hot rolled deformed steel			

		reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. <b>For Thrust Block</b>				
		Sub structure	Kg	7980	55	
(p)		RCC Chamber M20 for Valves with 12mm thick MS plate cover all complete	No.	13	45000	
<b>3.0 Water treatment plant</b>						
(a)		Construction of WTP with capacity 10.0 MLD, including design, drawing as approval from authority etc complete. As directed by engineer-in-charge including all civil and mechanical, Electrical, Instrumentation works of WTP like Head works, Clariflocculator, filter unit, Chlorination unit, clear water Reservoir, Laboratory, store, office and Clear water sump and Pump House, Compound wall with Gate all complete shall be as per CPHEEO manual incl. Clear Water Reservoir (4000 KL) at WTP incl. Supply, erection, testing, commissioning of two no. (1working+1standby)100 KVA of 11/0.440KV transformer sub station with poles etc. all complete, including supervision fee	MLD	10.00	3000000	23.94
<b>4.0 Distribution</b>						
(a)		Earth work in Excavation for pipe trench in all kinds of soil and WBM in areas including dressing, watering and ramming and disposal of Excavated earth lead upto 50 meters and lift upto 1.5m, disposal earth to be leveled, neatly dressed.	cum	14497	129	
(b)		Earth work in Excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable on upto to 50 m lead and lift upto 1.5 m				
	(i)	Soft rock (without blasting) or pavement/ cement concrete road.	cum	3625	206	
	(ii)	Hard rock requiring Chiseling/where blasting is prohibited.	cum	6041	408	
(c)		Demolishing C.C./R.C.C. work by mechanical means, stacking of serviceable material and disposal of unserviceable material within 50 m lead.	cum	2500	703	
(d)		Filling with moorum for pipe bedding or over the pipe including supply of moorum	cum	2638	625	
(e)		Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. in depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils	cum	19330	29	34.30
(f)		Providing, laying and jointing socket & spigot centrifugally cast (Spun) Ductile Iron pressure pipes with inside cement mortar lining (class K-7) conforming to IS 8329/2000 with suitable Rubber Gasket (Push on) joints as per IS:5382/85 including testing of joint (laying conforming to IS 12288 : 1987)				
	(i)	100 mm	Meter	533	1004	
	(ii)	150 mm	Meter	3131	1470	
	(iii)	200 mm	Meter	3640	1876	
	(iv)	250 mm	Meter	3024	2456	
	(v)	300 mm	Meter	445	3102	
	(vi)	400 mm	Meter	1562	4835	
	(vii)	500 mm	Meter	1865	6570	

		Cost of Specials (5% of cost of Pipe)	LS		2028950
(g)		Providing, laying, Jointing & field testing of following High Density Polyethylene pipes (HDPE) conforming to IS 4984/ 14151/ 12786/ 13488 with necessary jointing material like mechanical connector or jointing 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 & leak proof joint by thermosetting process. It may be required to be done with Jacks/Hydraulic Jacks/ But fusion machine. (50mm & above fusion jointed & below 50mm mechanical jointed)			
	(i)	110 mm dia. PE 100 6 kg./ sq. cm. (OD)	Meter	6040	312
	(ii)	160 mm dia. PE 100 6 kg./ sq. cm. (OD)	Meter	3590	655
	(iii)	200 mm dia. PE 100 6 kg./ sq. cm. (OD)	Meter	4965	1013
	(iv)	250 mm dia. PE 100 6 kg./ sq. cm. (OD)	Meter	213	1568
		Cost of Specials (5% of cost of Pipe)	LS		479973
(h)		Providing & fixing of Cast iron double flanged sluice valves as per I.S.:14846-2000 fitted with cast iron cap including jointing & testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete (PN1)			
	(i)	150 mm	No	1	6237
	(ii)	200 mm	No	5	10173
	(iii)	250 mm	No	2	17101
	(iv)	500 mm	No	2	45000
(i)		Providing, and laying ductile Iron PN-16 type flanged sockets conforming to IS 9523/2000 having dimension as per table 23 of IS 9523/2000 in the following nominal diameter /sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS 9523/2000			
	(i)	150 mm	Each	1	1076
	(ii)	200 mm	Each	5	1529
	(iii)	250 mm	Each	2	1992
	(iv)	500 mm	Each	2	8580
(j)		Providing, and laying ductile Iron PN-16 type Iron flanged spigot conforming to IS 9523/2000 having dimension as per table 24 of IS 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS 9523/2000			
	(i)	150 mm	Each	1	1225
	(ii)	200 mm	Each	5	1753
	(iii)	250 mm	Each	2	2441
	(iv)	500 mm	Each	2	11152
(k)		RCC Chamber M20 for Valves with 12mm thick MS plate cover all complete			
	(i)	1.0 m x 1.0 m (inner size)	No	6	38000
	(ii)	1.2 m x 1.2 m (inner size)	No.	4	45000
(l)		Providing & laying mechanically mixed cement concrete 20mm maximum size graded crushed stone including cost of centering & shuttering. For Thrust Block			
		M20	Cum	80	4778
(m)		Providing and placing in position cold twisted or un-coated HYSD steel bar and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage.			

		For Thrust Block			
		Sub structure	Kg	5600	55
(n)		Excavated Earth Disposal - Carriage of Material by Mechanical transport including loading unloading & stacking etc. upto 2 km(Earth and Moorum)	Cum	4833	97
		<b>Road Restoration</b>			
(o)		Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering & shuttering (with 20 mm nominal size graded stone aggregate)	Cum	581	4321
		iv) 1:2:4			
(p)		Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering & shuttering (with 20 mm nominal size graded stone aggregate)	Cum	291	3595
		ii) 1:4:8			
(q)		Construction of granular sub-base by providing coarse graded material, spreading in uniform layers with on prepared surface, mixing by mix in place method at OMC, and compacting with vibratory roller to achieve the desired density, complete in all respect and as per relevant clauses of section-400. Construction of granular sub-base by providing coarse graded material, spreading in uniform layers with on prepared surface, mixing by mix in place method at OMC, and compacting with vibratory roller to achieve the desired density, complete in all respect and as per relevant clauses of section-400.			
		for grading- I Material	Cum	581	604
(q)		Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with vibratory roller 8-10 tonnes in stages to proper grade and camber, applying and brooming requisite type of screening/ binding materials to fill up the interstices of coarse aggregate, watering and compacting to the required density and as per relevant clauses of section-400.			
		Grading- I (90-45mm)			
		Using Screening Crushable type	Cum	291	899
		Grading- II (63-45mm)			
		Using Screening Crushable type	Cum	218	857
		Grading- III (53-22.4mm)			
		Using Screening Crushable type	Cum	218	815
®		Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor on the prepared bituminous/granular surface cleaned with mechanical broom and as per relevant clauses of section-503.			
		@0.40 kg per sqm (Non-bituminous surfaces) granular base not primed.	Sqm	2901	14
(s)		Providing and laying bituminous macadam with hot mix plant using crushed aggregates of specified grading premixed with bituminous binder, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction complete in all respects and as per relevant clauses of section-			

		504.				
		for Grading II( 50-75mm thickness ) bitumen content 3.4%	Cum	146	5726	
(t)		Providing and laying bituminous concrete with hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder, transporting the hot mix to work site, laying with a mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction in all respects and as per relevant clauses of section-509.(Only cement will be used as filler).				
		for Grading II ( 30-45 mm thickness ) with 60/70 bitumen	Cum	88	8226	
<b>5.0 Bulk Connection and House Service Connections DI Pipe 20mm Dia</b>						
1		Electromagnetic Bulk Flow Meters Supply of Electromagnetic full bore meter complete as per specification including transportation to site, storage, safety, installation, testing, commissioning, making connections with existing pipe line, including excavation at site, cuts in the existing pipe system, dewatering and reinstating the same after completion of installation as per specification and drawings including all taxes. Accuracy of meter + 0.3% of measured value, Flange connection as per AWWA & IS, Liner: Hard Rubber, Fully welded sensor housing complying to IP 68 standard, Electrodes SS 316, Sensor housing SS 304, Cable gland 1/2" NPT, Sensor housing fully welded SS 304 housing with protective Polyurethane paint, Flow Transmitter/Converter : Microprocessor based, modular design display 2 line back lit LCD for indication of actual flow rate, forward, reverse, sumtotalizer, Perfection category : IP 65 - <b>FOR IISER</b>				
		250 mm	No	1	155823	
		MS Panel with Transmitter, Totalizer, etc. as per specifications	No	1	12552	
		Uninterruptible Power Supply [6hr Battery Backup (500 VA) ]	No	1	25105	2.53
2		Woltman Turbine Bulk Meters Supply of Woltman Turbine Bulk meters class B, multijet, magnetically coupled as per specifications conforming to is 770/1994, ISO 4064/1 and EEC approved, including transportation to site, storage, safety, installation, testing, commissioning, making connections with existing pipeline, including excavation at site, dewatering and reinstating the same after completion of installation as per specifications and drawings including all taxes.				
		80 mm dia	No	25	12523	
3		Providing & fixing of Cast iron double flanged sluice valves as per I.S.:14846-2000 fitted with cast iron cap including jointing & testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete (PN1)				
		100 mm	No	6	3938	
		150 mm	No	13	6237	
		200 mm	No	2	10173	
		250 mm	No	3	17101	

	300 mm	No	1	19397
4	Providing, and laying ductile Iron PN-16 type flanged sockets conforming to IS 9523/2000 having dimension as per table 23 of IS 9523/2000 in the following nominal diameter /sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS 9523/2000			
	100 mm	Each	6	698
	150 mm	Each	13	1076
	200 mm	Each	2	1592
	250 mm	Each	3	1992
	300 mm	Each	1	2684
5	Providing, and laying ductile Iron PN-16 type Iron flanged spigot conforming to IS 9523/2000 having dimension as per table 24 of IS 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS 9523/2000			
	100 mm	Each	6	769
	150 mm	Each	13	1225
	200 mm	Each	2	1753
	250 mm	Each	3	2441
	300 mm	Each	1	3278
6	RCC Chamber M20 for Valves with 12mm thick MS plate cover all complete			
	i) 1.0 m x 1.0 m (inner size)	No	21	38000
	i) 1.2 m x 1.2 m (inner size)	No	4	45000
	<b>House Connection wt. Meter</b>			
1	Providing and supplying Blue MDPE pipes conforming to ISO : 4427 : 1996 manufactured from virgin resin PE 80 Food grade Compounded RAW material having Blue colour only with quality assurance certificate from quality agencies WRC / CIPET (India)/ DVGM / KIWA / SPGN etc. for usages of Drinking Water System the cost shall be include Testing of all Materials , all Taxes Cental , State , Municipal , Inspection Charges transportation upto site transitsurance, loding , unloading, staking etc., complete.			
	PNR 16 ( SDR 9 )			
	20 MM DIA	RMT	4000	33
2	Providing &Supplying of Compression Fitting, PN 16 rated in conforming to ISO : 14236-2000 and shall be tested as per ISO:3459, ISO : 3501 & ISO :3503, Suitable for drinking water & approved by WRAS ,UKI KIWA etc. , in food grade polypropylene and shall as testing , all taxes related to central, state &municipal, Inspection Charges transportation upto site transitsurance, loding , unloding, staking etc., complete.			
	Compression Fitting			
	Metal inserted Compression Female			
	Threaded Adaptor with SS 304 Material			
	20x15 mm	Each	2000	170
	Compression 90 Deg. Elbow			
	20mm	Each	2000	110
3	Supply & Installation of Domestic Water Meters of inferential type, multijet, magnetically coupled, having dry dial, straight reading Class B conforming to is: 779/1994, ISO and EEC approved, including			

		transportation to site, storage, safety, installation, testing, commissioning, making connections with existing pipeline, including excavation at site, dewatering and reinstating the same after completion of installation as per specifications including all taxes.				
		15 mm dia	No.	1000	1152	
4		Providing and fixing gun metal/ brass check (non-return) valves Class-II, confirming to IS-778/1984 (Reaffirmed 2005) female ends, tested to 21.09 kg/sq.cm.				
		15 mm dia	each	1000	253	
5		Providing & Supplying of PVC Ball Valves in PN 16 rated with one end compression using Blue colour compression nut In polypropylene material & other end with female threads conforming to ISO : 4422-4, certified from WRAS UK/KIWA etc. suitable for food products & drinking water female threads in accordance with ISO : 7/BS:21/ IS:554 and shall be inclusive of all cost such as testing , all taxes related to central, state & municipal, Inspection Charges transportation upto site transit insurance, loding , unloading, staking etc, complete.				
		PVC Ball Valve with Compression & Female Threads				
		20x15 mm	Each	1000	175.00	
6		Providing & Supplying of Clamp Saddle ( DI Strap Saddle) for House Service connection from metal pipe Water Distribution mains shall be of fastened strap type with threaded outlet for service connection. Clamp Saddle for nominal size of distribution mains pipe line. The strap Shall be elastomer coated (insulated) type for firm grip on the pipe and to insulate the identical metals. The strap shall be single strap type upto pipe sizes of NB 600 and service outlet 15mm, 20mm & 25mm Fastener shall be obtained by using a profiled elastomer seal matching to the curvature of the pipe. The seal shall be of elastomer type, suitable for all potable water application The material of construction of the body, straps, Fastener etc. shall be of non-corrosive material such as engineering plastic (PE/PP) or stainless steel or a combination of both.				
		100NBx15mm,20mm,25mm	Each	900	1100	
		150NBx15mm,20mm,25mm	Each	100	1300	
<b>6.0 Crossings ( cost in parallel mains and deposit to the department</b>						
	1	1 no. Railway crossing	Each	1	2000000	4.68
	2	1 no. NH crossing	Each	1	7500000	
<b>Total</b>						<b>100</b>

**Note:**

- 1.0 Under this agreement, it is clarified that any payment for the work of feeder/ road restoration for any executed quantity shall only be made on the item rates given against each item of the work, after these given rates are adjusted by a factor explained in point no. 2 below. Accordingly the total lump sum accepted tender cost shall be adjusted as per actual work done under these items.  
**Thus, any increase or decrease in the work described above shall be paid or deducted from the total agreement cost of the work on the basis of the unit rates of actual quantities of these items executed.**
- 2.0 The final rates of above items shall be the rates plus or minus the overall percentage of the approved lumpsum tender cost. If the accepted cost of this tender is "x" than all the above mentioned rates shall be adjusted by a factor of "x" / ( ) and the increase/reduction shall be done on the basis of such adjusted rates.
- 3.0 As per clause 51 of GC if any order for change of scope is issued the contractor shall be liable to execute quantities more than the above quantities, if required as per site conditions and payment for such excess work shall also be made on the adjusted rates mentioned in point no. 2 above. Such excess quantities shall however remain within the 10% of the agreement cost of the total work.

- 4.0 Bidder shall be responsible for reconstruction of road excavated because of excavation of pipe trenches till one rainy season. In case of any repair to be made because of bad quality of construction the same shall be made good without any extra cost.
- 5.0 Bidder shall carry out fencing along the boundary of WTP.
- 6.0 The scope of work includes crossing of Railway/highway as may be required for laying of pipeline. No extra payment shall be made to the contractors for doing the same.



**SECTION 5  
AGREEMENT FORM  
AGREEMENT**

This agreement, made on the day of \_\_\_\_\_ between (name and address of Employer) (hereinafter called "the Employer) and \_\_\_\_\_ (name and address of contractor) hereinafter called "the Contractor" of the other part.

Whereas the Employer is desirous that the Contractor execute \_\_\_\_\_ (name and identification number of Contract) (hereinafter called "the Works") and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein, at a cost of Rs. \_\_\_\_\_

NOW THIS AGREEMENT WITNESSED as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the conditions of contract hereinafter referred' to and they shall be deemed to form and be read and construed as part of this Agreement.
2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the contract.
3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein 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.
4. The following documents shall be deemed to form and be ready and construed as part of this Agreement viz.
  - i. Letter of Acceptance
  - ii. Contractor's Bid
  - iii. Condition of Contract: General and Special
  - iv. Contract Data
  - v. Bid Data
  - vi. Drawings
  - vii. Bill of Quantities and \_
  - viii. Any other documents listed in the Contract Data as forming part of the Contract.

In witnessed whereof the parties there to have caused this Agreement to be executed the day and year first before written.

The Common Seal of affixed in the presence of:

Signed, Sealed and Delivered by the said \_\_\_\_\_ in the presence of:

Binding Signature of Employer \_\_\_\_\_

Binding Signature of Contractor \_\_\_\_\_

## Section-6

**ANNEXURE: X**

### **BILLING BREAK-UP**

**A. For Supply and installation of Raw and Clear water pumps & motor (2.75 % of the total sanctioned cost)**

- 1 5% shall be payable to the Contractor after approval of Designs and drawings.
- 2 65% shall be payable to the Contractor on supply of all the electro-mechanical items at site.
- 3 25% shall be payable to the Contractor on erection and complete fitting of motors and pumps at site.
- 4 5% shall be payable to the Contractor after completion of the whole work

**B. For Pipeline (Raw/ Clear water pumping main 31.80 % of the total sanctioned cost)**

- 1 5% shall be payable to the Contractor after approval of designs and drawings.
- 2 60% shall be payable to the Contractor on supply of pipes.
- 3 25% shall be payable to the Contractor after laying of pipeline in all respect on pro-rata basis (i.e, with the on progress of work).
- 4 5% shall be payable on Successful Testing of the pipeline.
- 5% shall be payable after completion of the whole work and trial run for a period of 3 month

**C. For Water Treatment plant/clear water pump house/ sump well (23.94 % of the total sanctioned cost)**

- 1 5% shall be payable to the Contractor after approval of Designs and drawings.
- 2 25% shall be payable to the Contractor on completion of excavation, PCC and foundation in all respect up to G.L. on pro-rata basis.
- 3 65% shall be payable to the Contractor on pro-rata basis as per the progress of Civil Works.
- 4 5% shall be payable to the Contractor after completion of the whole work and trial run for a period of 3 months including training the staff of NAGAR PARISHAD, for running and maintenance.

**D. Distribution Network (34.31 % of the total sanctioned cost)**

- 1 5% of the unit cost shall be payable to the Contractor after approval of designs and drawings.
- 2 50% of the unit cost shall be payable to the Contractor on supply of pipes.
- 3 30% of the unit cost shall be payable to the Contractor after laying of pipeline in all respect on pro-rata basis (i.e, with the on progress of work).
- 4 10% shall be payable on Successful Testing of the pipeline.
- 5 5% shall be payable after completion of the whole work.

**E. House service connection & Water meters (2.53% of the total sanctioned cost)**

Payment for House service connection/Water meters work shall be made for the number of meter supplied, installed, complete, as per actual work done on unit rate basis. (lumpsum bid/probable amount of contract).

**F. For Crossings (4.68 % of the total sanctioned cost).**

(The unit rate for item B & D shall be the rate indicated in price breakup plus the increase/decrease of tender percentage).

**Operation and Maintenance:**

The Bidder shall be responsible for the operation and maintenance of the works under the proposed project for a period of 5 years from the date of successful completion of the work. During O&M all the expenses for repairs, replacements & consumables except electricity (to be borne by MUNICIPAL CORPORATION as per actual) shall be on the part of Bidder. It shall be the responsibility of Bidder that the water should be supplied through the pipeline at desired capacity and pressure during the O&M period. ULB shall extend all the necessary support to the Bidder for fulfilling the Obligations for operating and maintaining the system successfully. During O&M the scope of Contractor shall be,

Details of the operation and maintenance,

- 1.0 Repairs and replacements in the component of proposed project so that desired quantity of water should be delivered upto Bhopal Municipal area.
- 2.0 Electrical expenditure shall be borne by MUNICIPAL CORPORATION as per actual however Bidder shall ensure that the combined efficiency of Motor and pumps should not be less than 70% during O&M period.
- 3.0 Bidder shall comply service level bench mark for 24x7 water supply including desired pressure shall be on the part of bidder
- 4.0 Suitable penalties for non-adhering service level benchmark (as detailed in preceding paragraph) shall be imposed on the Bidder.
- 5.0 Bidder shall handover the project facilities to the MUNICIPAL CORPORATION as per original condition as constructed on 1<sup>st</sup> day after execution.

Details of Staff,

S. No.	Particulars	Minimum Qualification	Experience	No.	Minimum monthly salary at the start of O&M in Rupees
1	Project Manager	B.E.(Civil)	5 years	1	30,000
2	Dy Project Manager	Dip (Civil)	3 years	1	20,000
3	Mechanical engg.	BE.(Mech)	3 years	2	18,000
4	Chemical engg.	Dip (Chemi.)	3 years	2	12,000
5	Electrician	Dip.(Elect.)	4 years	2	12,000
6	Skilled labours / operator	Fitter/welder	2 year	17	9,000
7	Un skilled labours	Helper	3 year	7	7,000

The payment against the O&M shall be made every year on satisfactory upkeep and running of the system @ 4.48 % of the sanctioned Bid cost with an increment of 5% every succeeding year after 2<sup>nd</sup> year,

S.No.	Year	% of amount to be paid by ULB for Operation Maintenance excluding Energy Charges
1.0	1 <sup>st</sup> Year	4.48
2.0	2 <sup>nd</sup> Year	4.71
3.0	3 <sup>rd</sup> Year	4.94
4.0	4 <sup>th</sup> Year	5.20
5.0	5 <sup>th</sup> Year	5.45

	Total	24.78
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The payment against the O&M shall be made in 4 equal installments after completion of each quarter. Period of Operation and Maintenance can be extended upto 10 years on the same terms and conditions as mentioned in this Bid. If bidder will not employ the no. of staffs shown, proportionate deduction shall be made according

## **SERVICE LEVEL BENCHMARKS DURING OPERATION & MAINTENANCE**

1. **General:** The contractor shall be responsible to maintain service level standards during the operation and maintenance period and these standards shall be effective on the date of handing over the project to ULB.
2. **Service Level Standards:** The following standards shall be maintained by the contractor-
  - i. **Supply of safe & portable drinking water-** The safe and portable drinking water having characteristics of water as per IS: 10500 (latest) shall be supplied to each consumer. The testing of samples shall be done by contractor, as per IS: 1622-1981.
  - ii. **Per capita supply of water-** The contractor is liable to ensure supply of potablewater for domestic use to each consumer @ 135 lpcd minimum at consumer end (The same shall be waived on case of unavailability of water in source due to reasons beyond the control of contractor).
  - iii. **Pressure at consumer end should not be less than 7.0 m as far as possible.**
  - iv. **Unaccounted flow of Water** shall be within 15% of water produced, for which bulk flow meters shall be provided at each OHTs.
  - v. **Complaint redressal-** The contractor shall attend the complaints of the consumer within 48 hours of information received and the normal supply should be restored within 48 hours of its occurrence.

## Operation and Maintenance Estimate

S. No.	Particulars	Qty.	Unit Rate	Unit	Amount / annum (In Lacs)
<b>1.0</b>	<b>Power expenditure to be paid by Municipal Corporation, Bhopal</b>				
	Raw water pumps and WTP electrical cost. for raw water pumps 160HP & 102 meter head and considered commercial rates of electricity. @ Rs. 5.00 per kw				144.55
			<b>Total</b>		<b>144.55</b>
Operation and Maintenance Expenditure to be paid by Bidder					
<b>2.0</b>	<b>Consumption of Chemicals :</b>				
(i)	Annual Alum consumption at the rate of 25 mg/l for 8 months and 50 mg/l for 4 months for 10 mld. Total requirement of alum				
	$30 \times (25 \times 8 + 50 \times 4) \times 11.0 \times 10^6 / (1000 \times 1000 \times 1000)$	132	10000	MT	13.20
(ii)	Lime 4 MT per MLD for 11.0 MLD	44	5000	MT	2.20
(iii)	Chlorine consumption @ 3.50 P.P.M. for 11.0 mld				
	$11.0 \times 3.5 \times 30 \times 12 / 1000$	12.6	20000	MT	2.80
(iv)	Laboratory maintenance cost/Other chemicals	L.S.	-	-	5.00
<b>3.0</b>	<b>Maintenance of civil structures pumps etc.</b>				
(i)	WTP @ 1% of total cost	-	-	-	7.50
(ii)	Raw water pumps and pumping main @ 1/2% of total cost	-	-	-	5.00
(iii)	Distribution System @ 1/2% of total cost	-	-	-	5.00
<b>4.0</b>	<b>Salary and wages</b>				
					40.32
(i)	1 Project manager & 1 Dy. Project Manager	50,000			
(ii)	3 operator @ 9000/3 nonskilled staff @ Rs 7000/- for Intakewell	48,000			
(iii)	7 skilled/nonskilled staff for WTP (1 ext+1prop)				
	4 nonskilled staff @7000	28,000			
	6 skilled staff @ 9000	54,000			
	2 Electrician @ 12000	24,000			
	2 Chemist @ 12000	24,000			
(iv)	2 valve man for Rising/Feeder main of 10700 m @ Rs 9000/- 1 for per 5 KM	18,000			
(v)	6 Valve man for distribution main of 29033 m @ Rs 9000/- for per 5.00 KM	54,000			
(vi)	2 nos. Mechanical Engineer @ Rs 18,000	36,000			
	<b>For 12 months</b>	4,032,000			
<b>5.0</b>	<b>Miscellaneous works</b>				
					10.00
			<b>Total</b>		<b>91.02</b>
	O & M Cost for First Year				91.02
	O & M Cost for Second Year (5% Increase)				95.57
	O & M Cost for Third Year (5% Increase)				100.35
	O & M Cost for Fourth Year (5% Increase)				105.37
	O & M Cost for Fifth Year (5% Increase)				110.64
	<b>Total Five Year O&amp;M Cost</b>		<b>Rs. Lacs</b>		<b>502.75</b>

## Annexure 'E'

### Specifications (for Bhauriwater supply related works)

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# Chapter 1

## General:

The specifications for this project & various components thereof shall be as follows,

- 1.0 The specifications for various material to be used for the project shall confirm to BIS standards with upto date amendments as given below,

S. No.	IS Code No.	Title
1.	IS 269:1989	33 grade ordinary Portland cement
2.	IS 8112:1989	43 grade ordinary Portland cement
3.	IS 12269:1987	53 grade Ordinary Portland cement
4.	IS 1489:1991	Portland pozzolana cement
	Part I:1991	Fly ash based
	Part II:1991	Calcined clay based
5.	IS 1786:1985	High strength deformed steel bars and wires for concrete reinforcement
6.	IS 875:1987	Code of practice for design loads for building structure
	Part I:1987	Dead loads
	Part II:1987	Imposed loads
	Part III:1987	Wind loads
	Part IV:1987	Snow loads
	Part V:1987	Special loads and load combinations
7.	IS 13920:1993	Ductile detailing of reinforcement concrete structures subjected to seismic forces
8.	IS 1893:2002	Criteria for earthquake resistant design of structures
9.	IS 456:2000	Code of practice for plain and reinforcement concrete (third revision)
10.	IS 457: 1957	Code of practice for general construction of plain and reinforcement concrete for dams and other massive structure.
11.	IS 1343:1980	Code of practice for pre-stressed concrete (first revision)
12.	IS 3370:1965	Code of practice for concrete structure for the storage of liquids.
13.	Part 1:1965	General requirement
	Part 2:1965	Reinforced concrete structure
	Part 3:1967	Pre-stressed concrete structures
	Part 4:1967	Design tables
14.	IS 6518:1972	Code of practice for control of sediment in reservoirs
15.	IS 5330:1984	Criteria for design of anchor block for penstock with joints (first revision)
16.	IS 7357:1974	Code of practice for structural design of tanks.
17.	IS 3913:1966	Suspended sediment load samplers
18.	IS 3917:1966	Scoop type bed material samplers.
19.	IS 4890: 1968	Method for measurement of suspended sediment in open channels.
20.	IS 4926:1976	Ready mix concrete (first revision)
21.	IS 6295:1986	Code of practice for water supply and drainage high altitude and/or sub-zero temperature regions (first revision)
22.	IS 5477	Method for fixing the capacities of reservoir
	Part 1:1969	General Requirement
	Part 2:1969	Dead storage
	Part 3:1969	Live storage
	Part 4:1971	Flood storage
23.	IS 9668:1980	Code of practice for provision and maintenance of water supply for fire fighting



S. No.	IS Code No.	Title
24.	IS 8062	Code of practice for cathodic protection for steel structure
	Part1:1976	General principles
	Part2: 1976	Underground pipelines
25.	IS 10221:1982	Code of practice for coating and wrapping of underground steel pipes
26.	IS 8329: 2000	Centrifugally cast(spun) ductile iron pressure pipes for water, gas, and sewerage
27.	IS 9523:1980	Ductile iron fittings for pressure pipes for water, gas, and sewerage
28.	IS 11906:1986	Recommendation for cement mortar lining cast iron, mild steel and ductile iron pipes
29.	IS 12288:1987	Code of practice for laying of ductile iron pipes
30.	IS 4984:1994	HDPE pipes for potable water supplies, sewage and industrial effluents(third revision)
31.	IS 7634 Part2:1975	Laying and jointing polyethylene(PE) pipes.
32.	IS 8008	Injection moulded HDPE fittings for potable water supplies
	Part1:1976	General requirement

NOTE:-Any other BIS standards as may be required will also be applicable. Quality assurance program of the manufacturer shall have to be enclosed with the detailed design and drawings.

2.0 The other part of the specifications for various components of the project shall be as per provisions of clauses and sub clauses of chapters of Manual on Water supply and Treatment (third edition), CPHEEO Ministry of Urban Development Govt. Of India

- a. Transmission of water, Chapter 6
- b. Water treatment Chapter 7, 8 and 9
- c. Distribution system Chapter 10
- d. Pumping Stations and Machinery Chapter 11
- e. Instrumentation and Control in Water treatment plant Chapter 12
- f. Operation and Maintenance Chapter 13
- g. Laboratory Tests and Procedures Chapter 15

**Disclaimer :** Any specifications not covered above shall be as per best Engineering practice or as directed by Engineer In Charge. In the event of any disparity between the written specifications and BIS provisions, the provisions in BIS shall prevail.

**The itemwise specifications to be followed by the Contractor are given in the subsequent Chapters.**

## Chapter 2

### Specification for providing laying and jointing of pipelines

#### **1.0 Excavation of trenches, back filling, road restoration**

##### **1.1. Excavation for Pipe Line Trenches**

The excavation in hard rock will have to be carried out either by controlled blasting or chiselling, wedging or by mechanical means and the tendered rate is supposed to cover cost of all such means.

##### **1.2. Site Clearance**

The pipe line alignment shall be cleared of all bushes, shrubs, roots, grass, weeds and if required trees, coming in the alignment of pipe line in the trench width portion. The rates for excavation shall cover all such site clearance work and no extra payment will be allowed on this account.

##### **1.3. Alignment marking**

After the work site is cleared as above, pipe line alignment with required trench width shall be marked on the ground with apex points, curves etc, as shown on the drawings or as directed by the Engineer-in-Charge for the stretch where the work is to be started. The contractor shall provide all labour, survey instruments, and materials such as strings, pegs, nails, bamboos, stones, mortar, concrete etc. required for setting out and establishment of bench marks. The contractor shall be responsible for the maintenance of bench marks and other marks and stakes as long as they are required for the work in the opinion of the Engineer-in-Charge.

##### **1.4. Working survey**

Working survey of the pipeline alignment shall be carried out by the contractor before start of the excavation work. Based on the working survey, the alignments, L-section (depth of laying), grade, and location of specials, valves and chambers shall be finalized and got approved from the competent authority. The gradient and alignment shall be such that minimum horizontal and vertical bends shall be required.

##### **1.5. Use of Machinery :**

All excavations shall be carried out by mechanical equipments / machinery unless, in the opinion of the Engineer-in-Charge, the work involved and time schedule permit manual excavation.

##### **1.6 Trench Width and Depth :**

All buried pipelines shall be minimum 1 meter **+/- 0.2 mtr** below ground level to maintain proper cover & gradient unless other depths are approved by the engineer in charge. The trench width shall be constant throughout the trench depth, & shall provide a clearance of **about 0.30 m** on either side of the pipe line. The contractor May, for the facility of work or similar other reasons, excavate and also backfill later, if so approved by the Engineer-in-Charges, at his own cost, outside the allowable trench width specified above. Should any excavation be taken below the specified trench bottom, contractor shall fill it up to required level, at his own cost, with the same material available at the trench bottom including watering and compaction.

The excavation shall be as per approved in drawings, having sufficient depth over the pipe cover, bedding below pipe line wherever bedding is required. The trench bottom shall be excavated to proper grade as shown on drawings. The contractor shall provide site rails and levelling instruments required for checking the grade during excavation, bottom bedding and pipe laying Projections in rock excavation shall be removed by chipping.

The contractor shall carryout extra excavation at the pipeline joints to be welded in the trench, as required (minimum 0.6 m deep and 0.9 m lengthwise, all around the pipe), for facilitating proper welding of the bottom joint from outside. The work of trench excavation should be commensurate with laying and jointing of the pipe line. It should not be dug in advance for a length greater than 250 m ahead of work of laying and jointing of pipeline unless otherwise permitted by the Engineer-in-Charge.

##### **1.7 Barricading and Guarding:**

To protect persons from injury and to avoid damage to property, adequate barricades, construction signs, red lanterns and guards as required shall be placed and maintained during the progress of work, by the contractor at his cost.

All precautions shall be taken during excavation and laying operation to guard against possible damage to any existing structures, underground cables, pipe lines of water, gas, sewage etc. Any damage done to such properties will have to be repaired / rectified by the contractor at his cost. The Contractor has to ensure the following:

- safety protections as mentioned above have to be incorporated in the work process
- hindrances to the public have to be minimized
- the trench must not be eroded before the pipes are laid
- the trench must not be filled with water when the pipes are laid
- the trench must not be refilled before laying of the pipes

The bed for the laying of the pipes has to be prepared according to the L-Section immediately before laying of the pipes.

**1.8. Reuse of surface material**

All surface materials, which in the opinion of the Engineer-in-Charge, suitable for reuse in restoring the surface shall be kept separate from the general excavation material, as directed by the Engineer-in-Charge.

**1.9. Stacking of excavated material**

All excavated materials shall be stacked in such a manner that it does not endanger the work and avoids obstructing foot paths and roads. Hydrants under pressure, surface boxes, fire and other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clean or other necessary provisions made for street drainage and natural water courses shall not be obstructed. All the excavated material shall be the property of the Employer and shall be stacked or disposed off as directed by the Engineer-in-Charge.

**1.10. Maintenance of traffic**

The work of excavation and pipe laying shall be carried in such a manner that it causes the least interruption to traffic and the road / street May be closed in such a manner that it causes the least interruption to the traffic. Where it is necessary for traffic to cross open trenches, suitable bridging arrangement shall be provided. When the street is closed for traffic, suitable signs indicating that street is closed shall be placed and necessary detour signs for proper maintenance of traffic shall be provided.

**1.11. Structure protection**

Temporary support, adequate protection and maintenance of all underground and surface structures, drains, sewers and other obstructions encountered in the progress of work shall be furnished under the direction of the Engineer-in-Charge. The structures which have been disturbed shall be restored upon completion of work.

**1.12. Protection of property**

Trees, shrubby fences, poles and all other property shall be protected unless their removal is allowed by the Engineer-in-Charge. When it is necessary to cut roots and tree branches, such cutting shall be done under the supervision and direction of the Engineer-in-Charge.

**1.13. Avoidance of existing services**

As far as possible, the pipeline shall be laid below existing services, such as water and gas pipes, cables, cable ducts and drains but not below sewers. Excavation of the trenches shall be carried out to the required depth accordingly. If it is unavoidable, the pipeline shall be suitably protected and lesser trench depth in such cases can be allowed. A minimum clearance of 150 mm shall be provided between the pipeline and such other services. When thrust or auger boring is proposed for laying pipeline across roads, railway or other utilities, larger clearance as required shall be provided. Adequate arrangements shall be made to protect and support the other services during excavation and pipe laying operations. The work shall be so carried out as not to obstruct access to the other services for inspection, repair and replacement. When such utilities are met with during excavation, the authority concerned shall be intimated and arrangements made to support the utilities in consultation with them.

**1.14. Bailing out of Water**

During the excavation if subsoil water is met with, contractor shall provide necessary equipment and labour for dewatering the trenches. If pumping out subsoil water is found necessary, contractor shall provide sufficient number of pumps for the same. The TENDERed rate shall cover all costs for bailing out of water including hire charges of pumps, cost of diesel and labour etc and hence, no extra payment shall be allowed.

**1.15. Disposal of loose boulders etc**

All loose boulders, semi detached rocks, (along with earthy stuff which might move therewith), not directly in the excavation but close to the area to be excavated, as to be liable, in the opinion of the Engineer-in-Charge, to fall or otherwise endanger the workman equipments, or the work etc, shall be stripped off and removed away from the area of the excavation. The method used shall be such as not to shatter or render unstable or unsafe the portion which was originally sound and safe. The TENDERed rate is supposed to cover this job and no extra payment will be allowed on this account.

**1.16. Moorum / Sand Bedding below Pipeline**

In case of hard rock and black cotton soil, before lowering of the pipes in trenches, a layer of selected moorum, available from excavated material under the same contract shall be provided below the pipe line to act as bedding. The bedding shall be compacted properly including required watering and the thickness of well compacted layer shall not be less than 150 mm. The bedding shall be provided for full trench width with proper grade as shown on drawings.

**2. Refilling the trenches**

**2.1. Use of selected excavated material**

Filling of excavated material in trenches shall be commenced as soon as the joints of pipes and specials have been tested and passed. The backfilling material shall be properly consolidated by watering and ramming, taking due care that no damage is caused to the pipes and the outer coating.

Selected surplus spoils from excavated material shall be used as backfill. Fill material shall be free from clods, salts, sulphate, organic or other foreign material. All clods of earth shall be broken or removed. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murum or earth to fill up the voids and the mixture used for filling.

## 2.2. Filling zones

For the purpose of back-filling, the depth of the trench shall be considered as divided in to the following three zones from the bottom of the trench to its top:

Zone A: From the bottom of the pipe (top of bedding) to the level of the centre line of the pipe	Back-filling by hand with selected approved material available from excavation, placed in layers of 150 mm and compacted by tamping. The back-filling material shall be deposited in the trench for its full width on each side of the pipe, specials and appurtenances simultaneously. Special care shall be taken to avoid damage of the pipe and the coating or moving of the pipe.
Zone B: From the level of the centre line of the pipe to a level 300 mm above the top of the pipe	Back-filling and compaction shall be done by hand or approved mechanical methods in layers of 150 mm; special care shall be taken to avoid damage of the pipe and the coating or moving of the pipe.
Zone C:	Back-filling shall be done by mechanical methods in 15 cm.

2.3. All excavations shall be backfilled to the level of the original ground surfaces unless otherwise shown on the drawings or ordered by the Engineer-in-Charge in Charge, 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-in-Charge in Charge, 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.

The back filled layers shall be wetted and compacted to a density of minimum 90 percent of the maximum dry density at optimum moisture content of the surrounding material. Any deficiency in the quantity of material for backfilling the trenches shall be supplied by the Contractor at his expense.

The Contractor shall at his own 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 as refuse or unsuitable soil.

## 2.4. Fillings of the trench excavated in rock

In case of excavation of trenches in rock, the filling up to a level of 30 cm above the top of the pipe shall be done with fine materials, such as soft soil, moorum etc. The filling up of the level of the centre line of the pipe shall be done by hand compaction in layers not exceeding 15 cm, whereas the filling above the centre line of the pipe shall be done by hand compaction or mechanical means in layers not exceeding 15 cm. The filling from a level of 30 cm above the top of the pipe to the top of the trench shall be done by mechanical methods with broken rock filling of size not exceeding 15 cm mixed with fine material as available to fill up the voids.

## 2.5. Consolidation

The consolidation of the filled material shall be done to attain 95 % proctor density. The density of the filled and compacted material shall be tested regularly and record maintained accordingly.

## 3.0 Supply, laying and jointing of DI Pipes and fittings.

3.1 The laying of pipe shall be as per IS 12288:1987 with up to date amendments.

3.2 The manufacturer and their associates (if any) should have the facility to carry out the internal coating lining and external coating / painting at factory for pipes and specials confirming to IS 11906:1986.

3.3 The DI pipe manufacturer should have valid BIS license from last 5 years (or valid BIS license from last 2 years with an experience of manufacturing and supplying at least 500 kms of various diameters of DI pipe to any State/Central govt/ board/organization of repute in last 3 years conforming to IS 8329-2000 and with upto date amendment.

- 3.4** The DI pipe manufacturer should have house facility for carry out the following test for size DN 80-DN1000:-
- C -value determination arrangement
  - Type test for leak tightness as per ISO 2531:2009/BS EN 545/IS 8329:200.
- 3.5** DI pipe manufacturer should have the ISO 9001:2008 & ISO 2531:2009 certification for manufacture of DI pipe.
- 3.6** Quality assurance program of the manufacturer shall be enclosed with the Tender.

**4.0 Laying and jointing of High Density Polyethylene (HDPE) Pipes and fittings.**

- 4.1.** The testing, supplying, laying, jointing and testing at work sites of HDPE pipes shall be as per standards and Codes. If requirements of this Specification conflict with the requirements of the standards / Codes, this Specification shall govern.

Code No.	Title/Specification
IS 4984	High Density Polyethylene Pipes for Water Supply
IS 2530	Methods of test for polyethylene moulding materials and polyethylene compounds DI K7 Pipes, Joints and Fittings for use for Potable Water Supply
IS 5382	Rubber sealing rings for gas mains, water mains and sewers.
IS 4905	Methods for random sampling
IS 7328	High density polyethylene materials for moulding and extrusion
IS 7634	Laying & Jointing of Polyethylene (PE) Pipes
IS 9845	Method of analysis for the determination of specific and/or overall migration of constituents of plastics material and articles intended to come into contact with foodstuffs
IS 10141	Positive list of constituents of polyethylene in contact with food stuffs, pharmaceuticals and drinking water.
IS 10146	Polyethylene for its safe use in contact with foodstuff, Pharmaceuticals and drinking water.

**4.2 Handling, Transportation Storage and Lowering of pipes**

During handling, transportation, storage and lowering, all sections shall be handled by such means and in such a manner that no distortion or damage is done to the section or to the pipes as a whole.

The following procedures should be followed so as to eliminate potential damage to pipes and fittings and to maintain maximum safety during unloading, lifting and lowering.

- Pipes must not be stored or transported where they are exposed to heat sources likely to exceed 60°C.
- Pipes shall be stored such that they are not in contact with direct sunlight, lubricating or hydraulic oils, petrol, solvents and other aggressive materials.
- Scores or scratches to a depth of greater than 10% or more of wall thickness are not permissible; any pipes having such defects should be strictly rejected.
- PE pipes should not be subjected to rough handling during loading and unloading operations. Rollers shall be used to move, drag the pipes across any surface.
- Only polyester webbing slings should be used to lift heavy PE (>315mm) pipes by crane. Under no circumstances, chains, wire ropes and hooks be used on PE pipes.
- Pipes shall not be dropped to avoid impact or bump. If any time during handling or during installation, any damage, such as gouge, crack or fracture occurs, the pipe shall be repaired if so permitted by the competent authority before installation.
- During coiling care should be taken to maintain the coil diameter at or above the specified minimum to prevent kinks. Coiling shall be done when the pipe attains the ambient temperature from the extruder. In uncoiling or recoiling care should be taken that sharp objects do not scour the pipe.
- When releasing coils, it must be remembered that the coil is under tension and must be released in a controlled manner. The end of the coil should be retained at all times, then the straps released steadily, one at a time. If the coil has bands at different layers of the coil, then they should be released sequentially starting from the outer layers. The amount of the energy locked up in the coil will depend on the size of the pipe, the SDR of the pipe, and the size of the coil.

- Straight lengths should be stored on horizontal racks giving continuous support to prevent the pipe taking on a permanent set
- Bare coils shall be wrapped with hessian cloth for long distance (> 300Kms) transportation. The truck used for transportation of the PE pipes shall be exclusively used of PE pipes only with no other material loaded – especially no metallic, glass and wooden items. The truck shall not have sharp edges that can damage the Pipe.
- Pipes manufactured at factory are to be carried to the site of work directly or stacked suitably and neatly along the alignment/road side/elsewhere near by the work site or as directed by the Engineer-in-Charge.
- Damages during transit, handling, storage will be to the Contractor's account and replacement for such pipes has to be made by the Contractor without any extra cost as directed by the Engineer-in-Charge.

#### **4.3 Lowering, Laying of Pipes**

- Each pipe shall be thoroughly checked for any damages before laying and only the pipes which are approved by the Engineer-in-Charge shall be laid.
- While installing the pipes in trenches, the bed of the trench should be level and free from sharp edged stones. In most cases, the bedding is not required, as long as the sharp and protruding stones are removed, by sieving the dug earth, before using the same as backfill material. While laying in rocky areas suitable bed of sand or gravel should be provided. The fill to about 10 to 15 cm above the pipe should be fine sand or screened excavated material. Where hard rock is met with, bed concrete M15, 15 cm or 20cm thick sand bed as approved by the Engineer-in-Charge May be provided.
- As PE pipes are flexible, long lengths of Electro/Butt-fusion jointed pipes having joints made above ground can be rolled or snaked into narrow trenches. Such trenches can be excavated by narrow buckets.
- During the pipe laying of continuous Electro/Butt-fusion jointed systems, due care and allowance should be made for the movements likely to occur due to the thermal expansion/contraction of the material. This effect is most pronounced at end connections to fixed positions (such as valves etc) and at branch connections. Care should be taken in fixing by finishing the connections at a time the length of the pipe is minimal (lower temperature times of the day.)
- For summer time installations with two fixed connection points, a slightly longer length of PE pipe May be required to compensate for contraction of the pipe in the cooler trench bottom.
- The final tie-in connections should be deferred until the thermal stability of the pipeline is achieved.
- The flexibility of polyethylene pipes allows the pipe to be cold bend. The fusion jointed PE pipe is also flexible as the plain Pipe. Thus the total system enables directional changes within the trench without recourse to the provision of special bends or anchor blocks. However, the pipe should not be cold bend to a radius less than 25 times the OD of the pipe.
- The Installation of flanged fittings such as connections to sluice/air/gate valves and hydrant tees etc., requires the use of stub ends (collars/flange adaptors complete with backing rings and gaskets. Care should be taken when tightening these flanges to provide even and balance torque.
- Provision should be made at all heavy fittings installation points for supports (such as anchoring of the flange in the soil) for the flange joint to avoid the transfer of valve wheel turning torque on to the PE flange joint.
- 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
- 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.
- 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.
- Pipe embedment backfill shall be stone-free excavated material placed and compacted to the minimum 95% of maximum dry density.

**4.4** The pipe ends shall be suitable for Electro-fusion/ Butt- Fusion jointing system that shall provide for fluid tightness for the intended service conditions.

#### **4.5 Bedding, Backfilling and Compaction**

##### **4.6 Bedding**

In case of sandy strata no separate bedding is required. However the bottom face / trench bed where pipe shall be placed shall be compacted to provide a minimum compaction corresponding to minimum 95% of

maximum dry density. The pipe bedding should be placed so as to give complete contact between the bottom of the trench and the pipe. The minimum cover over buried pipe should be 1 m.

#### **4.7 Back Filling**

Backfilling should be placed in layers not exceeding 15cm thickness per layer, and should be compacted to a minimum 95% of maximum dry density. The refilling should be done on both sides of pipe together & height difference in earthfill on each side should not be more to cause lateral movement of pipe.

Most coarse grained soil are acceptable. This May comprise of gravel or sand. 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. Like wise, 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.

#### **4.8 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 minimum 95% of maximum dry density.

#### **4.9 Thrust Block**

RCC thrust blocks, if required, should be suitably designed & provided at bends and at places of reduction in cross section to take care of thrust as required as per the provisions of relevant standards/codes.

#### **4.10 Fittings & Specials**

All HDPE fittings/ specials shall be of minimum PN 6 or above Pressure class, fabricated in accordance with IS: 8360 (Part I & III). PE Injection moulded fittings shall be as per IS: 8008 (Part I to IX). All fittings/specials shall be fabricated or moulded at factory only. No fabrication or moulding will be allowed at site, unless specifically permitted by the Engineer-in-Charge. Fittings will be **Butt** welded on to the pipes or other fittings by use of Electro/Butt fusion process. Recommended makes for PE / PP fittings / specials are Georg-Fischer / Glynwed / Frialen / Durafuse if purchased or should be manufactured by the manufacturer himself to have consistency with pipe material/grade.

#### **4.11 Bends**

HDPE bends shall be plain square ended conforming to IS: 8360 Part I & III Specifications. Bends shall be moulded.

#### **4.12 Tees**

HDPE Tees shall be plain square ended conforming to IS: 8360 Part I & II Specifications. Tees May be equal tees or reduced take off tees. Tees shall be moulded or fabricated from pipe elements.

#### **4.13 Reducers**

HDPE Reducers shall be plain square ended conforming to IS: 8008 Part I & VII Specifications. Reducer must be moulded.

#### **4.14 Flanges/ HDPE Pipe Ends**

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.

#### **4.15 Slip-On Flanges**

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.

#### **4.16 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 Electro or Butt-fusion welding using automatic or semi automatic, hydraulically operated, superior quality Electro/Butt-fusion machines which will ensure good quality welding of HDPE pipes.

Normally Electro/Butt fusion welding shall include following activities:

- Aligning of pipe on welding M/C
- Surface preparation for welding.
- Heating of pipes/ ends
- Holding pipes for welding
- Cooling etc.

#### 4.17 Hydraulic Testing

Pipes shall be given different hydraulic tests for ensuring quality of manufacture as per clause 11.0 of this chapter.

#### 4.18 Site Fabrication of PE Fittings

Two or more PE specials coming at one place (like PE Tee, Reducer, Flanged end etc.,) shall be jointed at contractor's workshop and transported to the site of works for final installation with proposed PE pipelines. In no case, jointing of three or more welds in one place, at site will be allowed.

#### 4.19 Training

The Contractor shall provide on-site training on PE pipe laying, jointing, testing and maintenance etc., to the personnel authorized by EMPLOYER.

#### 4.20 Manuals

Technical Manual on PE pipes including precautions to be taken during operation of the pipeline shall be prepared and submitted by the contractor immediately on completion of work.

#### 4.21 Flanges

All flanges employed in the project must be compatible whatever material used.

#### 4.22 Marking

All pipes shall be marked at maximum interval of 1 m. The marking shall indicate at least the following information.

- 1) Manufacturer's name & / or trade mark.
- 2) The dimensions (nominal outside diameter X nominal wall thickness)
- 3) The outside diameter tolerance (A or B)
- 4) The designation of pipes material (PE 100, PE 80 etc)
- 5) The nominal pressure (PN)
- 6) The production period (date or code)
- 7) The number of the International standard.
- 8) The word "Water" shall also be included.
- 9) **Lot number/Batch Number**

#### 4.23 Packing & Transport

The pipes should be preferably transported by road from the factory and stored as per the manufacturer specifications to protect damage.

#### 4.24 Summary of quality Tests :

1. **Quality Mark** : Pipe: IS 4984
2. **Material** : As per IS 4984. However only virgin resin is allowed, reworked Material is not allowed.
3. **Grade of Material** : PE 100 as per IS 4984 (Certificate from raw material Manufacturer is required).
4. **Pressure Rating** : Minimum PN 6 or above as per requirement.
5. **Colour** : as per IS 4984
6. **Dimensions** :
  - Diameter** : The nominal diameter (outside)
  - Wall thickness** : As per IS 4984.
  - Length** : **For diameter up to 110 mm** : min 6 mtr max. 100 meter  
**For diameter more than 110 mm** : minimum 6 meter.
7. **Visual Appearance** : as per IS 4984.
8. **Test and sampling** : as per IS 4984.
9. **Special Test** :

Notch hydraulic Test for the HDPE pipe made from PE-100 grade raw material as per ASTM 1474 OR ISO 13479 at manufacturers laboratory or independent laboratory and should pass the Hydraulic test as per IS:4984:1995 for a minimum 165 Hours. The test reports shall not be more than three months old.

Pipe shall convey water under variable temperature conditions ranging from 4 degree centigrade to 45 degree centigrade.

10. **Jointing of pipes (pipe end) :**



**For diameters up and more than 110 mm diameters: Electro-fusion Process**

**11. Quality Assurance :**

Quality Assurance Plan shall be got approved from the employer before production start.

**5. Field Hydraulic testing of the pipelines**

**a. Sectional tests**

After laying and jointing the pipeline shall be tested for tightness of barrels and joints, and stability of thrust blocks in sections approved by the Engineer-in-Charge in Charge. The length of the sections depends on the topographical conditions. Preferably the pipeline stretches to be tested shall be between two chambers (air valve, scour valve, bifurcation, other chamber). At the beginning, the Contractor shall test stretches not exceeding 1 km. After successful organizing and execution of tests the length may be extended to more than 1 km after approval of the Engineer-in-Charge in Charge. The hydraulic testing shall have to be commenced immediately after laying and jointing of 1 km reach is completed.

The water required for testing shall be arranged by the contractor himself. The Contractor shall fill the pipe and compensate the leakage during testing. The Contractor shall provide and maintain all requisite facilities, instruments, etc. for the field testing of the pipelines. The testing of the pipelines generally consists in three phases: preparation, pre-test/saturation and test, immediately following the pre-test.

**6. Flushing and disinfecting of pipelines**

After testing and commissioning the contractor shall flush the pipes with a velocity not less than 1 m/s or as approved by the Engineer-in-Charge in Charge. Disinfection of drinking water pipelines should be done by Contractor.

**7. Above ground pipeline**

DI K9 pipe of appropriate size, conforming to IS : 8329 or MS pipes of appropriate size and thickness, conforming to IS :3589 will be used wherever the pipeline is laid above ground. MS pipes will be in-lined and out-coated with 15 mm thick Cement concrete mortar or Epoxy coating of 400 Micron DFT.

**8. Flow measuring devices:**

Electromagnetic Flow Meter of appropriate size shall be provided along with 8 hour Battery back-up, at inlet and outlet of the Raw water and Clear water pipeline and Feeder pipeline outlet at RCC Over head tanks; to check losses and measure the quantity of water. Reading display of all the Flow meters, along with data logging instruments should be made available at single point, wherever decided by the Engineer-in-charge.

All the Electromagnetic Flow meters shall have the same make and salient features as under.

Coil housing of the Electromagnetic flow meters of Dican aluminium SS-304 and Flow-tube lining of PTFE / EPDM / Neoprene/ Hard rubber/ Poly urethane.

Recommended make: Krohne-Marshall / Yokogawa / Emerson- Rosemount/ Endress + Hauser/ Seimens ABB or equivalent.

**9. Technical Qualifications for procurement of pipes during construction:**

**9.1. H.D.P.E. Pipe:**

**9.1.1.** The Pipe manufacturer should have an annual installed production capacity of quantity equal to this TENDER.

**9.1.2** The manufacturer should hold valid IS license under IS:4984 consecutively for last five years to manufacture ISI marked pipes.

**9.1.3** The Pipe manufacturer should have manufactured and supplied in India at least **HDPE Pipe of minimum 110 mm or above dia. More than required in this TENDER during past 3 years ending 2016.** Self certified document from HDPE Pipe Manufacturer to be attached along with technical Tender.

**10.0 Installation and Commissioning of HDPE pipes**

**10.1 Installation**

**a.** Supplying, laying, jointing, testing and commissioning of pipes shall conform to relevant IS codes, as applicable.

**b.** The alignment of pipelines shown in drawings of the TENDER documents is only indicative and the exact alignment will be as per drawings and/or as directed by the Engineer or his representative.

**c.** The HDPE Pipes shall be laid in accordance with the latest IS 7634 Part-2

**11.0 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

**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.

**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 Engineer.

- d. The proper method of filling the pipeline with water shall be used. 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 as per testing method given in the IS 7634.
- e. As per IS code water required to built up allowable drop in pressure during test will be treated as a makeup water.
- 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.
- h. Test pressures are to be measured in kg/cm<sup>2</sup> 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.

## 12.0 INSTALLATION OF VALVES

### General

The installation of valves shall be made according to the instructions of the manufacturer and the Engineer.

### Installation of valves

Butterfly/Sluice valves shall be installed between flanges according to the instructions of the manufacturer.

Valves shall be placed on a support of concrete so that no shear stress is in the flanges. In case of axial thrust due to closure of a valve against pressure the valve shall be anchored in the support in a suitable manner to transfer the thrust into the floor slab of the chamber.

Air valves shall be installed on top of air valve tees.

### **SLUICE VALVES**

#### **DESIGN REQUIREMENT**

- A. Sluice valves shall generally conform to IS 14846/BS EN 1171/DIN 3352. Additionally, they should also meet specific requirement as stated.
- B. Spindle, thrust collar and operating arrangement including hand wheel should be designed in such a way that one adult male is able to operate the valve against full differential pressure by exerting no more than 8 kgf effort (pull and push) on the hand wheel.

#### **FEATURES OF CONSTRUCTION**

- a. Valves shall have inside screw, non rising spindle.
- b. Valves shall be with appropriate bushing arrangement for replacement of packing without leakage (350 mm  $\varnothing$  and above), up to 350 mm  $\varnothing$  valves shall be glanduss.
- c. Valves 450 mm  $\varnothing$  & above shall be provided with an antifriction device / ball thrust bearing arrangement to minimize friction between spindle collar and casting. These should be housed away from wet chamber and should have facility for periodic greasing.
- d. Valves of size 450 mm  $\varnothing$  and above shall be provided with enclosed, grease packed spur gear box.
- e. Valves 450 mm  $\varnothing$  and above shall be provided with a drain and air plug.
- f. All valve doors when fully closed would ensure door faces are riding on body seat ring by at least 50% of the width of seat ring and there is sufficient room for wear travel. Applicable for valves 350 mm and above. Up to 300 mm valves shall be resilient seated.
- g. All face and seat rings will be force/press fitted and additionally riveted (300  $\varnothing$  & above) to the recess in the CI casting. No screws are allowed.
- h. Spindle, thrust collar and operating arrangement including hand wheel should be designed in such a way that one adult male is able to operate the valve against full differential pressure by exerting no more than 80 N effort (pull and push) on the hand wheel. Only single start, square threads with a pitch not exceeding 12 mm in the spindle be used.
- i. Manufacturer to give details of gear box proposed – no. of spur pair, ratio, efficiency etc.
- j. Manufacturer to justify with calculation that the valve proposed is operable within the effort parameters specified and no. of turns to ensure the time required to operate the valve from full open to full close is within reasonable limits. This is a vital requirement.

k. Nominal size of the valve shall be cast on the body of the valve.

**DATA :**

1. Size	:	150 mm to 350 mm
2. Rating (Kg/sq.cm)	:	PN 1.0
3. Drilling	:	IS 1538 Table 4 & 6 / relevant ISO with latest amendments/ BS EN 1092-2
4. Material of construction	:	
Body	:	DI IS 1865 Gr. 500/7 ; 400/15 or CI IS 210 Gr. FG 200 for PN 1.0 (all sizes)
Wedge	:	DI IS 1865 Gr. 500/7 ; 400/15 ( fully rubber lived EPDM, upto 300 mm) or CI IS 210 Gr. FG 200 for PN 1.0
Spindle	:	St. St. AISI 410 / 316 / relevant ISO with latest amendments
Seat & face rings	:	Bronze IS 318 LTB II 6 / relevant ISO with latest amendments ( for 350 mm above)
Drain & air plug	:	Bronze IS 318 LTB II 6 / relevant ISO with latest amendments
Ball thrust bearing	:	SKF or equivalent
Bushing arrangement	:	Halprene on bronze
Rivets	:	Soft annealed brass
Gland packing	:	Teflon coated / graphite asbestos / hemp
Fasteners	:	Carbon Steel

**SHOP TESTING :**

HYDROTEST	:	
Seat leakage	:	10 Kg/cm <sup>2</sup> (5 min) – for PN 1.0
Back seat leakage	:	5 Kg/cm <sup>2</sup> (2 min) – for PN 1.0
Body	:	15 Kg/cm <sup>2</sup> (5 min) – for PN 1.0

APPROVED MAKE IVC / KIRLOSKAR / VAG / FOURESS/IVI or equivalent

**BUTTERFLY VALVES**

- a. Butterfly valves shall be of double eccentric and resilient sealed type generally as per BS EN 593, BS 5155 and IS 13095. Valves shall be installed in valve chambers. Valves shall be provided with stainless steel extension spindle so that valves can be operated from ground level and without entering the chamber.
- b. Material of construction of butterfly valves shall comply with following requirements :

Item	PN 1.0 Valves
Body	Ductile IRON DIN 1693 – GGG40/spheriodal graphite icon IS 1865 Gr 400/12
Disk	Ductile IRON DIN 1693 – GGG40/spheriodal graphite icon IS 1865 Gr 400/12
Shaft	Stainless steel BS 970 Grade 431 S 29
Body Seat	Nickel weld overlay micro finished
Disc Seal	EPDM
Seal retaining ring	Ductile icon DIN 1693 – GGG40
Shaft bearing	Bronze with EPDM ‘O’ ring seal
Internal Fasteners	Stainless steel SS 316
Nuts, Bolts & washers for pipe flanges	High Tensile steel hot dip galvanized for valve in chamber. Stainless steel SS 316 for buried valves
Coating	Internal and external with power of liquid epoxy coating with minimum dry film thickness of 250 microns

- c. Butterfly valves shall be suitable for mounting in any position. The valve shall be free from induced vibration.
- d. Butterfly valve shall be suitable for bi directional pressure testing with head tight shut off even after long period of operation of 5 years. The valves shall be of double flanged long type.
- e. The valve seal shall be of replaceable design. When the valve is fully closed, the seal shall seat firmly. The seat surfaces shall be machined smooth to provide a long life for the seal. All fasteners shall be set flush so as to offer the least resistance possible to the flow through the valve.
- f. The shaft shall be stainless steel with bronze or equivalent seal with self lubricating bearings. Disc pin shall be stainless steel. Ring shall be Tenderirectional seal adjusting suitable for pressure and vacuum service. Removal and replacement of steel shall be possible without removing the operating mechanism, valve shaft and without removing the valve from the pipeline. Valve shaft shall be of one piece unit extending completely through the valve disc hubs.
- g. All valve spindle and head wheels shall be positioned to give access for operational personnel. Valves shall be provided with enclosed gear arrangement for ease of operation. The gear box shall be worm and worm wheel design type totally enclosed grease filled and weather proof. The operation with gearing shall be such that they can be opened and closed by one man against an unbalanced head of 1.15 times the specified ratings. Valves and gearing shall be such as to permit manual operation in a reasonable time and not exceed a required rim pull of 200 N. The valve disc shall be 90 deg turn.
- h. The disc shall be designed to withstand the maximum pressure differential across the valve in either direction of flow. The disc shall be contoured to ensure the lowest possible resistance to flow and shall be suitable for throttling operation.
- i. It should be possible to open the valve with upstream pipe fully filled and downstream pipe fully empty. The shaft shall be designed to withstand the maximum torque that will be imposed by the operator. It shall be secured to the disc by tapered stainless steel cotter pins.
- j. Valve shall be provided with mechanism position indicator to show the position of the disc mounted on the driven shaft end.
- k. Rigid adjustable stop mechanism shall be provided within the gear box or elsewhere on the valve to prevent movement of the disc beyond the fully opened or closed position (i.e. set points).
- l. Valve shall be capable of closing against the maximum flow that can occur in practice. The break way torque against maximum differential head conditions shall be within the manufacturer's limits.
- m. All hand wheels shall be arranged to turn in a clock wise direction to close the valve, the direction of rotation for opening and closing being indicated on the hand wheels.
- n. All hand wheels shall be provided with an internal locking device to prevent operation device by unauthorized person.

## **AIR VALVES**

### **A SCOPE AND GENERAL DESIGN FEATURE**

This section covers the requirements of double orifice type air valves with tamper proof cover to be used for evacuation of accumulation of air in water mains under pressure, for the exhaust of air when such mains are being charged with water and for inlet of air when they are emptied of water.

The working pressure of the air valves shall be 10 kg/cm<sup>2</sup> (PN 1).

### **B FUNCTION**

Automatic air valves generally conforming to IS 14845 / relevant ISO with latest amendments are to be used for evacuation of accumulated air in water mains under pressure, for the exhaust of air when such mains are being charged with water and for ventilating the mains when they are being emptied of water.

### **C DESIGN FEATURES**

- a) Air valves shall be double orifice type and tamper proof unless otherwise directed by Engineer. A buoyant rigid float shall seal the large orifice and the chamber housing shall be designed to avoid premature closing of the valve by the air whilst being discharged. Small orifice shall discharge small air volume during operation under full internal pressures. All air valves shall be provided with isolating sluice valves and flanged end connection.
- b) The valve shall be capable of exhausting air from pipe work automatically when being filled, the air being released at a sufficiently high rate to prevent the restriction of the inflow rate. Similarly the valve shall be capable of ventilating pipe work automatically when being emptied or under water hammer condition, the air inflow rate being sufficiently high to prevent the development of a vacuum in the pipelines. The valve shall also automatically release air accumulating in pipe work during normal working conditions.
- c) The valves shall be designed to prevent premature closure prior to all air having been discharges from the line. The orifice shall be positively sealed in the closed position with the float only raised by the liquid and not by a mixture of air and liquid spray. The seating shall be so designed to prevent the float sticking after a long period in the closed position.
- d) Air valves shall thus be designed to automatically operate so that they will;

- Positively open under internal pressure less than atmospheric pressure to admit air in bulk during pipeline draining operation;
- Exhaust air in bulk and positively close as water, under low head, fills the body of the valve during filling operation;
- Not blow shut under high velocity air discharge; and
- Exhaust accumulated air under pressure while the pipe is flowing full of water.

#### D CONSTRUCTION FEATURES

Material of construction of air valves shall comply with following requirements:

- All air valves shall be constructed so that internal working parts which May become necessary for repairs shall be readily accessible, removable, and replaceable without used special tools and removing the valve from the line.
- Valves with air intake or exhaust facilities shall have an integral protecting cover top shall be supplied to prevent dirt and debris from entering the outlet of the valve.
- The contractor shall verify with the supplier of the valves that the valves have the capacity to sustain the pipeline test pressure prior to testing. In the event that the valves do not sustain the pressure they shall be removed and the stub pipes from the main pipeline blanked off before pressure testing the pipeline.

#### E DATA

- |    |   |   |  |
|----|---|---|--|
| a) | Valve size  | : | 50 to 400 mm dia   |
| b) | Suitable for max. differential pressure (kg/cm <sup>2</sup> ) | : | 10   |
| c) | Material of construction                                      |   |  |
|    | Body and cover  | : | CI IS 210 Gr FG 200 <b>or</b> SG iron 1865 Gr 400/12 or grade GGG40          |
|    | Float   | : | Rubber coated timber <b>or</b> Polycarbonate up to 50 NB/ SS 304 above 50 NB |
|    | Internal Linkages   | : | SS 304   |
|    | Seat Ring   | : | Dexine (Nitrile Rubber) or bronze seat                                       |
|    | Isolating Sluice Valve  | : | Generally conforming to IS 14846/relevant ISO with latest amendments         |
|    | Spindle for Sluice Valve                                      | : | St. St. AISI 410   |
|    | Bolts & Nuts  | : | M.S.   |

#### TESTING AND PERFORMANCE

- When tested as per clauses 11.6.d.1, the air passage and the function of ball floats in a valve shall be satisfactory, and the valve shall work smoothly.
- Hydrostatic test of valve body, when tested in accordance with 11.6.d.4 there shall be no leakage through pressure sustaining components and joints. There shall be no permanent deformation of any part.
- Valve seat and cock, when tested in accordance with 11.6.d.2 and 11.6.d.3 shall not show any leakage.
- Function and Performance Test
  - The valve shall be fitted on a test bench. The pressure of the water in pipe shall be developed to working pressure, and the main valve shall be gradually opened to check the air release and float function. Compressed air shall then be slowly put into the valve through underside of the valve, and check the function of floats.
  - High Pressure Orifice Seat Test  
Subsequent to high pressure orifice performance test, hydraulic pressure shall be reduced upto half of the working pressure to check leakage of orifice seat for a duration of three minutes.
  - Low Pressure Orifice Seat Test  
Subsequent to high pressure orifice performance test, hydraulic pressure shall be reduced upto half of the working pressure to check leakage of orifice seat for a duration of three minutes.
  - Body Test  
The valve body (without cover and ball floats) shall be covered by a blank flange, keeping isolating valve open. Hydrostatic pressure of 1.5 times the pressure class of the valve shall be applied for duration of 5 minutes to check the water tightness of the body.

### 13 VALVE CHAMBERS

Valve chambers shall be constructed according to the typical drawings suitable for the respective valve and special arrangement if any shall be approved by Engineer. They shall be constructed in brick masonry as shown in the drawing. The chambers shall be constructed after the laying of the pipes and the assembly of specials and valves. The size of the chambers shall be according to the following criteria/ as per direction of Engineer.

- Minimum distance of flanges from walls : 45 cm
- Minimum distance of sockets from walls : 45 cm
- Minimum distance between highest point of equipment and roof slab : 30 cm
- Maximum distance between highest point of equipment and roof slab : 50 cm

Pipes passing through walls should be coated by two layer of soft material (Hessian felt) to allow for differential settling and longitudinal expansion if directed by Engineer. Only metallic pipes May be cast into the walls for anchoring purposes.

The work shall include excavation, consolidation, leveling, lean concrete as per drawing in foundations, finishing, refilling. It shall include all labour and material required for the complete chamber.

### 14 DISMANTLING JOINTS

Double flanged Dismantling joints shall be of Cast Iron in such a manner that valves (300 mm and above dia) can be dismantled without stress to the joints. These shall be for working pressures of 10 kg/cm<sup>2</sup> (1 Mpa) and shall be completely leak proof with proper gasket arrangement. Flange dimensions shall conform to IS 1538 (part I to XXII). Flanged specials shall be supplied with required nuts, bolts and rubber gaskets. The nuts and bolts shall be of best quality carbon steel, machined on the shank and electro-galvanized. Rubber gasket shall be as per IS 5382. Dimensions and drilling of flat gasket will be as per IS 1538 : 1993, suitable for making flanged joint. The dismantling pieces shall provide minimum clearance of + 25 mm (total distance 50 mm). The dismantling joint shall be internally and externally coated with hot applied (dip) bituminous paint.

### 15 THRUST BLOCKS

The thrust blocks shall be of plain/reinforced cement concrete on site as per design and drawings to be given by the Contractor and approved by the Engineer In Charge. The thrust blocks shall be cast directly against the undisturbed soil.

## Chapter - 3

### Domestic Type Water Meter – AMR Compatible / AMR Ready

#### 1.1 **Applicable Standards:**

Water meter 15 mm – 40 mm size, brass body, and horizontal inferential multijettype, magnetic drive with anti-fraud shield and dry dial with IP 68. Meter shall be made of copper 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. Meter must have the Endurance / Life Cycle test certificate from FCRI, manufacturer's test report and 60 month manufacturer's warranty certificate

The meters shall be supplied complete with brass nuts and brass nipples. Strainer & sealing shall be provided as per relevant IS provision.

#### 1.2 **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 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 magnetictampering on meter or to protect the magnetic transmission
- D) The internal pressure cup shall be made of Engineering plastic. The lowercase of the meter shall be painted with thermal painting externally. Thepainting materials should be safe for human uses and not affect humanhealth.
- E) Meter will be provided with monolithic plastic seal with copper/SS wire or Rust proof sealing wire

#### 1.3 **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.

**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.

The Register should have facility to externally mount AMR communication module for up gradation to AMR in the future.

**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 shall be made of copper having 5mm thickness mineral glass cover or any other anticorrosive metallic material. (required to maintain IP 68 protection class.)

**1.7 Metrological Characteristics:** The meter's performance shall be as per IS 779 or ISO 4064

**1.8 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 50<sup>o</sup> C.

**1.9 Pressure loss** through mechanical water meter shall not be greater than 0.25 bar at Q<sub>n</sub> and 1.0 bar at Q<sub>max</sub>

**2.0 Endurance Test** - The meters proposed should possess successful Lifecycle/Endurance Test Certificate as per IS 779 /ISO 4064 from Fluid Control Research Institute, Kerala.

**2.1 Weight-** Variation in weight of the meter will be permissible to ± 5% of the weight indicated by the bidder in his technical bid.

**2.2 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.

**2.3 Future AMR**  
In case of future up gradation to AMR meter, the RF trans-receiver shall be directly fitted on the water meter without wires. The RF trans-receiver shall be of the same brand/manufacturer as that of the meter

**2.4 Frequency** - The frequency of the AMR operating system must 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). An undertaking from the manufacturer for the said operating frequency shall be produced. In case, frequency of the operation in the free band, necessary documents / clearance from GOI / DOT shall be submitted

**2.5 AMR SYSTEM VALIDATION:** All AMR ready meters will be tested for its complete AMR solution at FCRI. A report will be submitted on below parameters.

- i. Remote reading of water meter in dry i.e. open air condition.
- ii. Remote reading of water meter in submerged condition i.e. underwater, with under variable water depth conditions.



- iii. Remote reading with different tamper alarms for back flows, magnet and physical damage, etc.
- iv. Response time of AMR reading on HHU.
- v. Visual inspection of AMR water meter and its AMR system along with its software.
- vi. Real Index tests i.e. all the time electronic index of the water meter shall match with mechanical index.
- vii. Demonstration of uploading of readings from hand held unit to PC and vice versa.

The contractor needs to furnish the **manufacturer's authorisation** for their offered water meters. This letter of authorisation should be on letter head of the manufacturer.

## Chapter 4 House Service Connections

One Service Connection means one tapping from a distribution main/ sub-main including one tapping saddles, elbows, service pipe from tapping point to the chamber near property boundary or inside the property boundary as per the direction with U-ball valve. The house connection using Medium Density Polyethylene pipes (MDPE) shall consist of the following;

- 1.0 Electro Fusion Tapping Ferrule of PN 12.5 PE 80 compatible to the HDPE Mains of various diameters. The outlets should be reinforced with female threaded metal inserts of SS 304, metal inserted male thread elbow, MDPE PE 80 Blue pipes, 90 deg double compression elbows, UPVC ball valves of required sizes and water meter. The outlet size shall be either 15mm, 20 mm depending upon the type of Service Connection.

Electro fusion Tapping Ferrule shall be provided with a SS-304 Brass cutter with cutting edges for making hole / tapping on the Mains as shown in drawing and Fusion joint in such a manner that the 20-63mm dia outlet depending on requirement of the house service connections rotate able 3600 to the axis of pipeline including maintaining the same for the period under O&M.

From the outlet of Male Threaded compression Elbow, 15/ 20 mm MDPE Service Pipe shall be extended upto the RCC/BBM chamber at property boundary as shown in the drawing. At the end of the Service pipeline, 90 Deg Double Compression Elbow shall be fixed and MDPE Service pipe shall be connected. From the Service Pipe, a U PVC Ball valve of necessary size with Compression joint at one side and Female joint at one side. The Ball valve shall be as per ISO 4422 Part 4 and rated PN 16

The entire assembly shall be as per the enclosed drawing.

The connecting pipe shall be made out of MDPE conforming to ISO 4984 & ISO 4427-1996. This International standard specified the required properties of pipes made from polyethylene (PE) to be used for buried water mains and services and for water supply above ground both inside and outside buildings. In addition, it specifies some general properties of the material from which these pipes are made, including a classification scheme. Other relevant IS and International Standards applicable for the MDPE pipe shall be followed as approved by the Engineer.

The MDPE Pipes for drinking water applications should have undergone type test by WRc-NSF, U.K. according to BS 6920 and a certificate from either WRc-NSF or WRAS (Water Regulations Advisory Scheme) should be available evidencing this fact/equivalent institutions approved by the employer.

### 2.0 **Technical Specifications for Electro Fusion tapping:**

All the electro fusion fittings included in this document will be designed for use in water distribution system 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. All the electro fusion fittings should (George Fisher/Wavin/Kimplast/Alaziz/ Equivalent) have Melt Flow Rate (MFR) in the range between 0.4 to 1.4 gms /10 min and shall be compatible for fusing on PE 100 distribution line manufactured according to the relevant national or international standards. The polymer used should comply with the requirements of BS 3412 and/or BS EN 12201-1.
2. All the electro fusion fittings should be manufactured in Blue PE80 - material which should be compatible with the distribution mains.
3. The tapping saddles to have drilling cutter which enable s tapping even below the maximum permissible operating pressure; the disc cut out of the pipe wall is permanently kept in the drilling cutter.

4. The products shall comply with the requirements of BS EN 12201-3: 2003, BS EN 1555-3 or ISO 8085-3.
5. 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 and a certificate from either WRc-NSF or WRAS (Water Regulations Advisory Scheme) should be available evidencing this fact/ equivalent institutions approved by the employer.
6. 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 PE 80 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 EN 12201 -1.
7. The fittings intended for water distribution applications shall be coloured blue for the clear identification of the services.
8. All the electro fusion 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.
9. The electro fusion products should be with only a single heating coil to fully electro fuse 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 millimeter diameter, protected with polyethylene shroud. Each terminal shroud should be additionally protected with polyethylene shroud caps.
10. 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.
11. The pipe fixation shall be achieved by external clamping /suitable devices as directed by the Engineer in charge.
12. 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 a 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.
13. The fittings should be V-regulated type designed to fuse at a fusion voltage of 40 volts AC.
14. 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.
15. 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.
16. All the sockets in the electro fusion fittings should include a method of tapping controlling the pipe penetration (pipe positioned /stopper).
17. The EF tapping ferrules should be the top loading type which are to be clamped on the mains for fusion using the custom made top loading clamps exerting 1500N (150 kilograms approximately) top load.

18. The tapping ferrules should be supplied with suitable adaptors for proper positioning of the top-loading clamp into the saddle.
19. The Torque required to operate the cutter after fusion of the PE mains should not exceed 45 N-m.
20. The cutter should be designed in such a way that the cut coupon is not allowed to fall into the pipeline and is retained inside the body of the cutter providing a positive sealing of the hole in the cutter head for pressure testing.
21. The tapping ferrules will have female threaded outlet to connect necessary compression fittings for further connecting MDPE Pipe in House connection.
22. The threaded outlet should be from sizes ½” to 1” BSP to suit the required House Service Connections.
23. The outlets should be reinforced with female threaded metal inserts of SS 304.

### **3.0 Installation and Fusion Jointing**

The fusion jointing process shall be carried out as per the procedure outlined in the DVS220 standard, if not available equivalent standards acceptable to employer.

A protocol for each fusion joint to be printed to ensure the joint process carried out is error free. The electro fusion machine shall have the facility to record & make print for each joint.

The precautions & measures as mentioned by electro fusion fittings/machine manufacturer be taken up rigorously while making the joints in the field.

The related pipe jointing accessories such as proper pipe cutter, Universal scrapped clamping kits, Pipe cleaners, Top load tools(for tapping saddle installation), Pipe peelers supplied by the same electro fusion fitting/machine supplier shall be used to ensure perfect jointing.

The usage of tapping tools such as tapping keys, tension clamps supplied by the same electro fusion fitting /machine supplier must be used to ensure perfect tapping of main lines.

The piping system will be tested as per the guidelines given by ISO standard. The guideline shall be furnished by the supplier of electro fusion fittings, tools and machines.

### **4.0 Electro fusion Welding Machine**

Supplying delivery and testing at site (Fusion Provida/George Fisher/Equivalent approved makes of Electro fusion welding machine as under:

The electro fusion control unit shall be designed for use with any electro fusion fittings required upto 48V. The unit shall operate in three modes, Automatic, Manual and Barcode. The unit shall be complete with all accessories and shall have the following features as minimum.

Full output voltage and output current monitoring throughout the jointing cycle.

Automated output voltage (True RMS) level control between 10 and 48 VAC

Graphical display of output current and voltage levels.

Data logging facility for storing minimum 600 joint records and facility for data transfer and print out. Required software shall be provided.

Shall have Soft start feature to prevent shock loading on generators.

Temperature compensation facility.

Protection against fitting overheat.

The unit shall give user friendly step by step operator instructions and printing facility (in English & Kannada languages).

Shall have back-lit graphical display.

Shall have a single combined lead for all modes of operation.

RS 232 serial interface cable shall be provided along with the unit.

The machine shall be provided with barcode reader and adaptors if any required.

These units are provided with 7 segment display unit to select the output voltage, Temperature, Fusion Time and Error message in case of malfunctions occurring before or during the Fusion.

The output voltage level control shall be between 10 and 44 VAC.

Specification

Operating Temperature Range (Min).	-10 to +50 Deg C
Operating Voltage Range (min)	190 V to 270 V, 45 to 50 Hz
Output Voltage	8 to 44 VAC 10 – 44 VAC (Barcode Mode)
Enclosure Protection	IP 54
Input Cable length	Minimum 12 meters
Output Cable length	Minimum 4 meters

**5.0 COMPRESSION FITTINGS:**

Compression fittings used for House service connection comply as per ISO 14236

**6.0 Material of Construction**

Compression fittings material shall conform to ISO14236.Clause -5.

A .Body-Polypropylene

b. Nut / Cap –Polypropylene.

c. Clip Ring-POM (Acetylic resin )

d. Packing bush- Polypropylene

e. “O” ring - NBR

f. Threaded metal inserts –SS 304 with BSP Threads

**7.0 Pressure testing**

The pressure rating of compression fittings as per clause 8 of ISO 14236 which shall be PN16

**8.0 Dimensions:**

The Dimension of compression fittings shall be as per clause 7.1 of ISO 14236

**9.0 Performance requirements**

The compression fittings shall be tested as per ISO 14236 having following Tests performed,

- Leak tightness under internal pressure.
- Resistance to pull out.
- Leak tightness under Internal Vacuum.
- Long term Pressure Test for Leak tightness for assembled joint
- MRS Value as per ISO 9080

## **10.0 Effects on Quality of Water**

The Compression fittings for intended for conveyance of Potable water for Human consumption to be tested to comply with BS 6920 specifications in any of the laboratories like DVGM / KIWA / SPGN / WRc –NSF/ equivalent institutions approved by the employer 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.

For clear identification of the water services, the nuts of the fittings should be coloured blue while the body to be black. All fittings with threaded ends should be with BSP threads.

## **11.0 U PVC BALL VALVES (STOP COCKS)**

Ball Valves used for HOUSE Service Connections comply to ISO 4422, Part 4.

Material of Construction:

Ball Valve material shall confirm to as per clause 4 of ISO 4422.

- a. Body and Handle - UPVC
- b. Seals - PTFE
- c. O-rings – NBR/EPDM
- d. Material of Construction for compression end will as per specifications for compression fittings.

### **11.1 Pressure Rating**

The Pressure of the Ball Valve shall be as per ISO 4422 shall be PN 16.

### **11.2 Dimensions:**

The Dimensions of the Ball Valve shall be as per Table 3 of ISO 4422.

### **11.3 Performance Requirements:**

The Ball valves shall be tested as per ISO 4422 having following test performed,

- Resistance of Valve Bodies to internal pressure
- Crushing Test
- Endurance Test
- Seat and Packing Test
- Operating torque Test

The Ball Valves intended for conveyance of Potable water for Human consumption to be tested to comply with BS 6920 specifications in any of the laboratories like DVGM / KIWA / SPGN / WRc –NSF/ equivalent institutions approved by the employer 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.

## 12.0 MDPE Pipes

These specifications are for MDPE Blue PE 80 Pipes for House Service Connections of Dia 15 mm to 200 mm OD.

1. 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/cm<sup>3</sup> confirming to ISO-4427 Standard. The PE 80 Resin shall have MRS of 8 Mpa.
2. Effects on Water Quality :  
The MDPE PE 80 Blue Pipes shall confirm to clause 3.5 of 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/ equivalent institutions approved by the employer 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. Pressure Rating:  
The Pressure rating of MDPE Blue PE 80 Pipes shall be confirming to Clause 4.1 of ISO-4427:1996.
4. Colour of Pipes:  
The Colour of MDPE PE 80 Pipes shall be BLUE confirming to Clause 3.2 of ISO 4427:1996.
5. Dimensions:  
The pipe dimensions shall be as per latest revisions of Clause 4.1 of ISO 4427 : 1996 and pipes upto diameters 200 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 80 Pipes shall be as per the table given below:

Nominal Dia of MDPE Pipe (mm)	PR rating	Wall thickness	
		Minimum	Maximum
20	PN 16	2.8	3.3
25	PN 12.5	2.8	3,3
32	PN 12.5	3.6	4.2

The dimension tolerances shall be as per ISO 4427 clause 4.1.3

6. 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 pipe manufacturer. The Employer will depute Third Party Inspection Agency to the pipe manufacturing facility of the manufacturer to inspect the pipes as per QAP approved by Engineer In charge.

7. Training:

The contractor shall provide training to Engineer in charge regarding erection, functionality & other manufacturing problem in the original manufacture factory unit for 5 days.

**13. Suggested make for M.D.P.E pipes for House service connections are as below. Bidder can use the same or equivalent make.**

1. M/s KIMPLAS PIPING SYSTEMS LTD
2. M/s Jain Irrigation Systems, Jalgaon
3. M/s George fischer
4. DURA LINE
5. MANEKYA S-LON

**14. Suggested make for Electro-fusion Tapping ferrule, Compression Fittings, U PVC Ball valves. Bidder can use the same or equivalent make.**

1. KIMPLAS PIPING SYSTEMS LTD
2. PALAPLAST
3. PLASTITALIA
4. RECCALATI
5. M/s. George Fishcer
6. M/S Jai



## **Chapter 5**

### **Specification Roadwork**

The specifications for Road works shall be governed by “Specifications for Road and Bridges works, 5<sup>th</sup> revision Ministry of Road Transport and Highways, Govt. of India”.

The Relevant IRC codes shall also apply.

## Chapter 6

### SPECIFICATION FOR VERTICAL TURBINE PUMPS FOR RAW WATER PUMPING

Design, manufacturer, supply, erection, testing commissioning of turbine pumping sets for pumping clear water including all electrical, mechanical equipment's accessories and civil works viz., foundation of pump, motor, cable, pipes, fittings for suction, delivery butterfly valves, reflex valve, specials etc., complete as per details given in this NIT.

#### 1.0 DETAILED SPECIFICATIONS OF PUMPS SETS :

The pumps shall be vertical turbine wet pit type and non-pull out design with multistage bowl assembly directly coupled with vertical hollow shaft motors.

- a. 3 units of self-water lubricated vertical turbine pumps sets each of capacity 263m<sup>3</sup>/hr against approximate total head of 102meters for pumping raw water at intake well.

b.

The pumps should be KIRLOSKAR/JYOTI/WORTHINGTON/BEACON WEIR/MATHER & PLATT make only.

#### 1.1 GENERAL SPECIFICATIONS

The pumps shall be water lubricated complete with bowl assembly, column pipe such floor discharge head, line shaft, oil tubes, foundation plate/sole plate, basket strainer, motor foot stool and all necessary accessories. The pump shall be designed so as to have a maximum flow capacity not less than 110% of the rated flow capacity. The pumps shall also be designed for continuously operation at any point of head capacity curve between 90% and 110% of pump rated flow, without undue vibration or overheating and thrust bearing should be antifriction type point head.

#### (A) BOWLS:

The bowl shall be made of close grained cast iron smoothly finished and free any casting defects. The bowls shall be capable of withstanding hydrostatic pressure equal to twice the pressure at rates capacity or 1.5 times of the shut off head whichever is greater. The water passage in the bowls shall be smooth and shall have the Nitril rubber linked bearing with bronze shall to save bearing for the impeller shaft. Neoprene rubber lined bearing with bronze shall should be provided in the bottom of the bowl assembly also.

#### (B) IMPELLERS :

Impellers shall be closed type made of zinc free bronze statically and dynamically balanced. Impellers shall be free from any casting defect and shall be properly machined. All the water passage shall be smooth finished. The impellers shall be secured to shaft with tapered lock collect or key & split rings.

#### (C) IMPELLER SHAFT :

The impeller shaft shall be of stainless steel with renewable stainless steel sleeves at bearing portion. The impeller shaft shall be guided by bearing provided in each bowl. The butting faces of the shaft shall be machined surer to the axis and the shaft shall be chamfered an the edged. The shaft shall have a surface finish of 0.75 micron as per IS : 3078/1967.

#### (D) LINE SHAFT :

The line shaft shall be made of High grade carbon steel. The shafts shall be furnished with interchangeable suctions having a length of 1.25 M / 2.5 M / 3M. The butting faces of shaft shall be machined square to shaft axis and the shaft ends shall be chamfered on the edges. To ensure to correct alignment of shafts they shall be perfectly straight.

The shaft shall not have the surface roughness more than 0.75 microns as per IS : 3073/1967. The shaft shall have the adequate strength to withstand all the forces at + 10% of the critical speed of shaft.

#### (E) COLUMN PIPE :

Column pipe shall be manufactured from the heavy class M.S. pipe confirming to relevant India Standard Specification. The column pipe shall not exceed 3.0 meters. in length & made of 6mm thick sheet the dia of bolts to be used in flange joints should not be less than 20mm.

#### (F) LINE SHAFT BEARING :

Line shaft bearings shall be designed to be lubricated by forced water. line shaft bearing shall be cutless Nitrile rubber lined bearing with bronze shell.

**(G) LUBRICATION :**

The pumps are water lubricated.

**(H) DISCHARGE HEAD :**

The discharge head shall be of standard construction cast iron as per IS:210 Gr. FG 200 and sufficiently strong to support the weight of the pump. It shall be fitted with a tube tension plate for tightening up. The shaft tubes for the purpose of aligning the shafts.

**(I) STUFFING BOX :**

A packing gland shall be provided at the top of stuffing box. Shaft sleeves shall be provided on the top shaft. The stuffing box shall be of sufficient depth to permit adequate packing. The space between the pump motor main coupling and the stuffing box shall be sufficient to permit removal of packing gland and insertion of new packing without dismantling the pump.

**(J) MOTOR STOOL :**

The motor stool shall be of fabricated mild steel shall be designed to take care of all static and dynamic loads on it.

**(K) PRESSURE INDICATION DEVICES :**

Each pump shall be provided with pressure gauge of best quality makes to give indications of delivery pressure. The pressure gauges shall be of Borden type, dial size 150mm.

**(L) LABORATORY TEST :**

Laboratory pump test shall be carried out as per IS: 9137 / for each pump to assess the pump discharge V/s head, horse power and efficiency figures. The pump shall be subjected to a test pressure of 1.5 times of the shut of pressure or twice the working (rated) pressure whichever is higher.

**(O) FIELD TEST :**

The field test shall be carried out as per IS : 1710 and 5126.

The successful BIDDER will ensure the Engineer-in-charge of work or any other Senior Engineer nominated by the CHIEF MUNICIPAL OFFICER, NAGAR PARISHAD Badagaon will inspect and witness tests conducted on the pumps and motors at manufacturer's place with respect to their characteristic and performance as specified by the department.

**1.2 GUARANTEED PERFORMANCE & TECHNICAL PARTICULARS :**

The contractor shall submit the details of guaranteed performance & technical particulars as desired in the Performa enclosed vide schedule's with the TENDER along with the preliminary out line drawing indicating principal dimensions & weight of pumping equipments and cross section drawing indicating the assembly of pumps & manor parts thereof with materials of constructions and special features. Complete descriptive and illustrated literature on the equipment and accessories offered.

**1.3 SPECIAL NOTES FOR BIDDER :**

1.3.1 Pump should be capable of throttling. The throttle point discharge should be quoted. The extent to which pump can be throttle and the corresponding discharge to be mentioned.

1.3.2 Duty point discharge should be specifically mentioned along with the head at which the same will be attained. Efficiency at different operating heads and discharge should be mentioned.

1.3.3 The accessories like surface, discharge head/underground discharge head with elbow, prelub tank with fittings, motor stand with NRR and thrust bearing housing, column assembly bowl, assembly, basket strainer, as per specifications shall be quoted, individually. The drawing to the scale showing the proposed arrangements for the pumps and the positions of various parts with detail drawing must accompany the TENDERS along with detailed specification, make, guarantee period etc.

1.3.4 Head capacity curve shall be rising type and shut off head must be higher than the maximum operating head for paralleled operations of pumps. Performance covers for each individual pump sets and also for the four pump sets working in parallel should be given for full load and for throttled conditions also. All pumps to be of identical in all respect.

**2.0 SPECIFICATIONS FOR 415-V INDUCTION MOTORS :**

**2.1 TYPE :**

The motor shall be vertical hollow shaft squirrel cage type induction motors suitable to operate on 415 V, 3 Phase, 50 Cycle A.C. Supply at 1500 RPM directly coupled with vertical turbine pump. The motor shall generally conform to latest revision of IS : 325/1978 and other relevant ISS. Duly fitted with space heater and RTDs & BTDs. The motor shall be of KIRLOSKAR, JYOTI, BHEL, CROMPTON, NGEF, make only.

**2.2 VARIATION IN SUPPLY VOLTAGE :**

The motors shall be capable of delivering rated out put and rated power factor with following variations :

Voltage	:	± 10%
Frequency	:	± 5%
Combined	:	As per IS 325

**2.3 RATED CAPACITY :**

The minimum conditions rated capacity of motors shall be such that it meets the power requirements of pumps in the complete range of its operation. It shall also provide on additional power requirement on the motor. By 5% at the maximum power requirement or by 10% at the duty point of operation whichever is maximum. The contractor shall ascertain the K.W. requirement and provide the motors of suitable capacity.

**2.4 ACCELERATION CHARACTERISTICS:**

The acceleration characteristics of motor shall be matched with the driven equipment so that acceleration is obtained without over heating of motor.

**2.5 METHOD OF STARTING :**

The motors shall be designed for star/delta/soft starting at full voltage with starting current not exceeding four times the rated full load current. The motor shall also be designed for a minimum pull out torque of 200%.

**2.6 CONDITION OF START :**

Motor when started with the drive imposing its full starting torque under the specified supply voltage variation shall be capable of withstanding at least one successive starts from hot condition to start from cold condition without damage to the winding.

**2.7 CLASS OF INSULATION :**

The motor winding shall be provided with insulation conforming to thermal class "F". The maximum temperature rise of the winding shall not exceed the limits specified from class "B" insulation. The insulation can be given tropical and fungicidal treatment for successful operation of motor in hot humid tropical climate. It shall of thermos setting type and shall remain unaffected by heat. The coils shall be highly uniform with uniform insulation strength and uniform dielectric losses.

**2.8 MOTOR CONSTRUCTION :**

The motor construction shall be suitable for easy dismantling and reassemble at site with the help of simple over head crane. The motor shall be of core pack construction attached to the stator frame to facilitate easy removal and replacement of the winding for maintenance purpose. The over head for winding at both ends of the core shall be accessible for usual inspection without resorting to major dismantling.

**2.9 MOTOR FRAME :**

Motor frames shall be rigid fabricated steel they shall be suitably annealed to eliminate any residual stress introduced during process of fabrication and machining.

**2.10 STARTOR LAMINATIONS :**

Stator laminations shall be made from suitable grade sheet steel varnished on inner side and shall be adequately designed to overheating during starting and running conditions stipulated above.

**2.11 ROTOR SHORT CIRCUITING RINGS :**

Rotor short circuiting and rings shall be such that it is free to move with expansion of bars without distortion. The connections of the bars to the end rings shall be made by bracing.

**2.12 LOCKING ROTOR WITH STAND TIME :**

Locked rotor with stand time under hot conditions at 110% voltage shall be more than starting time at minimum permissible voltage by at least two seconds.

**2.13 TYPE OF ENCLOSURE & DEGREE OF PROTECTION :**

The degree of protection provided by the enclosures of motor shall conform to IS: 4691. the enclosure for the motors shall be screen protected Drip Proof (SPDP) IP 23.

**2.14 SHAFT INSULATION :**

Suitable insulation shall be provided on shaft/bearing house to prevent shaft current. The insulation provided shall be such that it shall retain its dielectrically properties even after its handled for number of times during dismantling and reassemble.

**2.15 BEARING ASSEMBLY :**

Bearing assembly shall be such that it prevents dust and water from getting to the bearing. Further, bearing lubricant shall not find access to the motor winding. The bearing assembly shall be provided with proper lubricating nipples.

**2.16 EARTHING :**

The motor body shall have two separate earthing terminals for earthing in compliance with I.E. Rules.

**2.17 DIMENSIONS OF MOTORS :**

Motors shall be properly dimensioned to have greater stability and low vibration limit.

**2.18 TESTING**

All the motors shall be routine tested at manufacturers workshop and test certificate shall be provided with motors.

**(Bidder can suggest other options of pumps in the light of less Electrical expenditure and better efficiency without compromising on head and discharge. The change shall have to be approved by the Competent authority. However no separate cost shall be payable for the same.)**

## Chapter 7

### DETAILED TECHNICAL SPECIFICATION FOR 1800 KVA /suitable ELECTRIC SUB STATION (3 nos. for Raw water pumps)

#### 1. LOCATION OF WORK:-

Providing, supplying, erection and commissioning of Transformer of 315 KVA or suitable rating to be installed in an electric sub-station of 11KV/315 KVA located near intake.

#### 2. SCOPE OF WORK

The Scope of works includes design, supply erection construction commissioning and testing of 315KVA, 11KV/315 KVA electric substation (as per I.E. rules and specification) which mainly includes supply of transformer, outdoor, substation structure, cables, other electrical equipment, accessories, and other allied required civil work etc. complete.

The details specifications of the proposed work are given below. However specifications laid down in relevant in diameter standards shall be strictly followed.

#### 2.1 SUB STATION STRUCTURE AND ASESSORIES. :-

11/0.315KV outdoor substation comprising of 1 pole substation structure made of Double M.S. Girders & channels of adequate section (not less than ISHC 200x10 and ISMB 100x50) and length, with provision, of 11 KV lightning arrester, A.B. switch, D.I. set, disc and post insulators with hardware substation premises as per I.e. rules. Structure shall be complete with necessary painting of primary red oxide and finished with two coat of aluminum paint.

#### 2.2 TRANSFORMER

One number transformer of rating 315 KVA, 11/0.315 KV 3 phase, double, would Dy 11, ONAN cooled outdoor distribution transformer with off load top changer as per IS 2026 (with all standard fitting and bi directional rollers and accessories as per I.E. rules) and as per other detailed specification. The transformer shall be fixed on suitable plinth as per I.E. rules.

#### 2.3 EARTHING SYSTEM:-

Double earthing of entire electrical system connected to earthing plates buried in ground and surrounded in charcoal and salt up to adequate depth. The contractor shall have to carry out earth continuity tests earth resistance measurement and all other required test in the presence o the Engineer-in-charge, which are necessary to prove that complete job. If earthing system is

Already in working conditions then rectifications if required is to be done only

#### 2.4 CIVIL WORK:

All related civil works such as construction of transformer plinth, foundation of substation structure, partition wall between transformer, earth pits, cable trenches/cable trays, cable markers, foundation of Fencing pole structure, providing and spreading 40mm B.T. metal as per I.E. Rules complete job.

#### 2.5 FENCING FOR 11 KV SUBSTATION YARD.

Industrial yard fencing arrangement using 65 mm x 6mm angle iron post complete as per I.E. rules complete job if require at site

#### 2.6 LIGHTING:-

Sub station yard lighting provision in panel.

#### 2.7 SUPPLY OF SAFETY DEVICES:-

Supply of safety devices like rubber mating, hand gloves, first Aid box, danger boards, first Aid, charts, 0.5 Kg. Capacity Co<sub>2</sub> type fire extinguishers and sand buckets etc. complete required as per specification and I.E. rules One set.

#### 2.8 OPERATION OF SUBSTATION:

The contract include as operation and maintenance of the contract includes sub station after commissioning and training to departmental staff for 7days complete job.

#### 2.9 ANY WORKS Equipment not specified in particular but considered necessary to complete the work as per specification and I.E. Rules are also include in this TENDER and scope of works.

#### 2.10 PANEL INSTLATIONS ;

Panel is to be installed in substation or at place specified by the department.

**3.0 IMPORTANT CONDITIONS:-**

- 3.1 The BIDDER shall submit the brand names, & efficiencies at various at various points and design calculation for each and every equipment so as to assess and decide suitable offer.
- 3.2 A licensed class A electrical contractor authorized under I.E. Rules shall only carry out the work.
- 3.3 The Successful BIDDER on award of contract shall have to prepare and submit the detailed drawing of the work duly approved by the Chief Electrical Inspector and Electrical Adviser, Govt. of M.P. After completion of work the representative of the Chief Electrical Inspector and Electrical Adviser shall inspect the same. The inspection the same. The inspection fee shall be born by the contractor and electrical substation shall be charged only after approval and permission of the competent authority as per I.E. Rules.
- 3.4 Supply and inspection of all the equipments shall be as per relevant BIS/ I.S. Specification and latest I.E. Rules.
- 3.5 Make, Materials, Technical specification, Circuit diameter grams and connection details of each and every equipment and its major parts offered should be clearly specified in the TENDER.
- 3.6 Test certificates guarantee, certificate and operation manual shall be submitted along with the supply of equipment.
- 3.7 After commissioning of all the equipment successful trial will have to be given for at least 72 Hours .
- 3.8 Maintenance and training of department staff:-  
After installation, commission and official testing of electric substation and other equipment satisfactorily, the contractor shall have to run and maintain and electric substation to the complete satisfaction of the Engineer in charge for a period of at least 7 days round the clock through his experienced and competent staff under supervision of his experienced and qualified engineer.
- 3.9 Any work equipment not specified in particular but considered necessary to complete the works as per specification and I.E. Rules are also included in this TENDER.

**4. DESIGN DATA:-**

- 4.1 All the equipment shall be designed for operation in tropical humid climate subject to heavy rainfall and frequent thunderstorms with ambient air temperature of 50 deg. c (max)
- 4.2 The single line diameter gram of proposed 33 KV substation, main electric panel board bus bar is shown in the enclosed drawing. The proposed site plan showing the relative location of substation with respect to pump house are shown in separate drawing , which can be seen in office. The above drawing is enclosed only for the guidance of the BIDDER.
- 4.3 The rating and specification of transformers and other electrical equipment shown in the drawing and specification are indicative only The BIDDER shall checkup the rating of the equipment and satisfy thoroughly regarding their adequacy.
- 4.4 All the materials used in this work must be strictly in accordance with the relevant I.S. specification and I.E. rulers.
- 4.5.1 On completion of work, the contractor shall submit the completion drawing. Circuit diameter grams and detailed electrical mechanical drawing of the equipments and the maintenance manuals in form as desired by the engineer-in-charge.

**5. DETAILED TECHNICAL SPECIFICATION:**

**5.1 TRANSFORMER :-**

- (a) 315 **KVA**11/0.315 **KV** 3 phase, 50 Hz Oil immersed, Natural self cooled type Onan, core type with class "A" insulation, double wound with off load tape changer outdoor distribution transformer with accessories designed and manufactured with particular reference to tropical condition conforming to IS 1026: 1981 as per IE rules and as per detailed specification.

Rating	315 KVA OR OF SUITABLE RATING
No load voltage ratio	(HV/LV 33 KVA/3.3 KV
Winding materials	copper
No of phases	Three
Vector	Dy 11
<b>Connection On (HV/LV)</b>	Delta Star
Frequency	50 Hz
Installation	Outdoor
Type of cooling	Onan
Temperature rise in oil by thermometer	45 Deg. C
In winding of resistance	55 Deg. C
Terminal Arrangement	
*(a) Primary	Bare
(b) Secondary	Weather proof bare bushing
Type of tap changer	Off load top changer
Tapes step on HV	+5% - 5% in steps of 2.50%
Fitting and accessories	shall be provided as per IS 2026: 1981

## 5.2 CONSTRUCTION:

### CORE

The core shall be of C.R.G.I.O. annealed steel materials having low losses and good grain properties, bolted, together to the frames firmly to prevent vibration and noise,

### WINDING:-

Winding shall be made out of electrolytic grade copper paper covered wire strips. Generally H.V. winding shall be cross order of disc type with paper covered conductor and the L.V. winding, shall be cylindrical type disc or helical type depending upon the voltage currents.

### TANK :-

Transformer tank shall be robust construction and shall be fabricated with M.S. plate proper enforcement shall be provided so as to ensure that no building occurs during service.

### FITTING AND ACCESSORIES:-

All the fitting and accessories as mentioned below shall be of the good quality and confirming to Relevant IS specification.

1. Rating and diameter gram plate.
2. Earthing terminals
3. Lifting lugs
4. Off load tape changing switch
5. Drain cum sampling valve wit plug.
6. Conservator with oil level gauge
7. Thermometer
- 8,. Air release plug.
9. Silica gel breather.
10. Bucholes Relay.
11. Radiametertor.



## **PAINTING:-**

Thank in side, core clamp and other fitting exposed to the oil shall be painted by heat and oil resistant paint. the exterior of the transformer and other ferrous fitting shall be first thoroughly cleaned, scraped and then given two coats of zinc chromate, red oxide, primer following by two finishing coats of synthetic enamel paints as per shade No.631, of IS 5/1978.

## **DRAWING :-**

Three copies of GA drawing showing details dimension and position of fitting and accessories shall be submitted with equipment.

- v. Indicating lamps for breaker ON/OFF Spring charge trip circuit healthy.
- vi. Alarm Bell for S/C and E/F indication.
- vii. Push button for test /reset/acknowledge.

## **6 PANEL BOARD**

The LT AC Switch Board shall be of volts, 3 phase and neutral 50 Hz Distribution board, indoor type, sheet clad by 1.5mm thick CRC sheet over S channel structure frame, floor mounted free standing type, cubical pattern, dust & vermin proof having protection group IP 53, and shall comprise of following.

1 Nos. of incoming ACB OF suitable rating make L&T siemens, Alsthan  
C&S and Schinder

1Nos. SFU OF suitable rating

- 1Nos. off 144 sq. mm flush tie ampere meter with selector switch.
- 1Nos. set of Indication Lamps for all three phase, On OFF auto Trip .
- 1 Nos. set of CT for protection and metering.
- 1 Nos. of solid state Triple pole on directional IDMTL over load and earth fault relay.
- The bus bar shall be suitable for 3 Phase and applicable amps,.the bus bar shall be with colored insulated sleeves. The supports shall be suitable spaced to give mechanical rigidity for with standing stress due to system fault,. The panel compartments shall have adequate space for termination of incoming and outgoing feeder cables equipped with gland, lugs etc. Panel Board should have a digital display unit showing line voltage, phase voltage, current and power factor. Control panel should have automatic capacitor bank.

## **7 CABLES:-**

Power cable of PVC, aluminum armored cable of size 3x400mmx3,5 with require lugs gland. Total to be considered for lump sum offer is 20 meter. each from transformer to panel.

Control cable of PVC, copper cable of size 1 x 2.5 sq.mm x 3 and 6 core with required lugs, glands. Total length to be considered for lump sum offer is 50mtr, for various connections.

**Units rates of cable to be quoted for any addition as required at time of execution.**

## **8 SUB STATION STRUCTURE ADN ACCESSORIES.**

8.1 33/0.44 KVA outdoor substation comprising of suitable substation structure and other required sub station material as given below:

8.2 SUB STATION STRUCTURE :-

Sub station structure extension made of 1 Nos. of two pole structure made out Two Nos. of 200xc 100mm M.S. channels fabricated and welded using 33 x 5 mm. M.S flat to make one pole of substation total substructure have our poles MS channels shall be not less than 100x 50mm and length as required to complete the substation structure, clamps, nut bolts and other necessary MS Material as required for construction of substation structure. These structures shall be made as per detailed drawing enclosed.

8.3 3 KV Lightning arresters:

Station class 1- KA rating, single pole lightning arrester for use of 33 KV solidly ground natural system and suitable for pedestal mounting complete with bolts and nuts. One SET of three numbers.

8.4 AIR BREAK SWITCHES:-

Air break switches 33 KV 400 amp. Triple pole with earth blades, gang operated, double break isolators suitable for horizontal mounting, complete with locking arrangement in both On/Off position post type insulators operating pipe arcing horns, hand operated machismo. The isolators will be complete with fixing bolts and nuts. all hardware parts shall be hot dip Galvanized.

**8.5 DROP OUT FUSES:-**

Drop out fuses 33 KV outdoors drop out fuse cut out of expulsion type compete with insulators mounted on bas channels and suitable for cross arm mounting for a working current up to 400 amps. complete with fuse holders, fuse elements and operating rod. All hardware parts shall be hot dip galvanized Each set comprise for 3 Mps single pole drops fuses. The drop out fuse set shall be for control of 500 KVA Transformer Primary One set.

**8.6 Post pin and Disc insulators**

33 KV disc insulator complete with hardware.

33 KV pin post complete with GI pin

**8.7 ALUMINUM TUBULAR BUSBAR.:-**

Aluminium tabular bus bar required for internal connection of 33 KV equipment such as transformer Isolator, DO fuse etc. Jumpers, Terminal connectors connection supports. insulators bolts nuts etc complete

**8.8 PAINTING**

Structure shall be complete with necessary painting of primary red oxide and finished with two coat of aluminium paint.

**9 SHIFTING OF TRANSFORMER**

There is no work of shifting of old transformer.

**10 CIVIL WORK**

All related civil work such as construction of transformer plinth foundation of substation structure earth pits cable trenches/ cable trays, cable markers, providing and spreading 40 mm BT metal as per IE rules complete job.

**11 EARTING SYSTEM:-**

Double earthing of entire electrical system connected to earthing plates buried in ground and surrounded in charcoal and salt up to adequate depth, where damaged earth is encountered at a distance of 2 meters from any permanent structure shall be provided. It shall also included digging of pits earth plates as per latest IS, watering pipe with funnel of required length and diameter earth strip per without kinks lugs and clamps, salt and charcoal earth chamber etc as per EI rules the contractor shall have to carry out earth continuity tests, earth resistance measurement and all other required test in the presence of the Engineer in charge which in his opinion are necessary to prove that the system is in accordance with design specification and as per IE rules complete.

**11.1 EARTHING MATERIAL**

Copper earthing plate of size 3.15 x 600x 600mm 6 nos

Copper earthing strip 50x 5 mm as required

GI earthing plate of size 6.3 x 600x600mm

GI earthing strip 50 x 5mm as required for earthing arrangement

CI main hole cover for earthing pits.

GI pipe for earthing pits 50 mm diameter of length 1.5 meter

Funnel and other required earthing materials as per IE rules & IS

**12 FENCING FOR 33 KV SUBSTATION YARD**

Industrial type fencing arrangement using 65 mm x 6mm angle iron post each of 3 meter height fixed as required at a spacing of 2 meter with 2 meter high GI chain link wire mesh fencing of minimum opening of 75mm x 75mm 2 meter wide main gate with locking arrangement and etc complete as per IE rules complete job.

**13 LIGHTING**

Sub station lighting provision in panels is to be done.

**14 SUPPLY OF SPARES**

Supply of essential spares like DO fuses, HRC fuses indication lamps cable lugs for maintenance one set

**15 Supply of essential tools**

Supply of essential tools and equipment like DO operating rod earthen rod sets, required for operation of sub station helmet HD one set of each item.

**16 SUPPLY OF SAFETY DEVICES :**

Supply of safety devices like rubber mating gloves, first Aid box leather apron danger boards, first and charge 0.5 kg capacity CO2 type fire extinguisher and sand buckets etc complete required as per specification and IE rules one set.

Note : The quantities given in annexure E&F are approximate. However the contractor shall have to execute the complete works as per specification and IE rules.

## Chapter 8

### SPECIFICATIONS FOR TREATMENT PLANT

All the work shall be carried out as per relevant clause of CPHEEO Manual

- (1) **Construction of Treatment Plant of 10.00 MLD capacity. The Job includes the construction Clariflocculator, Pressure filters, Proper arrangement for dosing of chemicals for pre & post chlorination.**

This work shall comprise of the following items:-

1. Chemical house and chemical feeding equipments.
2. Flash mixer.
3. Aerator
4. Clariflocculator.
5. Rapid sand gravity filters.
6. Disinfections arrangements.
7. Laboratory & laboratory equipments.
8. Clear water pump house and sumpwell of 4000 KL
8. Construction of boundary walls for WTP.

- (2) **TREATMENT:**

Specifications of all the treatment units shall be as per CPHEEO Manual and relevant IS standards. Bidder shall require to submit a brief write up on the treatment plant along with the TENDER. On acceptance of TENDER the successful Bidder shall submit a detailed design and drawings of the treatment plant based on CPHEEO Manual and relevant IS specifications for the approval of competent authority.

- (3) **Pre & post Chlorination shall be done by providing Chlorinator of Siemens / Penwalt make.**

The chlorinator shall be 4 kg/hr cabinet mounted vaccum operated, solution feed type designed for wall mounting and shall incorporate following features :

- a. Notch Control Mechanism with accuracy of +/- 4% of indicated flow
- b. Differential Pressure regulating valve Maintains the proper vacuum differential across the V-notch orifice for consistent feed rate, regardless of changes in the operating vacuum
- c. Vaccum gauge for easy visual functional check.
- d. Manual adjustment of dosage rate.
- e. Safety vent to be piped to external atmosphere.
- f. 10" Glass Rotameter

The required vacuum tubing and the vent tubing should be supplied with the chlorinator.

#### **Injector**

The chlorinator shall be driven by a ¾" fixed throat injector which would create the required operating vacuum. The injector shall have following features :

- Built-in double check valve for protection against back flooding
- The main check valves shall consists of a spring-loaded diaphragm with a spherical seat for positive sealing
- A spring-loaded poppet check to provide additional safety
- Anti-syphon arrangement for negative backpressure applications

#### **Vacuum Regulator**

The vacuum regulator shall be so designed that it opens when the vacuum is generated by the injector. On failure of water to injector, the vacuum regulator must close automatically. The regulator shall have a maximum nominal capacity of 4kg/hr with built-in internal pressure relief valve. The unit shall be cylinder mounted thereby reducing gas pressure to a vacuum immediately.

**Tonner Container Mounting Kit**

The system shall be supplied with mounting kit to adapt to vacuum regulator for tonner container mounting. The kit shall include heater, liquid chlorine drip leg and removable strainer.

**Booster Pump**

The system shall be supplied with suitable booster pump to generate the desired vacuum at injector

**Chlorine Tonners**

Contractor shall provide 2 nos. Chlorine Tonners for proper replacement.

- (4) For the testing of incoming Raw water & outgoing Clear water laboratory of suitable Class as per CPHEEO Manual shall be provided by the Contractor. The Laboratory equipments & Chemicals to be provided should be of GLAXO/ RANBAXY/ MERCK make.

Contractor shall provide proper testing instrumentation for checking the water quality parameters in regard to color, residual chlorine, Conductivity, Turbidity, etc. at various critical locations, i.e, inlet chamber, Clear water sump and at the outlet pipe.

## **Chapter 9**

### **SPECIFICATION FOR BULK FLOW METER**

Woltman Turbine Bulk meters class B, multijet, magnetically coupled as per specifications conforming to is 770/1994, ISO 4064/1 and EEC approved

**The suggested brand of various equipments shall be as below. Bidder can use the suggested or equivalent make.**

S. No.	Equipment	Suggested makes
1.	Transformer	NGEF, Crompton, Alsthom, Kirloskar, Volttempbtcl, TESLA
2.	3 KV VCB	CROMPTON, ALSTHOM, ABB, JYOTI, SIEMENS, BHEL, NIEPE-BANGLORE
3.	AIR CIRCUIT BREAKER	L & T, SIEMENS, ABB, JYOTI, CROMPTON, C & S
4.	CTS PTS	CROMPTON, ALSTHOM, UNIVERSAL, JYOTI, C&S
5.	44 KV LIGHTING ARRESTER	IGE, OBLUM ALPRO, CROMPTON
6.	RELAYS	L & T, SIEMENS, ABB, JYOTI, C&S
7.	AIR BREAKS SWITCHES	SIL, WSL, KIRON TEXTILE
8.	POST AND DIS INSULATORS	SIL, WSI, KIRON TEXTILE, ATLAS JAIPURIA, JYOTI
9.	ALUMINUM TUBULAER BUSBAR	AS PER IE RULE AND AS PER RELATIVE STANDARD
10.	CABLES	FINOLEX UNIVERSAL HAVELLS NICCO CCI
11.	DROP OUT FUSES	SIL, WSI, KRON TEXTILE, ATLAS, JAIPURIA
12.	EARTHING MATERIAL	AS PER IE RULES AND AS PER RELATIVE STANDARD D
13.	SAFETY DEVICE	AS PER IE RULE AND AS PER RELATIVE STANDARD
14.	METERS	AE, MECO.

<b>Item / Component</b>	<b>Suggested makes</b>
VT and Centrifugal Pump	Kirloskar / Jyoti / Mather+Platt / WPIL/maxflow/darling
Pump motor	Kirloskar / Jyoti / Crompton / ABB / Elsthom / Siemens
Sluice Valve / Scour Valve	Kirloskar / IVC / VAG / IVI / marck
Non-return / Check Valve	Kirloskar / IVC / VAG / IVI / marck / marck
Kinetic Air Valve	Kirloskar / IVC / VAG / IVI / marck
Butterfly Valve	Fouress / IVC / VAG / L&T (Audco) / marck
Valve Actuator	Auma / Rotork / Limitork
Single faced Sluice Gate / Stop-log	Kirloskar / JASH / VAG
Flow & Pressure regulating Valve	Darling Muesco / VAG / Keystone
Electro-magnetic Flow meters – Battery operated	Emerson / Krohne Marshall / Yokogawa / Endress Hauser
Water Hammer Control	Sureseal or equivalent
D.I. pipe Specials & Fittings	Electrosteel / KISWOK / Jindal / Kejariwal
Electro-fusion & Compression fittings	Glynwed / Georg Fisher/Astore/Magnum
Chlorinators	Pennwalt (W&T), SIEMENS, Alldos
Chlorine leakage detectors	Pennwalt (W&T), Capital Control(US), Alldos
WTP Equipments : <b><u>(Bar Screen, Flash mixer, Clariflocculator, Clarifier, Pressure Sand filter, Activated Carbon filter, Chemical dosing system etc.</u></b>	Voltas / Shivpad / Triveni / Hindustan Dorr-Oliver
Power Transformers	ABB / Crompton / Emco / Siemens / Alstom
HT Switch Gear	Alstom / Jyoti / Crompton / Siemens
Vacuum Circuit Breaker (VCB)	Siemens / Schneider M.G. / Jyoti / L & T
Air Circuit Breaker (ACB)	Siemens / Schneider M.G. / Jyoti / L & T
Moulded Case Circuit Breaker MCCB	Siemens / Schneider M.G. / Jyoti / L & T
Soft starters	Siemens / Alstom / Jyoti / ABB
Relay and Contactors	Siemens / Alstom / Jyoti / ABB / L&T
Cables	Tropodur / Finolex / Asian / Gloster / Incab / Universal / Polycab / C%S
EOT crane	Hitech / Indef / Hiking / Ambika



<b>FOR INSTRUMENTATION, AUTOMATION AND SCADA SYSTEM :</b>	
<b>Item / Component</b>	<b>Suggested makes</b>
Programmable Logic Controllers (PLC)	Rockwell ( <i>Allen Bradley</i> ) / Siemens / Honeywell
Panel Enclosures and Consoles	Rittal / President / Cutler Hammer
Ultrasonic Type Level Measurement Device	Endress+Hauser / Krohne Marshall / Hycontrol UK.
Float & Board Type Level Measuring system	Nivo (Toshniwal), Endress + Hauser, Pune Techtrol
Switch fuse Disconnecter	L & T, FN Type, Siemens, GEPC
Multi-Function Energy Meters	Enercon, L & T, SOCOMEC
Capacitor bank	Crompton Greaves, Khatau Junker, Malde, L & T
Cable Termination kit	Raychem, Denson, M-Seal
Battery	HBL NIFE, Exide, Amco
Battery Charger	Chaabi Electrical, Masstech
Tacho Meter on line	Kana Electric, Proton, Jay Shree Electronics
Pressure switch	Indfoss, Switzer, Tag Process Instruments
Flow switch	Switzer, General Instrument, Forbes Marshall
Pressure gauge	WAREE, WIKA, AN Instruments, Guru, Hitek
Pressure Transmitter	Emerson, Foxbro, Druck, Endress – Hauser, ABB, Honeywell Automation
Engineering cum Operator work Station	IBM, Compaq, Dell
Printer	EPSON, HP, CANNON, WIPRO
Local Supervisory Station	IBM, Compaq, Dell
HMI Software	Wincc, Rs View, Monitorpro, Intellution, Indusoft
Alarm Annunciator	Minilec, Peacon, ICA, APLAB
Uninterruptible Power Supply	HI-Real, Pulse, Tata Libert, APC, APLAB
Instruments & Control Cables	Delton, Asian, Serval, TCL, Thermopad
Receiver Indicator/Digital panel meter	Masibus, Yokogawa, Lectrotek, NISHKO, SaiTech, MTL INSTS
Intercom system	Betel, Samsung, Tata, Panasonic, Matrix
Conductivity level switch	Pune techtrol, Krohne Marshall, E+H
Multifunction power monitor	MASIBUS, L&T, ENERCON, SOCOMECH, SECURE, DAE
Temperature Scanner	SaiTech, Masibus, Nishko, Lectrotek
Analog Signal Multiplier	MASIBUS, Sai Tech, MTL INSTS, NISHKO
Portable vibration measuring equipment	Shrenk Every, IRD, STM Instrument, TIME
Portable sound measuring equipment	CENTER, MECORD, CYNGET