Solapur City Development Corporation Limited

Tender Document

For

Temporary Flow Measurements in the ABD Area of Solapur using Clamp on Type Ultrasonic Flow Meters and Piping Works

Revision: Nil

Particulars	Details
Client Name	Solapur City Development Corporation
Project Name	Implementation of Projects under Smart Cities Mission in Solapur City
Name of the Work	Temporary Flow Measurments in the ABD Area of Solapur using Clamp on type Ultrasonic Flow Meters and piping works.
Cost of the Blank Tender Form	Rs. 5,900.00/- (Rupees Five Thousand Nine Hundred Only including GST)
Estimated Amount	Rs. 32,34,550/- (Rupees Thirty Two Lakh Thirty Four Thousand Five Hundred and Fifty Only)
Earnest Money Deposit	Rs. 32,345 /-(Rupees Thirty Two Thousand Three Hundred and Forty Five Only)
Tender/ Execution Period	Period Forty Five (45) Calendar Days (including civil works)
Document Issue Date	8 March 2018
Document Number	2017-18/18

Solapur City Development Corporation Limited,

Dist. Planning Office, New Collector Office premises, Near Govt. Milk Dairy, Saat Rasta, Solapur, 413003, Maharashtra, India

.MARCH 2018

VOLUME I

Contents

1. DETAILED E-TENDER NOTICE

Online Digitally Percentage Rate Basis Tender of below mentioned work is invited By SOLAPUR CITY DEVELOPMENT CORPORATION LIMITED (SCDCL), SOLAPUR from reputed and experienced contractors. The Bid Documents are available on the website https://mahatenders.gov.in from – 8th March 2018, 10:00 am to 22nd March 2018, 3:00pm.

1	**Description of work**	Temporary Flow Measurments in the ABD Area of Solapur using Clamp on type Ultrasonic Flow Meters and piping works.
2	**Estimated cost**	Rs. 32,34,550/- (Rupees Thirty Two Lakh Thirty Four Thousand Five Hundred and Fifty Only)
3	**Cost of Blank Bid form / Tender Fee (Non-Refundable)**	**Rs. 5,900.00/- (Rupees Five Thousand Nine Hundred Only including GST) (Tender Document can only be downloaded from https://mahatenders.gov.in**
		Credit / Debit Card / Net Banking)
4	**Period of Contract**	Period of Forty Five (45) Calendar Days (including civil works)
6	**SCDCL Contact Details**	**SOLAPUR CITY DEVELOPMENT CORPORATION LIMITED, Dist. Planning Office, New Collector Office premises, Near Milk Dairy, Saat Rasta, Solapur-413003. Tel:-0217-2318800** **E-mail:- solapurcitydcl@gmail.com**
7	**Bid Validity**	**The proposal shall remain valid for a Period of 90 Days From the Last Date of Submission**
8	**Bid Security / Earnest Money Deposit**	**The EMD is** Rs. 32,345 /-(Rupees Thirty Two Thousand Three Hundred and Forty Five Only) **EMD to be deposited electronically online at https://mahatenders.gov.in**
		OR **Demand Draft to be drawn from Nationalized Bank in favour of "Solapur City Development Corporation Limited", payable at Solapur.**
9	**Consortium /Joint Venture**	**Joint Venture / Consortium not allowed.**

2. TENDER SCHEDULE

Seq. No.	SCDCL Stage	Vendor Stage	Start Date & Time	Expiry Date & Time
1	Release Tender		8th March 2018 10:00 AM	22nd March 2018 3:00 PM
2A		Tender Download	8th March 2018 10:05 AM	22nd March 2018 3:00 PM
2B		Receipt update on e-Tendering portal	8th March 2018 10:05 AM	22nd March 2018 3:00 PM
3		Last date of Online Bid Submission		22nd March 2018 3:00 PM
4	Pre-Bid Meeting at SCDCL Office	ON 14th March 2018 3:00 PM		
5	Technical Bid Opening	23th March 2018 4:00 PM		
6	Financial Bid Opening	To be intimated later		

Notes:

- **The changes / corrigendum, if any will only be published on https://mahatenders.gov.in.**
- **Right to reject any or all bids without assigning any reasons thereof are reserved by the SCDCL.**
- **Bidders have to submit Technical Bid and Financial Bid online and technical bid offline (in hard copy)as well.**
- **All requisite information required for the submission of documents is available in the above said website.**
- **For any queries related to tender documents, please contact SCDCL E-mail:- solapurcitydcl@gmail.com.**

Chief Executive Officer, SCDCL, Solapur

DISCLAIMER

The information contained in this Tender Document or subsequently provided to Bidders, whether verbally or in documentary or any other form by or on behalf of the Employer or any of its employees or advisers, is provided to Bidders on the terms and conditions set out in this Tender Document and such other terms and conditions subject to which such information is provided.

This Tender Document is not an agreement and is neither an offer nor invitation by the Employer to the prospective Bidders or any other person. The purpose of this Tender document is to provide interested Bidders with information that may be useful to them in the formulation of their Proposals pursuant to this Tender Document. This Tender Document includes statements, which reflect various assumptions and assessments arrived at by the Employer in relation to the Work. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require. This Tender Document may not be appropriate for all persons, and it is not possible for the Employer, its employees or advisers to consider the objectives, technical expertise and particular needs of each party who reads or uses this Tender Document. The assumptions, assessments, statements and information contained in this Tender Document, may not be complete, accurate, adequate or correct. Each Bidder should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments and information contained in this Tender Document and obtain independent advice from appropriate sources.

Information provided in this Tender Document to the Bidder is on a wide range of matters, some of which depends upon interpretation of law. The information given is not an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The Employer accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on the law expressed herein.

The Employer, its employees and advisers make no representation or warranty and shall have no liability to any person including any Bidder under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this Tender Document or otherwise, including the accuracy, adequacy, correctness, reliability or completeness of the Tender Document and any assessment, assumption, statement or information contained therein or deemed to form part of this Tender Document or arising in any way in this Selection Process.

The Employer also accepts no liability of any nature whether resulting from negligence or otherwise however caused arising from reliance of any Bidder upon the statements contained in this Tender Document.

The Employer may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumption contained in this Tender Document.

The issue of this Tender Document does not imply that the Employer is bound to select a Bidder or to appoint the Selected Bidder, as the case may be, and the Employer reserves the right to reject all or any of the Proposals without assigning any reasons whatsoever.

The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Proposal including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by the Employer or any other costs incurred in connection with or relating to its Proposal. All such costs and expenses will remain with the Bidder and the Employer shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of the Proposal, regardless of the conduct or outcome of the Selection Process.

DEFINITION

(a) "Affiliate(s)" means an individual or an entity that directly or indirectly controls, is controlled by, or is under common control with the Bidder

(b) "Applicable Law" means the laws and any other instruments having the force of law in India, as they may be issued and in force from time to time.

(c) "CBUD" means Capacity Building for Urban Development

(d) "CEO" means the Chief Executive Officer of the Solapur City Development Corporation Limited.

(e) "Employer" means Chief Executive officer of Solapur City Development Corporation Limited (SCDCL), the implementing agency that signs the Contract for the Services with the selected Bidder.

(f) "Consultant" means the Infrastructure Services Consultant appointed by SCDCL for Designing of water and waste water infrastructure services under Smart City Mission (SCM) for Solapur City

(g) "Contractor" means a person or firm that undertakes a Contract to provide Materials or Labour to perform a service or to do a job

(h) "Contract" means a legally binding written agreement signed between the Employer and the Bidder and includes all the attached documents listed in its Clause 1 (the General Conditions of Contract (GCC), the Special Conditions of Contract (SCC), and the Appendices).

(i) "Data Sheet" means an integral part of the Instructions to Bidders (ITB) that is used to reflect specific country and assignment conditions to supplement, but not to over-write, the provisions of the ITC.

(j) "Day" means a calendar day.

(k) "Personnel" means, collectively, Key Personnel, Non-Key Personnel, or any other personnel of the Bidder).

(l) (I)"GoM" means the Government of Maharashtra

(m) "Gol" means the Government of India.

(n) "Joint Venture (JV)" means an association with or without a legal personality distinct from that of its members, of more than one Bidder where one member has the authority to

conduct all business for and on behalf of any and all the members of the JV, and where the members of the JV are jointly and severally liable to the Client for the performance of the Contract.

(o) "Key Expert(s)" means an individual professional (Expert Pool, and Deputy Team Leader) whose skills, qualifications, knowledge and experience are critical to the performance of the Services under the Contract and whose CV is taken into account in the technical evaluation of the Bidder's proposal.

(p) "SCDCL" Solapur City Development Corporation Limited

(q) "ITB" means the Instructions to Bidders that provide the Bidders with all information needed to prepare their Proposals.

(r) "LOI" means the Letter of Invitation being sent by the Client to the Bidders.

(s) "MD" means Managing Director of Solapur City Development Corporation Limited (SCDCL).

(t) "MoUD" means Ministry of Urban Development

(u) "Module" means group of projects

(v) "Non-Key Expert(s)" means an individual professional and support staff provided by the Bidder and who is assigned to perform the Services or any part thereof under the Contract and whose CVs are not evaluated individually.

(w) "Proposal" means the Technical Proposal and the Financial Proposal of the Bidder.

(x) "RfS" means the Request for Services to be prepared by the Employer for the selection of Contractor, based on the SRFP.

(y) "SRFP" means the Standard Request for Proposals, which must be used by the Client as the basis for the preparation of the RFP.

(z) "Services" means the work to be performed by the Bidder pursuant to the Contract.

(aa) "Sub-contractor" means an entity to whom the Contractor intends to subcontract any part of the Services while remaining responsible to the Employer during the performance of the Contract.

(bb) "SPV" means Special Purpose vehicle which is Solapur City Development Corporation Limited.

3. LETTER OF INVITATION

1st March 2018

RFP No. 2017-18/18

Project Name:

Temporary Flow Measurments in the ABD Area of Solapur using Clamp on type Ultrasonic Flow Meters and piping Works.

Name of the SPV: Solapur City Development Corporation Limited

Title of the Services:
Temporary Flow Measurments in the ABD Area of Solapur using Clamp on type Ultrasonic Flow Meters and piping Works.

Dear Mr. /Ms.

1. The Solapur City Development Corporation Limited (hereinafter called "Employer" or "Client") is implementing Smart City Proposal in Solapur City under Smart City Mission.

2. The Client now invites proposals to provide the services of Temporary Flow Measurments in the ABD Area of Solapur using Clamp on type Ultrasonic Flow Meters and piping works under Solapur Smart City development works (hereinafter called "Services") in Solapur City.

3. A bidder will be selected under Percentage Rate Basis Tender method and in a Proposal format as described in this Tender Document.

4. Bidders are advised that the selection of Contractor/s shall be on the basis of an evaluation by the Employer through the Selection Process specified in this Tender Document. Applicants shall be deemed to have understood and agreed that no explanation or justification for any aspect of the Selection Process will be given and that the Employer's decisions are without any right of appeal whatsoever.

5. The Bids shall be accepted through Hard Copy as well as Soft Copy submission process. Hard Copy to be submitted - Envelope A and B — Technical Bid. Enevelope C shall not be submitted in Hard Copy

6. Soft Copy to be submitted — Envelope A, B and C - Technical and Financial bid

7. The Bid will be rejected in case the Bidder has submitted the conditional bid and/or the specifications of the terms to be supplied are not complied with the Tender Document.

8. The Bidders will submit the proposal by the date & time indicated in Tender Schedule and as per the Instructions to Bidders.

9. The Tender Document includes the following documents:

Volume 1 – Instructions to Bidders
Volume 2 – Scope of Work, Sample Formats
Volume 3 – General Conditions of Contrcat and Specila Conditions of the Contract
Volume 4 – Bill of Quantities (Schedule –B)
Volume 5 – Technical Specifications

Yours sincerely,
Chief Executive Officer
Solapur City Development Corporation Limited Solapur
(Maharashtra), India
Pin- 413001

4. PROJECT INFORMATION

4.1. Backgorund and Context

The Smart Cities Mission of the Government of India under the Ministry of Urban Development (MoUD) is an innovative and new initiative to drive economic growth and improve the quality of life of people by enabling local development and harnessing technology as a means to create smart outcomes for citizens.

In the approach of the Smart Cities Mission, the objective is to promote cities that aim for sustainable and inclusive development that would have the trickle-down effect in the adjoining fringe areas.

Apart from Roads and other infrastructure development, as part of smart city mission, Solapur Municipal Corporation through its SPV "Solapur City Decelopment Corporation Limited" (SCDCL) has decided to improve the existing water distribution system in Dayanand and Ujani bypass Zone in ABD area. The SCDCL has hence intended to take up the works by appointing the experienced contractor.

4.2. ABD Proposed for Solapur under Smart City Mission

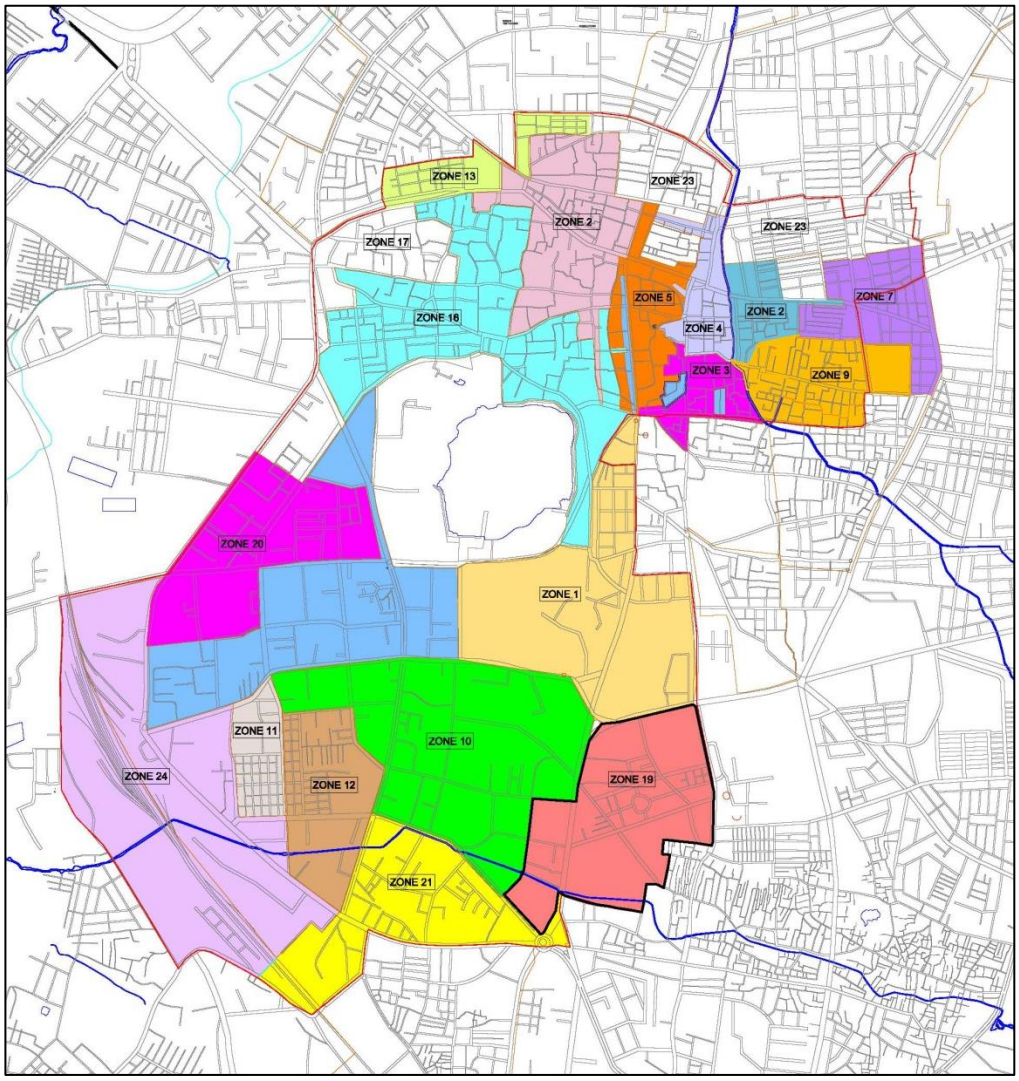
The core area of the city has been identified for area based development in the winning Smart City Proposal for Solapur. The approximate co-ordinates are on 17.65990 N, 75.90640 E. In terms of administrative jurisdiction, the proposed site is part of Solapur Municipal Corporation area. A preliminary analysis of the topography of the project area is carried out to understand the overall terrain. The average elevation of ABD area varies from 450 m to 470 m. Overall slope of the area is from South to north-west.

4.3. Current Situation of water supply system to Solapur City.

In current situation, Solapur Municipal Corporation (SMC) supply water to Solapur city once in four days. The water is supplied for each area at different timings at specified dates. SMC has prepared a water supply chart. As per water supply chart, the ESR and GSR are filled one day before for the day at which water is supplied. For some areas it is found that, direct water is supplied with bypass pumping arrangement and also gets more water than other areas. Average water supply hour for each area varies between 2 to 2.5 Hours.

To undertake improvements works for Water Supply in ABD Area, estimation of the Flow of water within the water zones is required and hence Survey for Flow Measurement in these zones shall be undertaken through this Tender.

The ABD area of Solapur Smart City is sub divided in total 19 Zones; the Flow Measurements have to be undertaken in these zones except zone no. 17 and Zone No. 23. The area is shown in **Fig. No.1**



4.4. Request for Proposal

A Contractor is to be appointed as per the provisions of the Agreements for the Project. In pursuance of the above, the SCDCL has decided to carry out the process for selection of a Contractor who shall work in accordance with this Tender Document.

SCDCL invites Proposals (the "Proposals") for selection of a Contractor (the "Contractor" or the "Bidder") who shall be responsible for execution of the scope mentioned in the Tender Document and ensuring the progress of the Project during the term of the Agreement in conformity with the Tender Document.

The SCDCL intends to select the Contractor through an open competitive bidding in accordance with the procedure set out herein.

5. INSTRUCTIONS TO BIDDERS (ITB)

5.1. Due diligence by Bidders

Bidders are encouraged to inform themselves fully about the assignment and the local conditions before submitting the Proposal by paying a visit to the Corporation and the Project site, sending written queries to the SCDCL.

The bidder is expected to examine carefully all instructions, conditions, terms, specifications and drawings contained in various volumes / addendums / common set of deviations which is a part of contract document. Failure to comply with the requirements of bid submissions or with any other bidding requirements will be at the bidder's risk. Pursuant to Clause 5.4 of ITB, the bids, which are not substantially responsive to the requirements, will be rejected.

5.2. Sale of RFP document

The document can be downloaded from the www.mahatenders.gov.in. The Bidder shall pay the Tender Fee of Rs. 5000(Five Thousand only) +2.5% SGST +2.5% CGST online on the above mentioned e-tendering website and copy of the payment proof shall be submitted along with the Proposal.

5.3. Validity of the Proposal

The Proposal shall be valid for a period of not less than 90 (Ninety) days from the Proposal Submission Date.

5.4. Eligibility of Bidders

5.4.1. Registration

a) The Bidder/s shall be an entity incorporated under the Indian Companies Act 1956/2013 or incorporated under equivalent law abroad or the Bidder should be a firm and should submit registration /incorporation under the governing legislation.
b) Bidder/s shall have a valid GST registration in India.
c) The Bidder shall be required to submit a true copy of its Incorporation Certificate along with the Proposal.

5.4.2. Technical Eligibility

The Bidder shall have experience in execution of at least one project of carrying out flow measurements and pipe line works for existing / new water supply net work for Water supply projects implemented for cities / towns etc.in last 3 financial years of minimum Project cost Rs. 12.20 Lakh. The bidder is allowed to subcontract the work of construction of Chambers. The sub contractor should have exceuted the civil works of minimum Rs.3.5 Lakh in last financial year.

5.4.3. Financial Eligibility

Minimum Average Annual Turnover of the Bidder shall be Indian Rupees (INR) 24.0 Lakh (Rupees Twenty Four Lakh) in the last three financial years (ending on 31' March 2017) preceding the Proposal Submission Date.

The bidder should have bid capacity more than the estimated cost put to tender as per bid capacity formula indicated as below.
Available Bid Capacity = (A x N x 2) — B

where A = Maximum value of Civil Engineering works executed in any one year during the last 3 years (updated to the current year by a factor of escalation of 10% per year) which will take into account the completed and ongoing works. B = Value of existing commitments and works (Ongoing) to be completed in the period stipulated for completion of work in present tender.

N = Number of years prescribed for completion of present tendered work, for which bids are invited.

5.5. One Bid per Bidder

One Bid submission allowed per Bidder. Multiple submissions will lead to disqualification and the EMD shall be seized.

5.6. Conditional Bids shall be rejected.

5.7. Cost of Bidding

The Bidder shall bear all the costs incurred in the preparation and submission of the Bid, including site visits and other actions mentioned or implied in these instructions. The Employer will not be responsible or liable for such costs regardless of the conduct or outcome of the Bidding process.

5.8. Site Visit

The bidder is advised to visit and examine the site of work and its surrounding and obtain himself at his own responsibility all information such as Site conditions, topography, hydrological and climatic conditions, extent and nature of work, laws, procedures and labor practices, availability of labor, material, machineries, fuel, water, electricity etc. and such similar information that may be necessary for preparation of the bid and entering in to the contract. The site visit(s) and collection of information/data shall be at the Bidder's own expense. A declaration to this effect will have to be signed by the bidder in the format given in Pre-qualification forms.

5.9. Clarification of Bidding Documents

In case any clarification is required by the bidder, he may obtain it personally or in writing well in advance from the Employer. The clarification for which request has been received prior to pre-bid meeting will be answered.

a) A pre-bid conference open to all prospective bidders will be held at the time and place as per **Tender Schedule** wherein the prospective bidders will have an opportunity to obtain clarifications regarding the bid conditions and the work.

b) The prospective bidders are free to ask any additional information or clarification, either in writing and orally, and reply to the same will be given by Employer and answer will be uploaded on the web site within 05 (Five) working days. Any modifications of bid documents, which may become necessary as a result of pre-bid Conference, shall be through issuance of an addendum on the website.

c) All the government resolutions and circulars mentioned / not mentioned in bidding documents shall be procured by the bidders themselves and they are applicable wherever mentioned.

5.10. Amendments to Bidding Documents

a) At any time prior to the deadline for submission of bid, the Employer may for any reason or without any reason specified, whether at his own initiative or in response to a clarification requested by a prospective bidder, modify the bid document by issuance of an addendum. The addendum will be uploaded online on the e-tendering portal for incorporation and Bidders are requested to visit the portal time to time and read carefully these amendments before quoting. These amendments shall form part of the Bid Document.

b) Amendments to Bid submission date: At any time, the Employer may similarly issue an Addendum to the Bid Documents which amends the Bid submission date. In that event, all rights and obligations of the Employer and the Bidders previously related to the original date shall thereafter be subject to the amended date.

5.11. Preparation of Bids

5.11.1. Language of bid

The Bid and all communications between the Bidder and the Employer or his representative(s) shall be typed or written in indelible ink. The language of the Bid and all related correspondence shall be **English**

5.11.2. Documents comprising the bid

The Proposal shall comprise the following:

1st Inner Envelope (Envelope-A): Pre-Qualification Documents

(1) Tender/ Processing Fee - Online payment Receipt
(2) Demand Draft or RTGS receipt of EMD Payment
(3) APPENDIX 1- Proposal Submission Form
(4) APPENDIX 2 - Power of Attorney for Signing of Application
(5) APPENDIX 3 - Financial Qualification of the Bidder
(6) APPENDIX 4 - Details of Works in Hand
(7) APPENDIX 5 - Affidavit Certifying that Bidder is not Blacklisted
(8) APPENDIX 6- Declaration of Bidder
(9) The documents for qualifying criteria including liquid assets, Annual Financial Turnover and Bid Capacity as mentioned in ITB.
(10) Details of Income Tax Circle or ward of the district in which the tenderer is assessed to Income Tax, Tenderer's PAN and complete postal address with Pin Code and telephone Numbers. Attested copy of Income Tax Return for the immediate previous financial year.
(11) Professional Tax Registration Certificate in form PTR.
(12) Copy of Audited Balance Sheet and Profit & Loss Account for the immediate three previous years along with tax audit report.
(13) GST Certificate.

AND

2nd Inner Envelope (Envelope-B): Technical Qualification Documents:

(1) TECH-1 : Technical Proposal Submission Form
(2) TECH-2 : Bidders' Organization and Experience
(3) TECH-3 : Team Composition, Assignment and Key Personnel' Inputs
(4) TECH-4 : List of machinery available
(5) TECH-5 : Statement of Legal Capacity

AND

3rd Inner Envelope (Envelope-C): Financial

Proposal - Form F

5.11.3. Bid Submission

Hard Copy Submission- Envelope A and B — Technical Bid

Hard copies of the same shall be submitted only 1 hour prior to Time of Bid Opening, i.e. addressed to:

CEO, Solapur City Development Corporation Limited,
New Planning Office, Near Doodh Dairy, Saat Rasta, Solapur-413001
Soft Copy Submission — Envelope A, B and C - Technical and Financial bid All Bids shall be submitted online to www.mahatenders.gov.in

5.11.4. Bid offer

a) The Offer quoted by the bidder shall include all the costs towards executing and completing the works including carrying out remedy for any defects therein, maintenance and repairs of the work during and till the end of Defect Liability period. The offer shall provide for all superintendence, labor, material, plant, equipment and all other items required for work including all Taxes, Duties, Royalties, GST, WCT, outgoings and such charges except for the exemption if any provided in the Bid documents. No taxes whatsoever in any increase shall be reimbursed.

b) The offer quoted by bidder shall be valid for the original contract period as well as during extensions if any duly granted and shall not be subject to any further adjustment by way of claim.

c) The bid price shall be inclusive of Royalty under Mining mineral Act 1968 payable directly to Revenue Department as per rates in force. The Royalty to be paid shall not be reimbursed by SCDCL.

d) The agreement is to be registered with the competent authority, the expenses towards registration; stamp duty etc. will have to be borne by the contractor / bidder.

5.11.5. Currencies of bid and payment

All the prices and rates mentioned in the bid document are entirely in Indian Rupees only. All the payments shall be made in Indian Rupees only. (INR)

5.11.6. Bid validity

5.11.6.1. Validity of the bid will be 90 days and shall be reckoned from the last date of submission of bids and thereafter until it is withdrawn by notice in writing duly addressed to the authority opening the bid. Such withdrawal by bidder after 90 days shall be effective from the date of receipt of notice by the employer.

5.11.6.2. During this period, the Bidder shall maintain its original Proposal without any change, including the availability of the Key Personnel, the proposed rates and the total price.

5.11.6.3. If it is established that any Key Personnel nominated in the Bidder's Proposal was not available at the time of Proposal submission or was included in the Proposal without his/her confirmation, such Proposal shall be disqualified and rejected for further evaluation, and the Bidder's EMD may be forfeited.

5.11.7. Bid security (earnest money deposit)

The bidder shall furnish as a part of his bid, a bid security of Rs. 32,345 (Rupees Thirty Two Thousand Three Hundred and Forty Five Only) as per contract data in Volume II. **(The Exemption Certificate for Bid Security is not allowed.)**

a) The Bid Security to be furnished shall be in the form of RTGS or Demand Draft as per details provided in Detailed Tender Notice.

b) Any bid not accompanied by the Bid Security shall be rejected by the employer as non-responsive.

c) In the event of Bidder's bid being accepted, the Bid Security Amount can be appropriated/ adjusted towards the amount of Performance security payable by successful Bidder under the conditions of contract.

d) If after submitting the bid, the bidder withdraws his offer or modifies the same or if after acceptance of his bid fails or neglects to furnish the performance security, without prejudice to any rights and power of the Employer here under or in law, the Employer shall be entitled to forfeit the full amount of Bid Security deposited by the bidder.

e) If the bidder does not accept the correction of the bid price, pursuant to, the bid security shall be forfeited.

f) In the event of bid being not accepted, the amount of Bid Security deposited by the bidder shall, unless it is forfeited as proposed above, be refunded to Bidder in Sixty (60) Days on passing of receipt thereto, without any interest.

5.12. Format and Signing of Bid:

a) The bid shall be signed, sealed and submitted as per the Guidelines given hereunder in ITB. All pages of Bid documents (in original) shall be signed by a person duly authorized to sign on behalf of the Bidder. All pages of the bid where entries or amendments have been made shall be initialed by the person or persons signing the bid.

b) Proof of authorization, in the form of written power attorney, shall be annexed to the letter of bid. All pages of the appendix to the bid and schedules where entries or amendments have been made shall be initialed by the person(s) signing the letter of bid.

c) The Bid shall contain no alterations or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the bidder in which case such corrections shall be initialed by the person or persons signing the bid.

d) The Bidder shall digitally sign all pages of volume I, II, Ill and V with the firm's seal and shall enclose with the bid document as content of Technical Bid. Also, the bidder shall sign all pages of hard copies of Volume I, II, Ill and V [Technical Bid] as stipulated.

e) The Bidder shall digitally sign all pages of Volume IV with the firm's seal and shall upload with the bid document as content of Financial Bid.

5.13. Online Bid Submission Procedure

Guidelines to Contractors/Bidders on the operations of Electronic Tendering System of SCDCL

E-Tendering Portal - https://mahatenders.gov.in **Steps for participating in e-Tendering of SCDCL**

Purchase Tender Document, drawings and any other supporting document from the website i.e. https://mahatenders.gov.in by making online payment

By using Debit Card, Credit Card, Net Banking.

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Register on the e- portal of Maharashtra i.e. Tendering https://mahatenders.gov.in

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Bidders should have valid class 2 and 3 Digital Signature Certificate (DSC). If bidders do not have they should purchase DSC from any valid Certifying Authority. DSC forms are also available on the e-Tendering website of Maharashtra i.e. https://mahatenders.gov.in

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Bidders should Prepare and Submit their Technical and Financial Bids online on the e-Tendering portal. Hard copy of the Technical Bid is to be submitted at SCDCL Solapur office. The procedure for Bid Preparation is mentioned below.

5.14. Pre-requisites to participate in the Tenders processed by SCDCL

a) Registration of Contractors on Electronic Tendering System of SCDCL:
The Contractors interested in participating in the e-Tendering process of SCDCL shall be required to enroll on the Electronic Tendering System to obtain User ID and Password.

After submission of application for enrolment on the System, the application information shall be verified by the Authorized Representative of the Service Provider. If

the information is found to be complete, the enrolment submitted by the Vendor shall be approved.

The Contractors may obtain the necessary information on the process of enrolment either from Helpdesk Support Team or may visit the information published under the link Enroll under the section E-Tendering Toolkit for Bidders on the Home Page of the Electronic Tendering System.

b) Obtaining a Digital Certificate

The Bid Data that is prepared online is required to be encrypted and the hash value of the Bid Data is required to be signed electronically using a Digital Certificate (Class — II or Class — Ill). This is required to maintain the security of the Bid Data and also to establish the identity of the Contractor transacting on the System.

Bid data / information for a particular Tender may be submitted only using the Digital Certificate which is used to encrypt the data / information and sign the hash value during the Bid Preparation and Hash Submission stage. In case, during the process of preparing and submitting a Bid for a particular Tender, the Contractor loses his / her Digital Signature Certificate (i.e. due to virus attack, hardware problem, operating system problem); he / she may not be able to submit the Bid online. Hence, the Users are advised to store his / her Digital Certificate securely and if possible, keep a backup at safe place under adequate security to be used in case of need.

In case of online tendering, if the Digital Certificate issued to an Authorized User of a Partnership Firm is used for signing and submitting a bid, it will be considered equivalent to a no objection certificate / power of attorney to that User to submit the bid on behalf of the Partnership Firm. The Partnership Firm has to authorize a specific individual via an authorization certificate signed by a partner of the firm (and in case the applicant is a partner, another partner in the same form is required to authorize) to use the digital certificate as per Indian Information Technology Act, 2000.

Unless the Digital Certificate is revoked, it will be assumed to represent adequate authority of the Authority User to bid on behalf of the Firm for the Tenders processed on the Electronic Tender Management System of SCDCL of Maharashtra as per Indian *Information Technology Act, 2000.* The Digital Signature of this Authorized User will be binding on the Firm. It shall be the responsibility of Partners of the Firm to inform the Certifying Authority or Sub Certifying Authority, if the Authorized User changes, and apply for a fresh Digital Signature Certificate. The procedure for application of a Digital Signature Certificate will remain the same for the new Authorized User.

The same procedure holds true for the Authorized Users in a Private / Public Limited Company. In this case, the Authorization Certificate will have to be signed by the Director of the Company or the Reporting Authority of the Applicant.

For information on the process of application for obtaining Digital Certificate, the Contractors may visit the section *Digital Certificate* on the Home Page of the Electronic Tendering System.

c) Recommended Hardware and Internet Connectivity:

To operate on the Electronic Tendering System, the Contractors are recommended to use Computer System with at least 1 GB of RAM and broadband connectivity with minimum 512 kbps bandwidth. However, Computer Systems with latest i3 / i5 Intel Processors and 3G connection is recommended for better performance.

d) Set up of Computer System for executing the operations on the Electronic Tendering System:

To operate on the Electronic Tendering System of SCDCL of Maharashtra, the Computer System of the Contractors is required be set up. The Contractors are required to install Utilities available under the section Mandatory Installation Components on the Home Page of the System.

The Utilities are available for download freely from the above mentioned section. The Contractors are requested to refer to the E-Tendering Toolkit for Bidders available online on the Home Page to understand the process of setting up the System, or alternatively, contact the Helpdesk Support Team on information / guidance on the process of setting up the System.

e) Payment for Service Provider Fees:

In addition to the Pre-bid / Pre-qualification / Main Bidding process fees payable to SCDCL, the Contractors will have to pay Service Providers Fees of Rs 1000 at a time of submission of bid through hard copy.

5.15. Steps to be followed by Contractors to participate in the E-Tenders processed by SCDCL

a) Preparation of online Briefcase:

a) All Contractors enrolled on the Electronic Tendering System of Maharashtra are provided with dedicated briefcase facility to store documents / files in digital format. The Contractors can use the online briefcase to store their scanned copies of frequently used documents /files to be submitted as a part of their bid response. The Contractors are advised to store the relevant documents such as Registration Certificate, PAN Card, GST Registration Certificate, Services Tax Registration Certificate, Professional Tax Registration Certificate, EPF Registration Certificate, Certificates of Works completed, ownership of Plant and Equipment in the briefcase, etc. so as to avoid scanning / uploading process for each Tender.

In case, the Contractors have multiple documents under the same type (e.g. multiple Work Completion Certificates) as mentioned above, the Contractors advised to either create a single .pdf file of all the documents of same type or compress the documents in a single compressed file in .zip or .rar formats and upload the same.

It is mandatory to upload the documents using the briefcase facility. Therefore, the Contractors are advised to keep the documents ready in the briefcase to ensure timely bid preparation.

Note: Uploading of documents in the briefcase does not mean that the documents are available to SCDCL at the time of Tender Opening stage unless the documents are specifically attached to the bid during the online Bid Preparation and Hash Submission stage as well as during Decryption and Re-encryption stage.

b) Online viewing of Detailed Notice Inviting Tenders:
The Contractors can view the Detailed Tender Notice along with the Time Schedule (Key Dates) for all the *Live Tenders* released by SCDCL on e-Tendering Portal on https://mahatenders.gov.in under the section *Recent Online Tender.*

c) Download of Tender Documents:
The Tender Documents are available for purchase and downloading by Contractors from the website i.e. https://mahatenders.gov.in

d) Online Bid Preparation and Submission of Bid Hash (Seal) of Bids:
Submission of Bids will be preceded by online bid preparation and submission of the digitally signed Bid Hashes (Seals) within the Tender Time Schedule (Key Dates) published in the Detailed Notice Inviting Tender. The Bid Data is to be prepared in the templates provided by SCDCL. The templates may be form based, extensible tables and / or up-loadable documents. In the form based type of templates and extensible table type of templates, the Contractors are required to enter the data and encrypt the data using the Digital Certificate.

In the up-loadable document type of templates, the Contractors are required to select the relevant document / compressed file (containing multiple documents) already uploaded in the briefcase.

Notes:

i The Contractors upload a single document or a compressed file containing multiple documents against each up loadable option.

ii The Hashes are the thumbprint of electronic data and are based on one — way algorithm. The Hashes establish the unique identity of Bid Data.

iii The bid hash values are digitally signed using valid Class — II or Class — Ill Digital Certificate issued by any Certifying Authority. The Contractors are required to obtain Digital Certificate in advance.

iv After the hash value of bid data is generated, the Contractors cannot make any change / addition in its bid data.

v This stage will be applicable during Technical and Financial Bidding Processes.

e) Close for Bidding (Generation of Super Hash Values):
After the expiry of the cut — off time of Bid Preparation and Hash Submission stage to be completed by the Contractors has lapsed, the Tender will be closed by the Tender Authority.

The Tender Authority from SCDCL shall generate and digitally sign the Super Hash values (Seals).

This stage will be applicable during both Technical and Financial Bidding Processes.

f) Decryption and Re-encryption of Bids (submitting the Bids online):

i. In case of Online Bid Submission (Technical and Financial) - After the time instant for Generation of Super Hash values by the Tender Authority from SCDCL has lapsed, the Contractors have to make the online payment of Rs.-- towards the fees of the Service Provider. After making online payment towards Fees of Service Provider, the Contractors are required to submit the hard copy of the Technical Bid (only) with SCDCL at the below mentioned address:

Solapur City Development Corporation Limited New Planning Office, Near Doodh Dairy, Saat Rasta, Solapur-413001

The Contractors are required to decrypt their bid data using their Digital Certificate and immediately re-encrypt their bid data using the Public Key of the Tendering Authority of the SCDCL. The Public Key of the Tendering Authority is attached to the**Tender during the *Close for bidding* stage.**

The details of the Earnest Money Deposit and Processing Fees shall be verified and matched during the Main Tender Opening event.

Note: At this time, the Contractors are also required to upload the files for which they generated the Hash values during the Bid Preparation and Hash Submission stage.
The Bid Data and Documents of only those Contractors who have submitted their Bid Hashes (Seals) within the stipulated time (as per the Tender Time Schedule), will be available for decryption and re-encryption and to upload the relevant documents from Briefcase. A Contractor who has not submitted his Bid Preparation and Hash Submission stage within the stipulated time will not bellowed to decrypt / re-encrypt the Bid data / submit documents. This stage will be applicable during both, Pre-bid / Pre-qualification and Financial Bidding Processes.

ii. Short listing of Contractors for Financial Bid Opening:

The Tendering Authority will first open the Qualification Bid, Qualification document/Technical Documents etc. on the prescribed date and time as mentioned in bidding data Volume-II and after scrutinizing these documents will shortlist the Contractors who are eligible for Financial Bid opening. The shortlisted Contractors will be intimated by email.

iii. Opening of the Financial Bids:

The qualified Contractors may remain present in the Office of the Tender Opening Authority at the time of opening of Financial Bids as intimated/as per Tender Schedule.

iv. Tender Schedule (Key Dates):

The Contractors are strictly advised to follow the Dates and Times allocated to each stage under the column Vendor Stage as indicated in the Tender Schedule. All the online activities are time tracked and the Electronic Tendering System enforces time-locks that ensure that no activity or transaction can take place outside the Start and End Dates and Time of the stage as defined in the Tender Schedule.

At the sole discretion of the Tender Authority, the Tender schedule of the Tender stages may be extended.

5.16. Deadline of submission of Bid

The bid shall be received by SCDCL at the address mentioned and not later than the Date and Time specified in the Detailed Tender Notice. SCDCL may at their discretion extend the deadline for submission of bid issuing an addendum, in which case, all rights and obligations of the employer and bidders previously subjected to the original dead line shall therefore be subjected to new deadline as extended.

5.17. Late Bids

Bid submitted after the deadline for submission will either not be received or if received inadvertently, will not be opened and shall be handed over unopened to the bidder on receipt of written request of the bidder.

5.18. Modification and Withdrawal of Bid:

If after submission of the bid the bidder withdraws his offer or modifies the same, without prejudice to any other rights and power of the Employer hereunder or in law, the Employer shall be entitled to forfeit the full amount of the Bid Security deposited by bidder.

5.19. Bid Opening and Evaluation

5.19.1. Brief description of the Selection Process

SCDCL has adopted a single stage selection process (collectively the "Selection Process") in evaluating the Proposals comprising qualification, technical and financial bids to be submitted in three separate sealed envelopes. In the first stage, the Bidders shall be evaluated for their compliance with the qualification. Based on the evaluation of prequalification, qualified Bidders shall be short-listed for further evaluation. In the second stage, a technical evaluation

will be carried out. In the third stage, a financial evaluation will be carried out. After the Financial evaluation, the lowest bidder shall be selected for negotiation (the "Selected Bidder") while the second ranked Bidder will be kept in reserve.

a) Technical Bid of each bidder will be opened serially. Documents in the envelope will be verified by the bid opening authority to check their validity as per requirements. If any particular document of any bid is either missing or does not meet the requirements specified then a note to that effect will be made by the bid opening authority. After opening of Technical Bid, the Employer will carry out evaluation of various documents / data submitted in the Technical Bid.
b) After the analysis and scrutiny of the documents with respect to requirements of technical bidding is over, the employer shall declare the outcome of scrutiny and shall intimate the date and time of opening of financial bid to the qualified bidders.
c) The Financial bids will be opened in the presence of bidders / their authorized representatives who choose to remain present at the date, time and place will be intimated later.
d) The procedure for opening of the Bids, as mentioned hereinbefore, in the guidelines to Bidders on the operation of Electronic Tendering System of SCDCL shall be followed.

5.19.2. Process to be Confidential:

The information relating to the examination, clarification, evaluation, comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award of the contract to successful bidder has been announced.

Any effort by a bidder to influence the Employer in the process of examination, clarification, evaluation, comparison of bids and in decision concerning the award of contract may result in rejection of bid.

5.19.3. Clarification of Bid

To assist in examination, evaluation of bid, the employer may ask bidders individually for clarification of their offer including break up of costs, reasons in case of very high / very low offer. Such request shall be in writing and the response shall also be in writing. But no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of the arithmetic errors discovered by the Employer in the evaluation of the bids in accordance with Clause 5.19.5 of ITB.

5.19.4. Bid Liable for Rejection

The bid is likely to be rejected if on opening, it is found that

a) The bidder has not strictly followed the procedure laid down for submission of bid.
b) Additions, corrections or alterations are made by the bidder on any page of the bid document, without affixing signature / initials.

c) Any page or pasted slips are missing.
d) The bidder has not signed each page of the bid.
e) The bidder has specified any additional condition.
f) The bidder has not attached the addendum, Common Set of Deviations and
g) Documents to the main bid volume as stated in ITB.
h) In case the bidder does not satisfy the bid capacity as specified in the Bid Document, the bid shall be treated as non- responsive and rejected.
i) The Bidder shall submit detailed information about all completed (works done) and on-going works (work in hand and work in progress).
j) All information shall be furnished duly signed by the officer not below the rank of Executive Engineer. The Employer reserves the right to inspect the sites of the completed/on-going works to ascertain the correctness of the information submitted by the bidder at the Bidders cost. If false information is found to have been submitted, the bidders bid shall be liable for rejection.
k) Information not submitted (i) in the prescribed format of Sample Forms
l) (ii) Calculation of bid capacity as per formula (Bidding Data Volume II), declaration of turnover & liquid assets on separate sheets duly Certified by Chartered Accountant and (iii) other information related to Qualification criteria as per Bidding Data Volume-II.
m) Information not submitted regarding Litigation and Arbitration cases.

5.19.5. Correction of Errors

Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the employer as follows:

In case of lump-sum bid, if there is any discrepancy between the offer quoted in figures and in words, the lower of the two will be treated as the offer.

i. In case of percentage rate bid, if there is any discrepancy between the percentage quoted in figures and in words, the lower of the two will be treated as the offer.
ii. In case of item rate bid, if there is any discrepancy between the rates in figures and in words, the lower of the two will govern and where there is discrepancy between the unit rate and the item total resulting from multiplying unit rate by the quantity, the unit rate as quoted will govern.
iii. If there is any arithmetical error in totaling of items, the correct total shall be computed by the Employer and the same shall govern.
iv. The amount stated in the bid will be adjusted by the employer in accordance with the above procedure for the correction of errors and it shall be considered as binding upon the bidder.
v. If the bidder does not accept the corrected bid price, the bid will be rejected and the
vi. Bid security shall be forfeited.

5.19.6. Evaluation and Comparison of Bids

a) The Employer will evaluate and compare only the bids determined to be eligible in accordance with Clause 5.4 of ITB.
b) The estimated effect for the price adjustment provisions of the Conditions of Contract (if provided), applied over the period of execution of the Contract shall not be taken into account in bid evaluation.
c) The decision of the Employer regarding post qualification and opening of bids shall be final and binding on all the bidders.

5.20. Award of Contract

5.20.1. Award Criteria

a) The Employer will award the contract to a bidder whose bid has been found to satisfy all the requirements of bid document and who has offered the lowest price.
b) Price Bid (Form F in Volume II) of only such bidders who qualify as per Clause 5.4 of ITB shall be opened. Provided however that bidders who otherwise qualify as aforesaid, shall be liable to be disqualified if they have —
   - Made misleading or false representations in any of the forms, statements and attachments submitted in proof of the qualification requirements;
   - A record of poor performance in respect of the works e.g. not properly completing contracts, inordinate delays in completion, bad quality of work, litigation history or financial failures etc.

5.20.2. Deciding Award of Contract

The process of decision and award of the contract shall be as under:

a) Only bids that qualify pursuant to Clause 5.4 above shall be considered for further evaluation. The Financial Bid of non-qualifying bids shall not be opened. The decision of the Employer regarding the post qualification and opening of bids shall be final and binding on all bidders.

b) The bidder with the lowest correct bid price, determined as per Clause 5.20.1 of ITB will be invited for further negotiations as may be necessary. If the negotiations with the firm are successful, the award will be made to that bidder. If, however, it is seen that a contract with reasonable terms cannot be concluded with the bidder with the lowest corrected bid price, the bidder with the second lowest corrected bid price, will be invited for negotiations. The process will be repeated until an agreed contract is concluded.

c) The Employer reserves the right to reject any or all offers received from the bidders without assigning any reasons.

5.20.3. Employers Right to Reject

The Employer reserves the right to accept or reject any bid, to cancel or suspend the bid process at any stage and reject all the bids at any time prior to award of contract without there by incurring any liability to the affected bidders or any obligation to inform affected bidders of the ground for Employer's action.

5.20.4. Notification of Award

Prior to the expiration of bids validity period or any such extended period, the Employer will notify the successful bidder in writing by a registered letter that his bid has been accepted. This letter (herein after and in conditions of contract called letter of acceptance) shall mention the rate at which the employer will pay to the Contractor as prescribed in the contract. After receiving the letter of Acceptance, the successful bidder shall submit the performance security in accordance with clause 5.21 of ITB. Upon furnishing the performance security by the successful bidder, the bidder shall enter into agreement with the employer in the prescribed format. This agreement shall be made by the bidder as per the guidelines of SCDCL. The order to start work will then be issued. The work order shall be accompanied by a true copy of the agreement bearing the number under which it is registered in the office of the Employer.

After or before signing the Agreement/Award of Contract if the Contractor is found ineligible for any reason or default at any stage of any terms and conditions as provided in the document is committed by the Contractor the Performance Security deposited by the Contractor shall stand forfeited without reference to the contractor and the work would be awarded at his risk and cost to another Contractor as provided in clause 5.21 (Award of Contract). The Agreement shall be signed not later than 15 days from the date of issuance of LOA.

5.20.5. Expected Date of Commencement of Services: Within 2 (Two) days from signing of Agreement.

5.21. Performance Security

The successful bidder whose bid has been accepted will have to pay 5% Performance Security (SD) (As per **Bid Data in Volume-II)** as performance security. It shall carry no interest.

5.21.1. The successful tenderer shall have to pay Rs. 31,500/- (Rupees Thirty Three Thousand Five Hundred Only) initial security deposit online or in the form of DD from a nationalized bank payable to CEO, Solapur City Development Corporation Limited, and complete the contract documents failing which his earnest money will be forfeited to Solapur City Development Corporation Limited. The EMD of successful tenderer shall be converted in to the Security Deposit and balance will be recovered from RA bills at the rate of 5% from each bill. Amount of total Security Deposit to be paid shall be 5% of the cost of accepted tender or estimated cost put to tender whichever is higher.

5.21.2. All compensation or other sums payable by the Contractor under the terms of this contract or any other contract or on any account may be deducted from his performance security or from any sums which may be due to him or may become due to him by SCDCL on any account and in the event of the security being reduced by reason of any such above noted deductions, the Contractor shall within 10 days of receipt of notice of demand from the SCDCL make good the deficit.

5.21.3. There shall be no liability on SCDCL to pay any interest on the performance security deposited by or recovered from the Contractor.

5.21.4. The performance security shall be refunded after issue of completion Certificate by Engineer in accordance with the provisions in the conditions of contract.

5.21.5. Any bidder quoting below 1 to 10% or more than 10% has to submit additional Performance Security with reference to Government resolution no: **BDG 2016-PWD Dept. Dated 12/02/2016 and BDG 2016-PWD Dept. Dated 12/04/2017.**

5.21.6. Deleted

5.22. Substitution of Key Personnel

5.22.1. If any of the Key Personnel become unavailable during the course of the work, the Contractor shall provide a written adequate justification and evidence satisfactory to the Client together with the substitution request. In such case, a replacement Key Expert shall have equal or better qualifications and experience than those of the originally proposed Key Expert. The technical evaluation score, however, will remain to be based on the evaluation of the CV of the original Key Expert.

5.22.2. If the Contractor fails to provide a replacement Key Expert with equal or better qualifications, or if the provided reasons for the replacement or justification are unacceptable to the Client, such Proposal will be rejected by the Client, and the Performance Security of the Contractor may be seized.

5.23. Corrupt or Fraudulent Practices

5.23.1. The Employer requires that the Bidders /Suppliers/Contractors shall observe the highest standard of ethics during the execution of contracts. In pursuance of this policy, SCDCL defines, for the purposes of this provision, the terms set forth below as follows:

a) 'Corrupt practice' means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution; and

b) 'Fraudulent practice' means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Employer,

5.23.2. Will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

5.23.3. Will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded any SCDCL contract, if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing SCDCL contracts. 5.23.4 Bidder shall not be affiliated with firms and entity

a) That has provided consulting services related to the works to the employer (SCDCL), during the preparatory stages of the works or of the projects of which the works form a part

b) That has been hired by employer (SCDCL) as a Design Consultant for the contract.

VOLUME II

Contents

VOLUME II

1. SECTION (I) SCOPE OF WORK

1.1 Scope of work

For measurement of flow in ABD (Area Based Development) area following are the scope of work.

1. Provide and construct B.B. masonry valve chamber with 15 cm thick 1:3:6 proportion PCC bedding, including Excavation. B.B. masonry in CM 1:5 proportion precast S.R.F.C. frame and cover etc. complete as directed by Engineer-in- as per scope of work ,Schedule-B,Specifications and drawings including all associated and incidental Works like saturated sand filling around chambers ,compaction ,reinstatement of disturbed /diameged Pavement as per Schedule –B and Specifications of Road and Pavement works.

2. Ffitting the new valve and temporary ultrasonic Clamp on type flow meter on buried water supply pipe of given size as shown in table below and carrying out flow measurment.

Table 1: Size of chambers

Flow Meter No/Valve Location	Diameter of Pipe in mm	Length in m	Width in m	Depth in m
F-HL	750	2.00	2.00	2.50
F2	525	2.00	2.00	2.50
F10	300	2.00	2.00	2.50
F7	450	2.00	2.00	2.50
F16	525	2.00	2.00	2.50
F20A	450	2.00	2.00	2.50
F20B	400	2.00	2.00	2.50
F13	500	2.00	2.00	2.50
F21	250	2.00	2.00	2.50
F19	525	2.00	2.00	2.50
Valve at Panjab National Bank	250	2.00	2.00	2.50
Valve at Collector Banglow	525	2.00	2.00	2.50
Valve at ZONE ESR Campus	525	2.00	2.00	2.50

3. Providing and fixing a heavy duty RCC cover on the masonry chamber.
4. To provide barricading for safety during construction of masonry chambers.
5. To provide watch and guard facility during the flow measurement task.
6. To co-ordinate between the client for and Project Management Consultant (PMC) during flow measurement task.
7. To provide safety measures to all employees at site.
8. To generate the flow measurement report as and when required by client and PMC.

9. To measure the pressures by using Mechanical pressure gauge by installing (item described in the cost estimate) on the pipeline. The locations of the pressure gauge should be downstream of the flow measuring device installed and as directed by engineer in charge.
   a. Method for pressure record
      i. The pressure readings should be taken during the intermittent supply hours (or as directed by the engineer in charge)
      ii. The pressure reading for every 10 minutes should be noted in the same log book used to register the flow records. Tagging details and locations will be different for pressure gauge log book.

   b. Method of submission of Pressure Gauge Result
      I. The original register of field records may be handed over to client
      II. The original data logger record in the BAT/DAT/CSV etc. should be handed over to the client

      The data of flow and pressure records for every five minutes may be entered into MS excel, separately for every day. The flow and pressure data table should include record time, flow, pressure, velocity and similar data columns.
10. Interconnection of pipe and providing new valve of the pipe at the following locations
    a. To install new valve on 250mm cast iron near Punjab National Bank and put in close position in zone no 13. For detail location refer drawing for zone no 13.
    b. To make joint between 300mm DI pipe laid under UID scheme to the existing 500mm DI pipe. For location please refer drawing for Zone 13.
    c. To install new valve of 600mm size on 525 cast iron pipe from High Level GSR near Collector Banglow.
    d. To install new valve of 600mm size on 525mm cast iron outlet pipe of Zone ESR 1004 in campus of Zone ESR.
    e. To interconnect four no's of 100mm in Zone no 9. For detail refer drawing of Zone no 7.
    f. Interconnection of two existing 400mm CI pipe (Outlet of old Zone ESR and Zone ESR 1004). There will be new outlet from Zone ESR 1004 by core cutting to the Tank. The details of the core cutting and interconnection will be given during execution.

11. To provide and fix the flow meter to measure the flow at following location given in following table. All necessary work required during fixing the flow meter is under contractors scope.
12. To measure the flow on flow meter for each zone as per flow meter measurement chart shown below.
13.

Flow Meter Location

Sr. No	Flow Meter No	Flow Meter Location	Diameter of pipe in mm	Material of pipe
1	F-HL	Collector Banglow Premises	750	Ductile Iron
2	F2	Vijapur Ves Chowk	525	Cast Iron
3	F10	Collector Banglow Gate - on road	300	Cast Iron
4	F7	Arkal Hospital near Delux Valve	450	Cast Iron
5	F16	Zone office 7/2	525	Cast Iron
6	F20A	Siddheshwar High school	450	Cast Iron
7	F20B	Siddheshwar High school	400	Ductile Iron
8	F13	MNP School No 177	500	Ductile Iron
9	F21	Shivaji Nagar (railway Gate 10 inch valve)	250	Cast Iron
10	F19	South- West corner Of Civil Hospital	525	Cast Iron

Flow Meter Chart

Sr. No	Flow Meter No	Flow Meter Location	Diameter of Pipe in mm	Material of Pipe	Zone No	Timing of Reading	Day for reading	Reading Calculation	Remarks
1	F-HL	Collector Banglow	750	Ductile Iron	1, 2, 3, 4, 5,	4.30am to 3.30pm	X		
					10, 11, 12, 24	4.30am to 12.00 Noon	XX		
2	F2	Vijapur Ves Chowk	525	Cast Iron	1	4.30am to 3.30pm	X	(F-HL)-(F2)	
					2	5.00am to 8.00am	X		
					3	8.30am to 10.30	X		Independently
					3 and 4	10.30am to 1.00pm	X		
					5	1.00pm to 3.30pm	X		
3	F10	Collector Banglow Gate - on road	300	Cast Iron	10	4.30am to 7.00am	XX		
					11	7.00am to 9.30am	XX		
					24	9.30am to 12.00am	XX		
					19	12.00 Noon to 2.30pm	XX		
					12	4.30am to 7.00am	XX	(F-HL)-(F10)	
4	F7	In Civil Hospital Premises near Delux Valve	450	Cast Iron	7	4.30am to 7.00am	XXX		
					8	7.00am to 9.30am	XXX		
					9	9.30am to 12.00 Noon	XXX		
5	F16	Zone office 7/2	525	Cast Iron	16A	4.00am to 6.00am	X		
					16A+16B	6.00am to 8.30am	X		
					16A+16C	8.30am to 11.00am	X		

6	F20A	Siddheshwar High school	450	Cast Iron	20	4.30am to 11.00am	X		
	F20B	Siddheshwar High school	400	Ductile Iron	20	4.30 to 11.00am	X		
7	F13	MNP School No 177	500	Ductile Iron	13	7.30am to 9.30am	XXXX		
8	F21	Shivaji Nagar (railway Gate 10 inch valve)	250	Cast Iron	21	4.30am to 7.30am	XX		
9	F19	South – West Corner Of Civil Hospital	525	Cast Iron	19	5.30am to 9.30am	XX		

X: First Day Reading; XX:Second Day Reading; XXX: Third Day Reading; XXXX: Fourth Day Reading. At each location total three readings should be taken.

1.1.1 Scope for valve operation during flow measurement:

Table 4: Water Supply Chart

Day	Date (first cycle)	Date (second cycle)	Day Water Supply
x	21.01.2018	25.01.2018	1st day Water Supply
xx	22.01.2018	26.01.2018	2nd day Water Supply
xxx	23.01.2018	27.01.2018	3rd day Water Supply
xxxx	24.01.2018	28.01.2018	4th day Water Supply

The dates given are indicative only. These dates will be changed as per Solapur Municipal Corporation (SMC) water supply during period of execution.

Zone 1

Valve operation

- Chakri valve shall open from 4.30 am to 3.30 pm on 'x' day.
- Proposed 600mm valve on 525mm CI pipe near Collector Banglow shall open from 4.30am to 3.30 pm on 'x' day.
- Civil hospital valve shall close on 'x' day

Zone 2

Valve operation

- Chakri valve open from 4.30 am to 3.30 pm on 'x' day.
- Proposed 600mm valve on 525mm CI pipe near Collector Banglow shall open from 4.30am to 3.30 pm on 'x' day.
- Civil Hospital valve shall close on 'x' day
- Lik valve shall open from 5.00am to 8.00am on 'x' day
- Kumbhar Ves valve, A1 valve and Vijapur Ves valve shall close during operation of lik valve.

Zone 3

Valve operation

- Chakri valve open from 4.30 am to 3.30 pm on 'x' day.
- Proposed 600mm valve on 525mm CI pipe near Collector Banglow shall open from 4.30am to 3.30 pm on 'x' day.
- Civil hospital valve shall close on 'x' day
- Kumbhar Ves valve shall open from 5.00am to 8.00am on 'x' day.
- Lik valve, Vijapur Ves valve, and A1 valve shall close during operation of Kumbhar Ves valve.

Zone 4

Valve operation

- Chakri valve open from 4.30 am to 3.30 pm on 'x' day.
- Proposed 600mm valve on 525mm CI pipe near Collector Banglow shall open from 4.30am to 3.30 pm on 'x' day.
- Civil hospital valve shall close on 'x' day

- Kumbhar Ves valve shall open from 5.00am to 1.00pm on ‘x’ day.
- A1 valve shall open from 10.30am to 1.00 pm on ‘x’ day
- Lik valve, Vijapur Ves Valve, shall close during operation of Kumbhar Ves valve and A1 valve.

Zone 5

Valve operation

- Chakri valve open from 4.30 am to 3.30 pm on ‘x’ day.
- Proposed 600mm valve on 525mm CI pipe near Collector Banglow shall open from 4.30am to 3.30 pm on ‘x’ day.
- Civil Hospital valve shall close on ‘x’ day
- Vijapur Ves valve shall open from 1.00pm to 3.30pm on ‘x’ day.
- Lik valve, Kumbhar Ves valve, and A1 valve shall close during operation of Vijapur Ves valve.

Zone 7, Zone 8 and Zone 9

Zone 7

Valve operation

- Sambharam valve shall open from 4.30am to 12 noon on xxx day.
- Delux valve shall remain open from 4.30am to 7.00am on xxx day
- Arkal valve and Arsa valve shall remain close during operation of Delux valve.

Zone 8

Valve operation

- Sambharam valve shall open from 4.30am to 12 noon on ‘xxx’ day.
- Delux valve shall remain open from 4.30am to 9.30am on ‘xxx’ day.
- Arsa valve shall open at 7.00am and close at 9.30am
- Arkal valve and branch valves between Delux valve and Arsa valve shall remain close at 7.00am.

Zone 9

Valve operation

- Sambharam valve shall open from 4.30am to 12 noon on ‘xxx’ day.
- Arkal valve shall open at 9.30am and close at 12 noon.
- Delux valve shall close at 9.30am on ‘xxx’ day.

Allied piping work:

Four numbers of 100mm pipe need to be interconnected from Bhartiya chowk to Ranga chowk.

Zone 10

Valve operation

- Chakri valve shall open from 4.30am to 2.30pm on 'xx' day.
- Bhanudas valve shall remain close up to 7.00am on xx day.
- All branch valves in zone no 10 shall open from 4.30am to 7.00am.
- Proposed 600mm valve on 525mm pipe near Collector Banglow shall close on xx day from 4.30am to 2.30pm.

Zone 11

Valve operation

- Chakri valve shall open from 4.30am to 2.30pm on 'xx' day.
- Bhanudas valve shall open at 7.00am on xx day.
- All branch valve in zone no 11 shall open at 7.00 am
- Kadadi Chawl valve shall remain close.
- All branch valves in zone no 10 shall close at 7.00am.
- Proposed 600mm valve on 525mm pipe near Collector Banglow shall close on 'xx' day from 4.30am to 2.30pm.

Zone 24

Valve operation

- Chakri valve shall open from 4.30am to 2.30pm on 'xx' day.
- Bhanudas valve shall open at 7.00am on 'xx' day.
- All branch valve in zone no 11 shall close at 9.30 am
- Kadadi Chawl valve shall open at 9.30am.
- All branch valves in zone no 10 shall close at 7.00am.
- Proposed 600mm valve on 525mm pipe near Collector Banglow shall close on xx day from 4.30am to 2.30pm.

Zone 12

Valve operation

- Chakri valve shall open from 4.30am to 2.30pm on 'xx' day.
- Proposed 600mm valve on 525mm pipe near Collector Banglow shall close on xx day from 4.30am to 2.30pm.
- Civil Hospital valve shall open at 4.30 am to 7.00am on 'xx' day.

Zone 19

Valve operation

- Chambhar valve shall remain close on 'xx' day.
- Proposed 600mm sluice valve remain open on 'xx' day from 5.30 am to 7.30am.

Allied piping work:

- A 600mm valve on 525mm CI pipe at outlet of zone ESR is proposed.

Zone 20

Valve operation

- Siddheshwar high school valve on 450CI and 400 DI shall open from 4.30am to 11.00am.

Zone 16

Valve operation

- Percival valve no 1 shall open from 4.00am to 11.00am on x day.
- Zone 16 is divided in three sub zones viz. 16a, 16b and 16c as per valve operation in zone no 16.
- Masare Galli valve shall open at 6.00am and close at 8.30 am.
- Narute valve shall open at 8.30am and close at 11.00am. Masare Galli valve shall close during operation of Narute valve.

1.1.2 Scope of Work for Pressure Gauge

Mechanical pressure gauge may be installed (item described in the cost estimate) on the pipeline. The locations of the pressure gauge should be downstream of the flow measuring device installed and as directed by engineer in charge.

a. Method for pressure record

i. The pressure readings should be taken during the intermittent supply hours (or as directed by the engineer in charge)
ii. The pressure reading for every 10 minutes should be noted in the same log book used to register the flow records
iii. The pressure readings should be recorded for seven days with daily record as mentioned in the 1 above.

b. Method of submission of Pressure Guage Result

i. The original register of field records may be handed over to client
ii. The original data logger record in the BAT/DAT/CSV etc. should be handed over to the client
iii. The data of flow and pressure records for every 10 minutes may be entered into MS excel, separately for every day. The flow and pressure data table should include record time, flow, pressure, velocity and similar data columns.

1.1.3 Closing the work

2. At the successful completion of the field work, after the consent of engineer in charge, the portable flow meters should be removed.
3. The mechanical pressure gauge may be removed and the tap plugged as appropriate

The chamber may be closed / filled with sand & closed as directed by the engineer in charge

1.1.4 Construction of Chambers for Valves & Flow meters

Providing and B.B. masonry chamber with 15 cm thick 1:3:6 proportion PCC bedding, including Excavation. B.B. masonry in CM 1:5 proportion precast S.R.F.C. frame and cover etc. complete as directed by Engineer-in- as per scope of work ,Schedule-B,Specifications and drawings including all associated and incidental Works like saturated sand filling around chambers ,compaction ,reinstatement of disturbed /damaged Pavement as per Schedule –B and Specifications of Road and Pavement works.

2. MILESTONE SCHEDULES FOR WORK EXECUTION

Sr. No.	Milestone	Duration
		Days from issue of Letter of Award (LOA)
1	Mobilization personnel ,plant and equipment to carry out works	7 days
2	Prepare work plan and getting approval from SCDCL and Traffic Dept.; submission of project timeline	8 days
3	Setting up, barricading & fencing the area where at work site, breaking pavement, making trenches and prepatory works.	12 days
4	Procurement of Piping materials/valve/specials etc	12 days
5	100% Laying of pipes, fixing valves & specials, construction of chambers, backfilling reinstatement of pavement.	30 days
6	100% Completion of flow measurement work as per scope of work	45 days

3. TEAMING (SUPERVISORY STAFF)

Sr. N	Position	Qualification and Experience
1	Lead Engineer (1)	Bachelor's degree in Civil Engineering having minimum 10 years' experience. He should have carried out the work of Flow Measurement works atleast for one Project.
2	Supervisors (4)	They should have experience of minimum five years in execution of civil works.

SECTION (II) SAMPLE FORMS

PRE-QUALIFICATION FORMS

(To be enclosed in Enveolpe- A)

APPENDIX 1— QUALIFICATION DOCUMENTS PROPOSAL SUBMISSION FORM
[On the Letter head of the Applicant]

{Location, Date}

To:

Chief Executive Officer,
Solapur City Development Corporation
Limited New Planning Office, Near Milk
Dairy, Saat Rasta,
Solapur, Maharashtra (INDIA) Pin 413003

Ref: Request for proposal for carrying out Temporary Flow Measurments in the ABD Area of Solapur using Clamp on type Ultrasonic Flow Meters and piping Works.

Dear Sirs,

We, the undersigned, offer to provide the Contracting services for **carrying out Temporary Flow Measurments in the ABD Area of Solapur using Clamp on type Ultrasonic Flow Meters & piping works** under Smart Cities Mission of Solapur, City of Maharashtra in accordance with your Request for Selection dated [Insert Date] and our Proposal for Percentage Rate Basis Tender method of selection. We are hereby submitting our Proposal, which includes this Technical Proposal and a Financial Proposal sealed in a separate sealed envelope.

We hereby declare that:

(a) All the information and statements made in this Proposal are true and we accept that any misinterpretation or misrepresentation contained in this Proposal may lead to our disqualification by the Client.

(b) Our Proposal shall be valid and remain binding upon us for the period of time specified in the ITB, Clause 5.11.6.

(c) We meet the eligibility requirements as stated in ITB 5.4, and we confirm our understanding of our obligation to abide by the Client's policy in regard to corrupt and fraudulent practices as per ITB 5.23.

(d) We, along with any of our suppliers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by any State Government or Government of India or any multilateral funding agency or any Government of the all the eligible countries.

(e) In competing for (and, if the award is made to us, in executing) the Contract, we undertake to observe the laws against fraud and corruption, including bribery, in force in the country of India.

(f) Except as stated in the ITB 5.22, we undertake to negotiate a Contract on the basis of the proposed Key Personnel. We accept that the substitution of Key Personnel for reasons other than those stated in ITB Clause 5.22.2 and ITB Clause 5.23 may lead to the termination of Contract negotiations.

(g) We confirm that our Application is valid for a period of 90 (Ninety) days from XX/XX/XXXX (Application submission online Due Date)

(h) Our Proposal is binding upon us and subject to any modifications resulting from the Contract negotiations.

We undertake, if our Proposal is accepted and the Contract is signed, to initiate the Services related to the assignment no later than the date indicated in Clause 5.21.5 of the ITB.

We understand that the Client is not bound to accept any Proposal that the Client receives.

We remain,

Yours sincerely,

Authorized Signature (In full and initials}: _____

Name and Title of Signatory: _____

Name of Bidder (company's name):
In the capacity of: _____

Address: _____

Contact information (phone and e-mail): _____

APPENDIX 2 — FORMAT FOR POWER OF ATTORNEY FOR SIGNING OF APPLICATION
(On Non — judicial stamp paper of Rs 100/- or such equivalent amount and document duly attested by notary Public)

Know all men by these presents, we (name and address of the registered office) do hereby constitute, appoint and authorise Mr. / Ms (name and residential address) who is presently employed with us and holding the position of as our attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to our application for Appointment of Contractor/s for **carrying out Temporary Flow Measurments in the ABD Area of Solapur using Clamp on type Ultrasonic Flow Meters & piping works** (the "Project"), including signing and submission of all documents and providing information / responses to SCDCL, representing us in all matters before SCDCL, and generally dealing with SCDCL in all matters in connection with our bid for the said Project.

We hereby agree to ratify all acts, deeds and things lawfully done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us.

For

_____

(Signature)

(Name, Title and Address)

Accepted

_____

(Signature)

(Name, Title and Address of the Attorney)*Note:*

The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure. In case the Application is signed by an authorized Director of the Applicant, a certified copy of the appropriate resolution/ document conveying such authority may be enclosed in lieu of the Power of Attorney.

APPENDIX 3 — FINANCIAL QUALIFICATIONS OF THE BIDDER

S. No.	Financial Year	Annual Turnover (Rs. Lakh)
1	Financial Year 2013-14	
2	Financial Year 2014-15	
3	Financial Year 2015-16	

Name of the auditor issuing the certificate

Name of the auditor's Firm:

Seal of Auditor's Firm:

Date:

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

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

APPENDIX 4
DETAILS OF WORKS IN HAND PROPOSED TO BE COMPLETED / ONGOING IN CURRENT FINANCIAL YEAR (2017-18) BY THE BIDDER

Name of Bidder:

Sr. No.	Name and address of organisation from work is carried out	Name of Work	Place of Work	Tendered Cost (Rs. in Lakh)	Time period for tender in months	Date of work order	Cost of work done during the years $ (Rs. in Lakh)	Cost of Work yet to be done (Rs. In Lakh)

$ - 31' March of the immediate last financial year

Signature of Chartered Accountant of Bidder

Signature of Bidder

APPENDIX 5
FORMAT FOR AFFIDAVIT CERTIFYING THAT BIDDER (CONTRACTING FIRM)/ DIRECTOR(S) OF CONTRACTING FIRM ARE NOT BLACKLISTED

(On a Stamp Paper of relevant value)

Affidavit

I / M/s. ..... , (the names and addresses of the registered office) hereby certify and confirm that we or any ofour promoter/s / director/s are not barred or blacklisted by any state government or central government / department / agency/PSU in India or abroad from participating in Project/s, either individually or as member of a Consortium as on

We further confirm that we are aware our Application for the captioned Project would be liable for rejection in case any material misrepresentation is made or discovered with regard to the requirements of this RfS at any stage of selection and/or thereafter during the Contract period.

Dated this.....Day of..... , 201....

Name of the Applicant

Signature of the Authorised Person

Name of the Authorised Person

APPENDIX 6
DECLARATION OF THE BIDDER

If We hereby declare that I / We have made myself / ourselves thoroughly conversant by visiting the site, with the site and the subsoil conditions, topography, geo technical investigation details, hydrological and climatic conditions, extent and nature of work, laws, procedures and labor practices, availability of labor, material, machineries, fuel, water, electricity, the local conditions regarding all materials (such as stone, murum, sand etc.) and labour etc. of which I /We have based on my / our rates for this work. The specification, conditions bore results and lead of materials on this work have been carefully studied and understood by me / us before submitting this tender. I / We undertake to use only the best materials approved by Engineer or his representative or his duly authorized representative during execution of the work and to abide by the decision.

I/We here by further declare that my / our tender is unconditional in every matter of whatsoever in nature.

I / We hereby undertake to pay the laborers engaged on the work as per Minimum Wages Act 1948 applicable to the zone concerned.

I/We have quoted my/our offer on Percentage rate basis in words as well as in figures.

SIGNATURE OF BIDDER

TECHNICAL QUALIFICATION FORMS

(To be enclosed in Envelope –B)

TECH-1
TECHNICAL PROPOSAL SUBMISSION FORM

{Location, Date}

To:

Chief Executive Officer,
Solapur City Development Corporation Limited
New Planning Office, Near Milk Dairy, Saat Rasta,
Solapur
Maharashtra (INDIA)
Pin 413001

Dear Sirs:

We, the undersigned, offer to provide the Contracting services for **carrying out Temporary Flow Measurments in the ABD Area of Solapur using Clamp on type Ultrasonic Flow Meters and piping works** (under Smart Cities Mission, of Solapur Smart City Proposal of Maharashtra in accordance with your Request for Services dated [Insert Date] and our Proposal for Percentage Rate Basis Tender method of selection. We are hereby submitting our Proposal, which includes this Technical Proposal and a Financial Proposal sealed in a separate sealed envelope.

We hereby declare that:

i. All the information and statements made in this Proposal are true and we accept that any misinterpretation or misrepresentation contained in this Proposal may lead to our disqualification by the Client.
ii. Our Proposal shall be valid and remain binding upon us for the period of time specified in the ITB, Clause 5.11.6.
iii. We meet the eligibility requirements as stated in ITB 5.4, and we confirm our understanding of our obligation to abide by the Client's policy in regard to corrupt and fraudulent practices as per ITB 5.23.
iv. We, along with any of our sub-consultants, suppliers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by any State Government or Government of India or any multilateral funding agency or any Government of the all the eligible countries.
v. In competing for (and, if the award is made to us, in executing) the Contract, we undertake to observe the laws against fraud and corruption, including bribery, in force in the country of India.
vi. Except as stated in ITB, Clause 5.22.2, we undertake to negotiate a Contract on the basis of the proposed Key Personnel. We accept that the substitution of Key Personnel for reasons other than.

vii. Those stated in ITB Clause 5.22.2 and ITB Clause 5.23 may lead to the termination of Contract negotiations.

viii. Our Proposal is binding upon us and subject to any modifications resulting from the Contract negotiations.

We undertake, if our Proposal is accepted and the Contract is signed, to initiate the Services related to the assignment no later than the date indicated in Clause 5.21.5 of the ITB.

We understand that the Client is not bound to accept any Proposal that the Client receives.

We remain,

Yours sincerely,

Authorized Signature {In full and initials}: _____

Name and Title of Signatory: _____

Name of

Consultant:

Address:

Contact information (phone and e-mail): _____

TECH-2
BIDDER'S ORGANIZATION AND EXPERIENCE

Form TECH-2: a brief description of the Bidder's organization and an outline of the recent experience of the Bidder that is most relevant to the assignment. For each assignment, the outline should indicate the names of the Bidder's Key Personnel and Sub-consultants who participated, the duration of the assignment, the contract amount, and the Contractor's role/involvement. Explanatory pictures of completed projects must also be attached.

A - Bidder's Organization

1. Provide here a brief description of the background and organization of your company,

2. Include organizational chart, a list of Board of Directors, and beneficial ownership

B - Bidder's Experience

1. List only previous similar assignments successfully completed' in the last 3(three) years.

2. List only those assignments for which the Bidder / Contractor was legally contracted by the Client as a company or was one of the joint venture partners. Assignments completed by the Bidder/ Contractor's individual personnel working privately or through other firms cannot be claimed as the relevant experience of the Bidder / Contractor, or that of the Bidder / Contractor's partners or sub-consultants, but can be claimed by the Personnel themselves in their CVs. The Bidder / Contractor should be prepared to substantiate the claimed experience by presenting copies of relevant documents and references if so requested by the Client

Duration	Assignment name/& brief description of main deliverables/ outputs	Name of Client & Country of Assignment	Approx. Contract value (in INR. equivalent)	Role on the Assignment	Certificate from the client provided
{e.g., 2014—2015}				{e.g., Lead partner in a Consortium }	Yes/No a. Copy of agreement/; b. Copy of completion certificate; (Issued by Competent Authority)
{2015-2016}			{e.g.,INR)	{e.g., Sole Contractor}	Yes/No a. Copy of agreement b. Copy of completion certificate; (Issued by Competent Authority)
{2016-2017}					Yes/No a. Copy of agreement b. Copy of completion certificate; (Issued by Competent Authority)

For similar assignments successfully completed, copy of Contract agreement or Completion Certificate from the competent authority needs to be attached.

Note: Completion certificate from respective Authority covering Scope, Cost and project duration shall be enclosed for all Assignments being submitted for evaluation. Explanatory pictures of completed projects must also be attached.

TECH-3

TEAM COMPOSITION, ASSIGNMENT, AND KEY PERSONNEL INPUTS

SR. NO.	DESIGNATION ON THIS ASSIGNMENT	NAME OF TEAM MEMBER	QUALIFICATION	ROLE AND RESPONSIBILITIES

FORM TECH-3

(CONTINUED)

CURRICULUM VITAE (CV)

Position, Title and No.	{e.g., K-1, Lead Engineer}
Name of Team Member	{Insert full name}
Date of Birth	{day/month/year}
Country of Citizenship / Residence	

Education: {List college/university or other specialized education, giving names of educational institutions, dates attended, degree(s)/diploma(s) obtained}

Employment record relevant to the assignment: {Starting with present position, list in reverse order. Please provide dates, name of employing organization, titles of positions held, types of activities performed and location of the assignment, and contact information of previous clients and employing organization(s) who can be contacted for references. Past employment that is not relevant to the assignment does not need to be included.}

Period	**Employing organization and your title / position. Contact info for references**	**Country**	**Summary of activities performed relevant to the Assignment**
{e.g., May 2005-present}	{e.g., Ministry of ……. , For references : Tel …… / email : …… ; Mr. xxxxxxx , deputy minister}		

Membership in Professional Associations and Publications: Language Skills (indicate only languages in which you can work):

Adequacy for the Assignment:

Detailed tasks assigned on Bidder's Team of Personnel :	Reference to Prior Work / Assignments that best illustrates capability to handle the assigned tasks
{List all deliverables / tasks as in TECH 2 in which the Team member will be involved}	

Team Member's contact information: (e-mail..... phone.....

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and I am available to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my disqualification or dismissal by the Client, and/or sanctions by the Bank.

{Day/month/year}

Name of Team Member Signature
Date

{Day/month/year}

Name of authorised Representative of Bidder Signature
Date

(the same who signs the Proposal)

TECH-4

LIST OF EQUIPMENT AVAILABLE WITH THE BIDDER WHICH WILL BE USED ON THIS WORK

(**Bidder to provide the information about flow meters & other equipment)**

Sr. No.	Flow meter type/Other equipment	Nos. of Unit	Kind and Make	Age of Machinery	Present condition of Machinery	Last calibration done/ Calibration valid till date (provide certificate of Calibration)	Present location with name and address of organization where machinery is in use.	Whether the machinery is Owned or rented
1	2	3	4	5	6	7	8	9

NOTE:

In case of non-availability of EQUIPMENT with the bidder, the bidder shall furnish details of any rented EQUIPMENT with proper agreement with renting agency / owner.

Signature of the Bidder

TECH-5

STATEMENT OF LEGAL CAPACITY

(To be forwarded on the letterhead of the Bidder)

Reference Date:

To

.....

.....

.....

Sub: Appointment of Contractor/s for **carrying out Temporary Flow Measurments in the ABD Area of Solapur using Clamp on type Ultrasonic Flow Meters and piping works**.

Dear Sir,

I/We hereby confirm that we, [Insert Bidder's name] satisfy the terms and conditions laid down in the RFP Document.

I/We have agreed that (Insert individual's name) will act as our Authorized Representative of [Insert Bidder's name] on our behalf and has been duly authorized to submit our Proposal. Further, the authorized signatory is vested with requisite powers to furnish such proposal and all other documents, information or communication and authenticate the same.

Yours faithfully,

(Signature, name, designation of the authorized signatory)

For and on behalf of .....

FINANCIAL PROPOSAL FORM

(To be emclosed in Envelope-C)

FORM F

FINANCIAL PROPOSAL (to be submitted online only)

TENDER FOR WORKS	
	I / We hereby tender for the execution, for the Solapur City
	Development Corporation Limited (hereinbefore and hereinafter referred to as "SCDCL") of the work specified in the underwritten memorandum within the time specified in such memorandum at_____ percent (%) below / above the estimated cost entered in "Schedule B" (Memorandum showing items of work to be carried out) and in accordance in all respects with the specifications, designs, drawings as specified .

DATA (APPENDIX TO BID)

[Note: w'th the exception of the items for which the Employer's requirements have been inserted, the following information must be completed before the Tender is submitted].

Sr.No	Item	Data
1	Employer's name and Address	The Chief Executive Officer, Solapur City Development Corporation Limited, New Planning Office, Near Milk Dairy, Saat Rasta, Solapur, 413003. (INDIA)
2	Contractors Name And Address	
3	Design Consultant Name and Address	Wadia Techno Engineering Services Limited (WTESL) , Raheja Point 1,J awaharlal Nehru Road,Vakola, Santacruz –East , Mumbai 400 055 or any other Engineer as employed by SCDCL.
4	Time For Completion For Work	45 DAYS
5	Defects Notification Period	NA
6	Electronic transmission Systems	e-mail, soft copies in CD / DVD
7	Governing Law	Laws of India and local law applicable to site of work
8	Ruling language	English
9	Language for Communications	English/ Marathi / Hindi
10	Time for access to the Site	As per the Local conditions to be verified by the contractor
11	Estimated Cost	Rs. 32,34,550/- (Rupees Thirty Two Lakh Thirty Four Thousand Five Hundred and Fifty Only)
12	Bid Security(EMD)	Rs. 32,345 /-(Rupees Thirty Two Thousand Three Hundred and Forty Five Only)
13	Performance Security (Security Deposit)	Total 5% of the Contract amount
14	Period for submission of the work program	7 Days after the receipt of work order
15	Delay Damages for the Works	As per clause 8.0 Special Conditions of contract
16	Maximum amount of delay damages.	As per clause 8.0 of Special conditions Conditions of contract
17	Payment Certificate	Minimum amount of Interim bill 30% of contract value
18	Currency/currencies of payment	Indian Rupees (INR) payable in India
19	Periods for submission of insurance	Within 5 days of the Commencement of works

VOLUME III

Contents

VOLUME III

GENERAL CONDITIONS OF CONTRACT

GENERAL CONDITIONS

1. Definitions and Interpretation

1.1. Definitions

In the Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them, except where the context otherwise requires:

a. **"Employer"** means the Solapur City Development Corporation Limited (SCDCL) a Company incorporated under the Companies Act, 1956 (The Corporation).

b. **"Contractor"** means the person whose tender has been accepted by the Employer and the legal successors in title to such person, but not any assignee of such person appointed without consent of Employer.

c. **"Subcontractor"** means the person named in the Contract as a Subcontractor for a part of the Works or any person to whom a part of the Works has been subcontracted with the consent of the Engineer and the legal successors in title to such person, but not any assignee of any such person appointed without consent of Employer.

d. **"Engineer Incharge"** means the person nominated by the Employer to act as Engineer for the purposes of the Contract

e. **"Engineer Incharge's Representative"** means a person appointed from time to time by the Engineer under Sub-Clause 2.2

f. The **'CEO'** means the Chef Executive Officer of the SCDCL, for the time being holding that office and also his successors and shall include any officer authorized by him.

g. **"Contract'** means these Conditions, the Specifications, the Drawings, the Bill of Quantities, the Tender, the Letter of Acceptance, the Work order, the Contract Agreement (if completed) and such further documents as may be expressly incorporated in the Letter of Acceptance or Contract Agreement (if completed).

h. **"Specification"** means the specification of the Works included in the Contract and any modification thereof or addition thereto or submitted by the Contractor and approved by the Engineer.

i. **"Drawings"** means all drawings, calculations and technical information of a like nature provided by the Engineer to the Contractor under the Contract and all drawings, calculations, samples, patterns, models, operation and maintenance manuals and other technical information of a like nature submitted by the Contractor and approved by the Engineer.

j. "Bill of Quantities" means the priced and completed Bill of quantities forming part of the Tender.

k. k. "Tender" means the Contractor's priced offer to the Employer for the execution and completion of the Works and the remedying of any defects therein in accordance with the provisions of the Contract, as accepted by the Letter of Acceptance.

l. I. "Letter of Acceptance" means the formal acceptance by the Employer of the Tender.

m. "Contract Agreement" means the contract agreement (if any)

n. "Work Order" means the written communication of the Engineer ordering starting of the Work and specifying Commencement date and date of completion.

o. "Commencement Date" means the date upon which the Contractor receives the notice to commence.

p. "Time for Completion" means the time for completing the execution of and passing the Test on Completion of the Works or any Section or part thereof as stated in the Contract calculated from the Commencement Date.

q. "Tests on Completion" means the tests specified in the contract or otherwise agreed by the Engineer and the Contractor which are to be made by the Contractor before the Works or any section or part thereof are taken over by the Employer.

r. "Taking over Certificate" means a completion certificate issued Engineer/Employer

s. "Contract Price" means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works and the remedying of any defects therein in accordance with the provisions of the Contract.

t. "Performance Security" means the aggregate of all monies retained by the Employer

u. "Interim Payment Certificate" means the certificate of payment issued by the Engineer other than the Final Payment Certificate.

v. "Final Payment Certificate" means the certificate of payment issued by the Engineer

w. "Works" means the Permanent Works and the Temporary Works or either of them as appropriate.

x. "Permanent Works" means the permanent Works to be executed (including Plant) in accordance with the Contract.

y. "Temporary Works" means all temporary Works of every kind (other than Contractor's Equipment) required in or about the execution and completion of the Works and the remedying of any defects therein.

z. "Plant" means machinery, apparatus and the like intended to form or forming part of the Permanent Works.

aa. "Contractor's Equipment" means all appliances and things of whatsoever nature required for the execution and completion of the Works and the remedying of any defects therein, but does not include Plant, materials or other things intended to form or forming part of the Permanent Works .

bb. "Section" means a part of the Works specifically identified in the Contract as a Section.

cc. "Site" means the places provided by the Employer where the Works are to be executed and any other places as may be specifically designated in the Contract as forming part of the Site.

dd. "Cost" means all expenditure properly incurred or to be incurred, whether on or off the Site, including overhead and other charges properly allocable thereto but does not include any allowance for profit.

ee. "Day" means calendar day.

ff. "Foreign currency" means a currency of a country other than that in which the Works are to be located.

gg. "Writing" means any hand-written, type-written, or printed communication, including telex, cable and facsimile transmission.

1.2. Headings and Marginal Notes

The headings and marginal notes in these Conditions shall not be deemed part thereof or be taken into consideration in the interpretation or construction thereof or of the Contract.

1.3. Interpretation

Words importing persons or parties shall include firms and corporations and any organization having legal capacity.

1.4. Singular and Plural

Words importing the singular only also include the plural and vice versa where the context requires.

1.5. Notices, Consents, Approvals, Certificates & Determinations

1. Wherever in the Contract provision is made for the giving or issue of any notice, consent, approval, certificate or determination by any person, unless otherwise specified such notice, consent, approval, certificate or determination shall be in writing and the words "notify", "certify" or "determine" shall be construed accordingly. Any such consent, approval, certificate or determination shall not unreasonably be withheld or delayed.

2. The contractor shall erect temporary sheds for storage for material if supplied by Corporation/Council and brought by him on site. Also at each construction site contractor shall have separate storage space for cement and other material.

3. All the water retaining structures shall be designed in M25 and constructed in M30.

4. Contractor shall execute the works as per drawings and specifications

5. The contractor shall maintain the record of works in the prescribed formats and registers as directed by the Executive Engineer/Engineer in charge/SCDCL. The sample of prescribed proforma is attached herewith. These registers shall be signed by both contractors and representative of Engineer-in-Charge. These registers shall be made available for inspection, verification for the department as and when required. These registers shall be in the custody of department and shall be maintained by the department.

6. Contractor shall take photographs of all sub-works during construction and submit two copies in hard and soft along with final bill.

7. Contractor shall prepare and submit 3 Nos. C.D. (R.W) along with three hard copies during the submission of final bill. Final bill will not be passed unless and until this is submitted. No extra payment will be made for submission of CDs.

8. Contractor shall maintain register for dewatering having details such as BHP of pumps, start and stop of dewatering pumps, Fuel consumed etc.

9. The material i.e. cement, steel, sand, metal, bricks, alum pipes valves etc. brought on the work site shall be accompanied with the necessary company/manufacturing firm's test certificate. In addition these materials shall be tested as per frequency prescribed by the department and the cost of such testing shall be borne by the contractor. If the test results are satisfactory, then and then only the material shall be allowed to be used on the work. If the test results are not as per standards, these materials shall be immediately removed from the work site at contractor's cost. In case of cement, if so requested by the contractor in writing, material will be allowed to be used before receipt of test results but this will be entirely at the risk and cost of the contractor.

10. All the formwork used for construction shall be of steel or with lining of steel. Wooden shutters may be allowed at the discretion of the Executive Engineer/Engineer in charge/Municipal Commissionerfor minor works.

11. Contractor shall have Cube Testing machine on site. Test cubes shall be tested in front of Executive Engineer/Engineer in charge/SCDCL / or his representative and a register for it shall also be maintained.

12. SCOPE AND MEANING OF CONTRACT

The term contract hereinafter used means and includes the notice for invitation of tender, schedule of items to be executed under this contract, general conditions, schedule of obligatory requirements, general and detailed specifications all appendices drawing and any other documents attached to the blank tender form issued to the contractor firm. These are subject to any alterations and modifications carried out and agreed to before the contract is fmally decided and accepted by the Executive Engineer, SCDCL. The term contract and firms means the agency entering into contract with SCDCL.

13. IMPORT LICENSE AND FOREIGN EXCHANGE

In respect of the work on contractors own design, the contractor shall quote for the indigenous equipment only. Foreign exchange and import license required by the contractor if any shall have to be arranged by the contractor independently. Department shall not take any responsibility in this regards. Delay in getting any materials shall not be entertained for extension of time limit of the contract.

14. ACQUITANCE WITH WORKS AND SITE CONDITIONS:

The contractor shall be deemed to have carefully examined the scope of work, location and alignment of various components under this tender, site conditions, the general conditions, the specifications, drawing availability of material required etc. and has fully acquainted himself regarding all aspects of works, if he shall have any doubt as to the meaning of any portion of the tender papers. He shall set forth the particulars of the tender to the notice of Executive Engineer, SCDCL, before submission of tender and get the doubts cleared. Once the tender is submitted duly filled, he shall be supposed to have accepted the conditions and specifications full and interpretation of the conditions be entirely at the discretion of the competent authority of the department.

15. OBSTRUCTIONS IN THE WORK:

All obstructions such as electric cables, telephone line, water and sewer mains, manholes, natural drainage, culverts, storm water drains etc. corning in the way shall be carefully looked after against any damages which otherwise will have to be made good by the contractor at his own cost. Any work of removing, repairing or remaking etc will be carried out by the contractor without any extra claims for the same in contractor with the respective departments.

16. LAND FOR THE USE BY THE CONTRACTOR FOR STORING MATERIALS ETC

As far as possible the contractor shall be allowed to use the Municipal Land without any charge, in possession of concern MC for stacking his materials, stores, erection of temporary structures, sheds etc with prior written permission of Engineer in charge/ Employer. The location of the temporary structures to be erected shall be got approved from the Engineer in charge / Employer and all the products obtained after cutting the same shall be stacked at suitable place as directed by Engineer in charge. Land occupied by the contractor for temporary use shall be handed over back in good conditions to the entire satisfactions of the Employer as and when demanded by him Any damage or alterations made in the area shall be made good by the contractor. If the departmental land is not available the contractor has to make his own arrangements of land on hire or otherwise at his own cost.

17. LABOUR CAMPS:

The contractor shall at his own expenses make all necessary provisions for land, housing grains, water supply and sanitary arrangements etc for employees and shall pay direct to the authorized concerned all rents, taxes and other charges. The contractor shall also comply with all requirements of health department in regard to maintenance of anti-epidemic conditions.

18. WORK THROUGH OTHER AGENCY IN THE SAME AREA:

The Engineer in charge / Employer shall have the right to execute the works, not included in this contract, but within the premises occupied by the contractor for the purpose of this contract, through any other agency.

19. SPECIFICATIONS

The wording of items shall be taken as guidelines for general provisions and coverage under the item. The detailed specifications for relevant items shall be as per detailed specifications enclosed and as per P.W.D. Hand Book, Standard Specifications, Relevant and latest editions of IS.Code. For Road Items MORTH Specifications shall be followed. The other standard, wherever quoted, shall be applicable. If the standard specifications fall short for the items quoted in the Schedule of this contract, reference shall be made to the latest Indian Standard Specifications, IRC codes. If any of the items of the contract do not fall in reference quoted above, the decision and specification as directed by the Executive Engineer/Engineer in charge / Employer shall be final.

It is presumed that the Contractor has gone carefully through the specification and the Schedule of rate of the Division, and has also studied site conditions before arriving at rates quoted by him. The special provisions and detailed specification of wording of any item shall gain precedence over the corresponding contrary provisions (if any) in the standard specification given without reproduction the details in contract. Decision of Engineer/Engineer in charge / Employer shall be final in case of interpretation of specifications.

20. WATER AND ELECTRICITY

The contractor shall make his own arrangements at his own cost for water required for construction and testing as well as for labour camp. The Solapur Municipal Corporation Solapur

does not take any responsibility for supply of water to contractor for construction or testing purposes during the entire work. If water is supplied by Corporation/Council, Contractor shall take connection at his cost and provide water meter on it. Water charges shall be paid by contractor as per prevailing water rates to Corporation/Council regularly every month. Power supply from MSEDCL if required for construction of work as well as for labour camp will have to be arranged by the contractor at his cost. Employer does not take guarantee for continuous power supply at site.

21. LINE OUT

The contractor shall himself carry out the line out of works in the presence of the representative of the Corporation/Council and the contractor shall be responsible for accuracy of it. He shall employ a qualified Engineer for this purpose as well as for supervision of works.

22. PROGRAMME AND PROGRESS SCHEDULE

The contractor shall furnish within 3 days from the date of work order a Work schedule indicating the date of starting, quarterly progress expected to be achieved and anticipated date of completion of each major item of the work. The schedule should be capable of achievement towards completion of whole work in the stipulated time.

i. The Contractor shall submit his own programme as per time limit stipulated in the tender, in the form of Bar Chart which should give details of milestones of physical stages of each sub work. Simultaneously with the execution of the Contract Agreement, the Contractor shall submit to The Engineer his item-wise programme, which shall be nothing but detailing of the programme,

ii. The programme shall also state the milestones of part commissioning and part completion of the sub-work included in the tender. The programme shall also provide the information as to required approvals to drawings, samples, materials, equipments and their time of submissions to the Corporation/Council. The progress shall be submitted by the Contractor visa-a-vis programme every week. The works team of the Contractor shall be so motivated to know the balance work at the end of each week and the rate required in the balance period to complete the work and therefore, shall endeavor to complete the task assigned for each week timely. In case, where the updated and revised schedule is required, the same shall be submitted to the owner for approval.

If deviation exceeds 10% in scheduled programme, competent authority has right to reject the tender of successful tenderer howver no deviations are allowed in milestones 4, 5 & 6.

In the event of contractor failing to execute the work as per scheduled programme submitted by him or in the event of delay in the part of contractor, he shall be liable to pay to Employer as compensation an amount at the fixed rate subject to maximum amounting to 10% of the tender cost as specified in Contract Conditions.

23. CHECKING QUALITY OF THE WORK:

The Engineer in charge should consider it necessary to satisfy himself to the quality of work, the contractor shall at any time during continuance of the contract period produce sample of work done or if necessary pull down a responsible part of the work enough for such inspection and

testing as the Engineer in charge may direct. The contractor shall make good the same at his cost and to the satisfaction of the Engineer in charge without extra cost.

24. CHANGES:

Any marginal and minor changes as may be found necessary by the Engineer in charge during execution shall have to be carried out by the contractor without extra cost.

25. INSURANCE OF WORKERS:

The successful tenderer should get the labour insurance done, on account of risk involved within 7 days from the date of work order, failing which Rs._____/- will be withheld from the R. A. bills of the work and it will not be refunded till labour insurance is done and a documentary evidence to this effect is produced by the contractor. The successful contractor tenderer should purchase insurance policy identifying the Employer therein.

26. ARBITRATION

During the course of work if the dispute arises between the contractor and the Engineer-in- charge then it shall be referred to the sole Arbitration of the CEO, SCDCL. His decision shall be final and binding. Even if the contractor resorts to approach in the court of law then in order that the work shall proceed, the Engineer has full right to hire another contractor to get the work done, and this process shall be applicable for whatever new contractors are employed.

27. INTENT AND INTERPRETATION OF CONTRACT DOCUMENTS

The contractor shall furnish and pay for all labour, supervision, materials, equipment, transportation, construction, equipment and machinery tools, appliances, water, fuel, power, energy, light, heat, utilities, telephone, storage, protections, safety provisions, and all other facilities like service, incidentals, approaches to site etc. any nature whatsoever necessary for the satisfactory and acceptable execution, testing and completion of the work in accordance with the contract documents, ready for use and operation by the owner. The cost of all these arrangements shall be deemed to be included in the contract offer and no separate payment shall be admissible thereof.

27.1. Interpretations

Written clarifications or interpretations necessary for the proper execution or progress of the work, in the form of drawings or otherwise, will be issued with reasonable promptness by the Engineer and in accordance with any schedule agreed upon.

27.2. Drawings

Figured dimensions on drawings shall govern over scaled dimensions and detailed drawings shall govern over general drawings.

27.3. Signed Drawings

Signed drawings alone shall not be deemed to be in order for work unless it is entered in the agreement or schedule or drawings under proper attestation of the Contractor and the Engineer or unless it has been sent to the contractor by the Engineer with a covering letter confirming that the drawing is an authority for work in the contract.

27.4. Technical Words

Work, materials or equipment described in words which so applied have a well-known trade or technical meaning shall be deemed to refer to such recognized meanings.

28. LANDS, CONDITION AND LAYOUT

28.1. Line out of the Work

28.2. Surveys and Measurements

The contractor shall carefully preserve all surveys as also setting out stakes, reference points, bench marks and monuments. If any stakes, points or benches be removed or destroyed by any act of the contractor or his employees, they may be reset at the contractor's expense. The contractor shall supply without charge the requisite number of persons with the means and materials necessary for the purpose of working survey, setting out works, and counting, weighing and assisting in the measurement or examination at any time and from time to time of the work or materials.

28.3. Contractor's Verification

The Contractor will establish at the work site a substantial B.M. and connect it to a permanent B.M. available in the area with known value. The contractor will then carry out necessary surveys and leveling, covering his work, in verification of the survey data on the working drawings furnished by the Engineer and he will be responsible for establishing the correct lines and levels and verification of the lines and level
furnished on the working drawings. If any error has occurred in the work due to nonobservance of this clause, the contractor will be responsible for the error and bear the cost of corrective work.

28.4. Site Office

The Contractor shall provide at his cost a temporary site office with minimum of 20 Sq.m area and shall be provided with minimum two tables, six Nos of chairs.The office and the furniture shall be provided and maintained by the contractor till the completion of works

29. SECURITY DEPOSIT AND INDEMNITY BOND

29.1. Security Deposit

The security deposit shall be returned to the contractor without any interest when the contractor ceases to be under any obligation under the contract. This shall be read with Security Deposit and Defect Liability Clause respectively.

29.2. Loss or Damage Indemnity Bond

The contractor shall be responsible during the progress as well as maintenance for any liability imposed by law for any damage to the work or any part thereof or to any of the materials or other things used in performing the work or for injury to any person or persons or for any property damaged in or outside the work limit The contractor shall indemnify and hold the Employer and the Engineer harmless against any and all liability, claims, loss or injury, including costs, expenses, and attorney's fees incurred in the defense of same, arising from any allegation, whether groundless or not, of damage or injury to any person or property resulting from the

performance of the work or from any material used in the work or from any condition of the work or work site, or from any cause whatsoever during the progress and maintenance of the work.

30. SUPERVISION AND SUPERINTENDENCE

30.1. Supervisory Staff:

The contractor shall have experienced technical qualified general supervisor for the work, who is capable of managing and guiding the work and also capable of understanding the instructions given to him by the Engineer in charge from time to time and shall be responsible to carry them out promptly. The contractor shall have during working hours, supervisor of sufficient training and experience to supervise the various items and operations of the work. Further, the Engineer in charge may notice, desire contractor high ranking member to be present on any specified date, the contractor shall comply with such directions Contractor's Supervision

The contractor shall supervise and direct the works efficiently and with his best skill and attention. He shall be solely responsible for means, methods, techniques, procedures and sequences of construction. The contractor shall co-ordinate all parts of the work and shall be responsible to see that the finished work complies fully with the contract documents, and such instructions and variation orders as the Engineer may issue during the progress of the works.

30.2. Agent

The Contractor shall keep on the work at all times during its progress a competent resident agent preferably a qualified and experienced Engineer, capable of managing and guiding the work and understanding the specifications and contract conditions. For this purpose the contractor shall communicate to the Department, name, qualification and experience of such Engineer to be appointed for execution of this work. The agent appointed by the contractor shall not be replaced without ten (10) days written notice to the Engineer except under extra-ordinary circumstances. The agent shall be the Contractor's representative at the site and shall have authority to act on behalf of the contractor. All communications, instructions and directions given to the agent shall be binding as if given to the Contractor by the Engineer not otherwise required to be in writing will be given or confirmed in writing upon request of the Contractor. or in work-order book

31. CARE AND USE OF SITE

The Contractor shall not commence operations on land allotted for work without prior approval of the Engineer. If these lands are not adequate the Contractor may have to make his own arrangements for additional lands required for his use. The contractor shall not demolish, remove or alter any of the structures, trees or other facilities on the site without prior approval of the Engineer. All the area of Contractor's operations shall be cleared before returning them to the Engineer.

32. OVERLOADING

No part of the work or new and existing structures, scaffolding, shoring, sheeting, construction machinery and equipment, or other permanent and temporary facilities shall be loaded more than its capacity. The Contractor shall bear the cost of correcting damage caused by loading or abnormal stresses or pressures.

33. USE OF EXPLOSIVES

The Contractor shall comply with the laws, ordinances, regulations, codes, orders, other governing the transportation, storage and use of explosives, shall exercise extreme care not to endanger life or property and shall be responsible for all injury or damage resulting from the use of explosives for or on the work.

34. MANUFACTURER'S INSTRUCTIONS

The Contractor shall compare the requirements of the various manufacturer's instructions with requirements of the contract documents, shall promptly notify to the Engineer in writing of any difference between such requirements and shall not proceed with any of the works affected by such difference shall until an interpretation or clarification is issued pursuant to article.

The contractor shall bear all costs for any error in the work resulting from his failure to the various requirements and notify the owner of any such difference.

35. PROTECTION

The contractor shall take all precautions and furnish and maintain protection to prevent damage, injury or loss to other persons who may be affected thereby. All the works and all materials and equipment to be incorporated therein whether in storage or on the site, under the care, custody or control of the contractor or any of his subcontractors and other improvements and property at the site or where work is to be performed including building, tools and plants, pole lines, fences, guard rails, guide posts, culvert and works markers, sign structures, conduits, pipelines and improvements within or adjacent to streets, right-of-way, or easements, except those items required to be removed by the Contractor in the contract documents. The Contractors protection shall include all the safety precautions and other necessary forms of protection, and the notification of the owners of utilities and adjacent property.

The contractor shall protect adjoining site against structural, decorative and other damages that could be caused by the execution of works and make good at his cost any such damages that could be caused by the execution of works and make good at his cost any such damages.

36. UTILITIES AND SUB-STRUCTURES

Before commencing any excavations, the Contractor shall investigate, determine the actual locations, and protect the indicated utilities and structures, shall determine the existence, position and ownership of other utilities and substructures in the site or before the work is performed by communication with such property owners, search of records, or otherwise and shall protect all such utilities and substructures.

36.1. Restoration and Repair

Except for those improvements and facilities required to be permanently removed by the contractor, the contractor shall make satisfactory and acceptable arrangements with the appropriate owners, and shall repair, restore all improvements, structures, private and public roads, property, utilities and facilities disturbed, disconnected, or damaged as a result or consequence of his work or the operations of those for whom he is responsible or liable, including that caused by trespass of any of

them, with or without his knowledge or consent, or by the transporting of workmen, material or equipment to or from the site.

37. WORKMEN

The contractor shall at all times enforce strict discipline and good order among his employees and shall not employ on the works any unfit person or anyone not skilled and experienced in the assigned task. The Contractor shall in respect of labour employed by him comply with or cause to be complied with the provisions of various labour law and rules and regulations as applicable to them in regard to all matters provided therein and shall indemnify the Employer in respect of all claims that may be made against the Employer for non-compliance thereof by the Contractor.

In the event of the contractor committing a default or breach of any provisions of labour laws and rules and regulations, the Contractor shall without prejudice to any other liability under the acts pay the Employer a sum as decided by the Engineer.

37.1. Work during Night or On Sundays and Holidays

Unless otherwise provided, none of the permanent works shall be carried out during night, Sunday or authorized holidays without permission in writing. However, when work is unavoidable or necessary for the safety of life, priority of works, the Contractor shall take necessary action immediately and intimate the Engineer accordingly.

37.2. Workmanship

The quality of workmanship produced by skilled knowledgeable and experienced workmen, machines and artisans shall be excellent. Particular attention shall be given to the strength appearance and finish of exposed work.

38. MATERIALS AND EQUIPMENT

All materials and equipment incorporated in the work shall be new. Materials and equipment not covered by detailed requirements in the contract documents shall be of the best commercial quality suitable for the purpose intended and approved by the owner prior to use in the work.

38.1. Optional Materials

Only one brand, kind or make of material or equipment shall be used for each specific purpose through-out the works, notwithstanding that similar material or equipment of two or more manufacturers or proprietary items may be specified for the same purpose

39. USE OF APPROVED SUBSTITUTIONS OR EQUALS

The contractor shall bear all extra expenses resulting from providing or using approved substitutions or equals where they affect the adjoining or related work, including the expenses of required engineering, redesigning, drafting and permits where necessary, whether the Engineer's approval is given after receipt of tenders.

40. LAWS AND REGULATIONS

40.1. GOVERNING LAW

The contract documents shall be governed by the laws and by-laws of India, the State of Maharashtra and the local bodies in this region.

40.2. RESOLVING THE DISPUTES

During the course of work if the dispute arises between the contractor and the Engineer -in - charge then it shall be referred to the sole Arbitration of the CEO, Solapur City Development Corporation Limited (SCDCL). His decision shall be fmal and binding. Even if the contractor resorts to approach in the court of law then in order that the work shall proceed, the Engineer has full right to hire another contractor to get the work done, and this process shall be applicable for whatever new contractors are employed.

41. BURRIED AND CONCEALED WORK

The contractor shall help in recording the precise location of all piping, conduits, ducts cables and like work that is buried, embedded in concrete or masonry, or concealed in wood or metal frame walls and structures at the time such work is installed and prior to concealment. Should the contractor cover such buried or work before such recording takes place, he shall uncover the unrecorded work to the extent required by the Engineer and shall satisfactorily restore and reconstruct the removed work with no change in the contract price or the contract time.

42. SAFETY PRECAUTIONS AND EMERGENCIES

42.1. Contractor's Responsibility for Safety

The contractor shall be solely responsible notwithstanding any stipulations by owner or Engineer for initiating, maintaining and supervising all safety precautions and programmes, in connection with the work and shall comply with all laws, ordinance, code rules regulations and lawful orders of any public authority having jurisdiction for the safety of persons or property or to protect them from damages, injury or loss during the entire contract period including non-working hours.

On the occurrence of an accident arising out of the works which result in death or which is so serious as to be likely to result in death, the contractor shall within one hour of such accident intimate in writing to the Engineer the facts stating clearly and with sufficient details the circumstances of such accidents and subsequent action taken by him All other accidents on the works involving injuries to the persons or property other than that of the contractor shall be promptly reported to the Engineer clearly and with sufficient details the facts of such accidents and the action taken by the contractor. In all cases, the contractor shall indemnify the Engineer against all losses or damages, resulting directly from the contractor's failure to report in the manner aforesaid.

This includes the penalties or fines, if any payable by the Employer as a consequence of failure to give notice under Workmen's Compensation Act or otherwise to conform to the provisions of the said Act in regard to such accidents. In the event of an accident in respect of which compensation may become payable by the contractor, such sum of money as may, in the opinion of the Engineer, be sufficient to meet such liability will be kept in deposit. On the receipt of award from the Labour Commissioner in regard to the quantum of compensation, the difference in the amount will be adjusted.

It is obligatory that the contractor shall take an all Risk Insurance Policy for the works and keep it in force throughout the work period.

43. WARNINGS AND BARRICADES

The contractor shall provide and maintain barricades, guards, guard rails, temporary bridges and walkways, watchmen, headlights and danger signals illuminated from sunset to sunrise and all other necessary appliances and safeguards to protect the work, life, property, the public, excavations, equipment and materials. Barricades shall be substantial construction and shall be painted such as to increase their visibility at night. For any accident arising out of the neglect of above instructions, the contractor shall be bound to bear the expenses of defense of every suit, action or other legal proceedings, at law, that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay all damages and costs which may be awarded in any such suit, action or proceedings to any such person or which may with the consent of the contractor be paid in compromising any claim by any such person.

44. ENGINEER'S STATUS DURING CONSTRUCTION, AUTHORITY OF THE ENGINEER

The Engineer shall have the authority to enforce compliance with the contract documents. On all questions relating to quantities, the acceptability of materials, equipment, or works, the adequacy of the performance of the work and the interpretation of the drawings and specifications, the decision of the Engineer shall be final and binding and shall be precedent to any payment under the contract agreement unless otherwise provided in the contract documents. The Engineer shall have the authority to stop the work or any part thereof as may be necessary to ensure the proper execution of the work, disapprove or reject the works which is defective, to require the uncovering and inspection or testing of the works to require reexamination of the works, to issue interpretations and clarifications, to order changes or alterations in the works, and other authority as provided elsewhere in the contract documents.

The Engineer shall not be liable for the results of any ruling, interpretation or decision rendered, or request, demand, instruction, or order issued by him in good faith. The contractor shall promptly comply with requests, demands, instructions and order from the Engineer.

The whole of the works shall be under the directions of the Engineer, whose decision shall be fmal, conclusive and binding on all parties to the contract, on all questions relating to the construction and meaning of plans, working drawings, sections and specifications connected with the work. The Engineer shall have the power and authority from time to time and at all times make an issue such further instructions and directions as may appear to him necessary or proper for the guidance of the contractor and the good and sufficient execution of the works according to the terms of specifications and the contractor shall receive, execute, obey and be bound by the same according to the true intent and meaning thereof; fully and effectually. Engineer may order any of the works contemplated thereby to be omitted, with or without the substitution of any other works in lieu thereof, or may order any works or any portion of works executed or partially executed, to be removed, changed or altered and if needful, may order that other works shall be substituted instead thereof and the difference of

expenses occasioned by any such diminution or alteration so ordered and directed shall be deducted from or added to the amount of this contract.

45. DUTIES OF ENGINEER'S REPRESENTATIVE

The duties of the representative of the Engineer are to check, inspect and continuously supervise the work and to test any materials to be used or workmanship employed in connection with the works. He shall furnish the drawings and information to the contractor, approve the contractor's drawings subject to post-facto approval and signature of the Engineer-in-Charge, recommend and approve the interim certificates and taking over certificates after thorough checking and inspection and recommend extra work required and extension of time.

Approval for or acceptance of any work or material or failure to disapprove any work or material by the representative of the Engineer shall not prejudice the power of the Engineer thereafter to disapprove such work of material and to order removal or modification thereof. If the contractor shall be dissatisfied with any decision of the representative of the Engineer, he shall be entitled to refer the matter to the Engineer, who shall thereupon confirm, reserve or vary such decision only in genuine cases.

The representative of the Engineer shall be liable to inform the Engineer about the daily progress and compare it with the programme. He shall also inform the contractor immediately about the log or lead in the progress than the programme.

46. DEFECTS AND RECTIFICATION

Defect liability period for the Piping work from the date of issuance of the completion certificate in accordance with Condition "Final Inspection and Acceptance", contractor shall remain liable for One Year (1 year) for any of the works or parts thereof or equipment and fittings supplied which in the opinion of the Engineer fail to comply with the requirements of the contract or are in any way unsatisfactory or defective except fair wear and tear. The process of the assembly commissioning of all sections of pipe lines, tested hydraulically in patches, will involve some additional measures such as shaft of suitable height, and all such measures shall be done by the contractor.

To the intent that the works and each part thereof shall at or as soon practicable after the expiry of the above period be taken over by the Engineer in the condition required by the contract to the satisfaction of the Engineer, the contractor shall finish the work (if any) outstanding at the date of completion as soon as may be practicable after such date and shall execute all such work of repair, amendment, reconstruction, rectification and making good of defects imperfections, shrinkages or other faults as may during the period of maintenance or after its expiry be required of the contractor in writing by the Engineer as a result of an inspection made by or on behalf of the Engineer prior to the expiry of the period. The contractor at his own expenses shall carry out all such work if the necessity thereof shall in the opinion of the Engineer and due to the use of materials or to neglect or failure on the part of the contractor to comply with any obligation expressed or implied on the contractors pat under the contract. If the contractor fails to do any such work as entitled to carry out such work in which the contractor should have carried out at the contractor's own cost, the Engineer shall be entitled to recover from the contractor the cost thereof or may deduct the same from the moneys that become due to the contractor. Notwithstanding the aforesaid, if the contractor remains in default, one calendar month after the Engineer has given written

instructions in writing, the Security Deposit shall become payable to the Employer who will deduct the cost plus overhead expenses of such works as have been necessary to rectify the contractor's default and the balance, if any, shall be disbursed. of the works. The Contractor will have a liberty to visit the operating works during the defect liability period and satisfy himself about the on-going operations in case he do not visit and a defect is observed then the Engineer's opinion shall be final and binding as to the application of defect liability.

47. RIGHT TO WITHHOLD

The Engineer may refuse to approve to any payment, or because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously approved and paid to such extent as may be necessary in the opinion of the Engineer to protect him from loss because (a). The work is defective, (b) Third party claims have been filed or there is reasonable evidence indicating probable filing of such claims, (c) of the Contractor's failure to make payment properly to sub-contractors or for labour, materials or equipment, (d) of damage to another Contractor, or to the property of other caused by the Contractor, (e) of reasonable doubt that the work cannot be completed for the unpaid balance of the contract price, (f) of reasonable indication that the work will not be completed within the contract time, (g) of the Contractor's neglect or unsatisfactory prosecution of the work including failure to clean up. Once the provisions of law that enables or require the Engineer to withhold such payments are removed, payment will be made for amounts withheld because of them to the extent the contractor is entitled to payment.

48. FINAL INSPECTION AND ACCEPTANCE

Upon written notice from the contractor, that the entire work required by the contract documents is complete and that all submittals required by him are made, and after the Contractor has delivered the bonds, certificates of inspection, guarantees, warranties, releases and other documents, as required by the contract documents or by law, the Engineer will make a fmal inspection, and he will notify the Contractor in writing of any particulars in which this inspection reveals that the work is defective, and will also notify the Contractor in writing of any deficiencies in the submittals and the document required from him.

The Contractor shall promptly make such corrections as are necessary to remedy all defects or deficiencies. After the Contractor has completed any such corrections to the satisfaction of the owner, the Engineer will issue a written completion certificate of the work and file any notice and completion required by law or otherwise.

49. CONTINUING OBLIGATION OF THE CONTRACTOR

The Contractor's obligation to perform and complete the work in accordance with the contract documents is and shall be absolute. Neither the observation during construction and final inspection of the work by the Engineer, nor any payment to the Contractor under the Contract documents, nor any use or occupancy of the work or any part thereof by the Engineer, nor any act of acceptance by the defective work by the Engineer shall constitute acceptance of work not in accordance with the contract documents.

50. TAXES TO BE DEDUCTED AT SOURCE

During the course of contract period the deduction of Income Tax/Work Contract Tax or any other Central/State or local tax required to be deducted at source, will be made as per prevailing rules from the contractors bills and will be remitted to the concerned Departments. Certificate for such deductions will be issued by the Executive Engineer/Municipal Commissioner.

51. RECORDS AND MEASUREMENTS

The Engineer shall except or otherwise stated therein, determine by measurement the value in accordance with the contract of works done in accordance therewith.

All items having a financial value shall be entered in a measurement book, level book etc. as prescribed by the Engineer so that a complete record is obtained of all work performed under the contract.

The Engineer OR his authorized representative shall take measurements jointly with the Contractor or his authorized representative. Before taking measurement of any work the Engineer or the person deputed by him for the purpose shall give reasonable notice to the contractor. If the contractor fails to attend or send an authorized representative for measurement after such notice or fails to countersign or record the objection within a week from the date of measurement, then in any such event measurements will be taken by the Engineer, or by the person deputed by him shall be taken to be correct measurements of the works and shall be binding on the contractor.

There shall be absolutely no doubt regarding the measurements and hence the contractor shall first arrange the exact branding of the alignment length on site, and mark distinctly. All hidden measurements shall be measured by steel tape, on the exact section as marked previously and depth by the regular staff generally at an average interval of 30 m or suitable interval decided by Engineer-in-Charge.

In case of difference of opinion in the measured quantity and the payable quantity of any particular measurements, the contractor must know the departmental practices developed as per the manuals and standard specifications.

The Contractor shall, without any extra charge, provide assistance with every appliance and other things necessary for measurements, such as leveling instruments (Auto setting), tapes, staffs, camera, paints, brushes and required labour.

Measurements shall be signed and dated by both the parties each day (for taking measurement) on the site on completion of measurements. The Contractor shall take up still colour photographs at intervals during the execution of works so that a history of development of the works is maintained.

The dated photographs, in two copies, shall be submitted to the Engineer-in-charge every time. No extra cost will be paid for this. This generation of record shall provide the used methodology of working and highlight the quality of material and workmanship. The cost of the said work shall be borne by the Contractor. It shall be the property of the Employer and shall not be used for campaigning, advertising without permission of the Employer.

52. WRITTEN NOTICE

Written notice shall be deemed to have been duly served or delivered in person to the individual or member of the firm or to an Engineer of the contractor for whom it was intended, or if delivered at or sent by registered or certified mail to the last business address known to him who gives the notice. The notice on the Fax Message/ E-Mail shall be deemed to have been duly served. The address given in the contractor's tender on which all notices, letters and other communications to the contractor shall be mailed or delivered, except that said address may be changed by the Contractor by notifying the owner in writing. This shall not preclude the service of any notice, letter or other communication upon the Contractor personally.

53. USE OF COMPLETED PORTIONS

The Employer owner shall have the right, upon written notice to the Contractor, to take possession or occupancy of, and use any completed or partially completed portions of the work, notwithstanding that the time for completing the entire work or such portions may not have expired but such taking possession or occupancy and use shall not deemed to waive of any requirement of the contract documents or a waiver or acceptance of any work not completed in accordance with the contract documents.

54. CLEANING UP

The contractor shall at all times during the work keep the site and premises, adjoining property and public property free from accumulations of waste materials, rubbish, and other debris resulting from the works, and at the completion of the work shall remove all waste materials, rubbish and debris from and about the site and premises as well as all tools, construction equipment and machinery and surplus materials, and shall leave the site and premises, clean, tidy and ready for occupancy by the owner. The Contractor shall restore to their original condition those portions of the site not designated for alteration by the contract documents paved ways, parking areas and roadways disturbed by the construction shall be redone by filing the excavation, if any, by sand compacted material and bringing it to its original shape as directed and approved by the Engineer. No waste material shall be buried or disposed off on the owner's property unless so approved in writing by the Engineer-in-Charge. Before the Contractor applies for fmal inspection and acceptance of the work, all items of work shall be complete, ready to operate, and in a clean condition as determined by the Engineer.

55. OWNER'S RIGHT TO CLEAN UP

If the Contractor fails to satisfactorily clean up or if a dispute arises between the Contractors or in several Contractors as to their responsibility for cleaning up, the Engineer may clean up and charge the cost thereof to the Contractor for his failure, or to the several contractors as the Engineer shall determine to be just.

56. FOSSILS ETC.

All fossils, coins, articles of value of antiquity and structures or other remains or things of geological or archaeological interest discovered on the site shall be deemed to be the

property of the Employer and the Contractor shall take reasonable precautions to prevent his workmen or any other person from removing or damaging any such article or thing and shall immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out at the expenses of the Engineer's order as to the disposal of the same.

57. LABOUR RULES

If demanded by SCDCL, the contractor will have to produce to the satisfaction of the accepting authority a valid and current license issued in his favor under the provision of Contract Labour (Regulation and Abolition) Act 1970, before starting the work, otherwise the Contractor shall have to face the further consequences. The contractor shall have to comply with the Apprentices Act 1961, and the rules and orders issued there under from time to time. If he fails to do so, his failure will be breach of contract and the Superintending Engineer, may in his discretion, cancel the contract, the Contractor shall also be liable, for any pecuniary liability arising on account of any violation of the provisions of this act, by him

Salient features of some major labour laws/ Acts applicable to establishment engaged will be as below:

a) Workman compensation Act 1923.
b) Payment of Gratuity Act 1972.
c) Employees PF and miscellaneous provisions Act 1952.
d) Maternity Benefit Act 1951.
e) Contract Labour (Regulations and Abolition) Act 1970.
f) Minimum Wages Act 1948.
g) Payment of Wages Act 1936.
h) Equal Remuneration Act 1979.
i) Payment of Bonus Act 1965.
j) Industrial Disputes Act 1947.
k) Industrial Employment (Standing orders) Act 1946.
l) Trade Union Act 1926.
m) Child labour act 1926.
n) Inter state Migrant Workmen's (Regulation of Employment and Conditioned of Services) Act 1979.
o) The Building and other construction works (Regulation of employment and conditions of Services Act 1946 and the cess Act of 1996).
p) Factories Act 1948.

All the relevant law and act will be applicable for this work.

58. STATUTORY INCREASE IN DUTIES, TAXES ETC.

All the taxes and duties levied by the Central Govt., State Govt and by Local Bodies at the prevailing rates applicable on the date of receipt of tender, considering this contractor should quote his offer. Any increase in tax rates till completion of work shall be fully borne by the Contractor and shall not be reimbursed to him on any account.

59. INSPECTION, TESTING & FEES.

All material & equipment, irrespective whether specified or not, shall be tested at manufacturer's works laboratory and the Test Certificate thereof shall be furnished. The test shall be witnessed by the Engineer-in-charge as well as the third party designated by the Pradhikaran/ Council/Corporation.

60. MACHINERY REQUIRED

All machinery required for erection/execution purposes such as cranes, trucks, etc. shall be arranged by the Contractor. Department shall not take any responsibility for providing such machinery even on rental basis. No concreting shall be permitted unless centering and reinforcement is approved by the Engineer-in-Charge.

61. WORK ORDER BOOK

A well bound work order book shall be maintained on site and it shall be the property of SCDCL / his agent shall promptly sign orders given therein by the Engineer in charge of SCDCL officials or his superior officer, in token of having received them and comply them. This will be a permanent record. The compliance shall be reported by the contractor to the Engineer in good time so that it can be checked. The blank work order book with machine numbered pages will be provided by the SCDCL free of charge for this purpose. The Contractor will be allowed to copy out the instruction therein from time to time. He will not record any remarks in the order book but may take up the matter recorded therein.

62. DISCREPANCIES AND OMISSIONS

The tender drawings and specifications shall be considered as explanatory, of each other and together shall form the technical requirements and stipulations of tender documents. Detailed drawings shall have preference over small scale drawings. Similarly, detailed specifications shall have preference over general specifications. Should any discrepancy arise as to the meaning, intent or interpretation of any specification or drawing the decision of the Engineer- in-charge shall be final and binding on the Contractor.

63. PRICE VARIATION - AUTHORITY

Price variation is not applicable to this tender unless other wise as provided in Special Conditions of Contract.

64. NO INTEREST ON DUES

No interest shall be payable by the SCDCL on amounts, due to contractors pending final settlement of claim.

65. Any recovery advised by the Engineer in charge shall be recovered from any bill or money retained from this contract. All the recoveries either outstanding or dues under the contract or incidental there to as determined may be, stand recoverable.

66. No Secured Advance will be granted unless otherwise if provided in Special Conditions of Contract**.**

67. Mobilization Advance will not be granted.

SPECIAL CONDITIONS OF CONTRACT

SPECIAL CONDITIONS

1. Payment against Excess quantities of various items.

Before making payment of excess quantities as per rules, the Engineer/ Engineer in charge /Employer shall get himself satisfied regarding genuineness of the claim Responsibility of informing the excess quantities as per approval of Employer and also for correctness of claim to be submitted in future shall rest with Engineer, a auditor and divisional Accountant also. While submitting the proposal for approval, concerned authorities should consider the exact position of the revised estimates, if necessary due to this excess.

Notwithstanding anything contray contained elsewhere in this agreement the Contract Price shall not vary save and except due to:

i) increase / decrease in depth of chambers

ii) increase or decrease in quantities of pipes/ quantities of valves

.

iii) increase or decrease in number of Chambers

Note: Upward or Downward revision in Contract Price shall be made only on account of i) ,ii) & iii) above with estimate rates in Schedule –B, after applying the percentage above or below as quoted by Contract in Financial Bid.provided however that such increase or decrease is upto 25 % of estimated quantities as per Schedule –B. Increase /decrease beyond 25% shall be paid or contractor shall give the rebate to Employer at fair market rate supported by rate analysis.

While asking the contractor to execute such excess quantity, the Engineer in charge should inform the Contractor in writing specifically that the payment in excess of quantities specified in the tender will be made after following concerned prescribed rules.

2. General

The quoted rate shall be total rate for the completed item of work as per the specification, and shall be inclusive of all incidental charges such as lifts, leads for materials, water for construction etc. The rates for excavation are inclusive of the edge of the excavation pit beyond foundation. Rate shall also include the charges for reinstatement of pavement as specified.

The tenderer must obtain on his own responsibility and his own expenses all the information which may be necessary for the purpose of making a tender and entering into a contract and must consider and satisfy himself with all local conditions, sites and quarries means of accesses, the nature of rock, material to be met with in all execution and all materials pertaining to work.

Specifications of item stipulated for other sub works shall be made applicable, where relevant.

3. Outline of works

The work will be on the lines of plans attached to the tender documents. The plans are however, liable to change as shown there is approximate.

The item of work and their approximate quantities are given in Schedule **-B** of the tender. The quantities are approximate and are liable to vary on plus or minus side.

4. Unit

The Price quoted by Contractor is for carrying out the Works as per Scope of Work and Schedule-B

5. Site conditions

It shall be presumed that the Contractor has satisfied himself as to the nature of the works, general and local conditions, particularly on those bearings on transport handling, storage of materials, availability of labour, weather conditions and has estimated the cost and quoted his rates Employer/Engineer in charge of Corporation/Council will bear no responsibility for lack of such acquaintance with site conditions and consequences thereof.

6. Extras, Omissions and Discrepancies.

In all the cases of the omissions, doubts or discrepancies in the dimension in the drawing and items of works, reference shall be made to the Engineer, whose elucidation and elaboration shall be considered final.

7. Supply of material by the contractor.

7.1. The contractor should supply all the material mentioned in Scope of Work/BOQ. This shall be conforming to relevant IS & approved MJP vendors. All types of pipes, valve and specials will be accepted only on providing manufacturer's certificate and inspection and approval by Engineer.

7.2. Other material such as cement, for steel etc. shall be conforming to relevant IS. Testing charges for cement, steel shall be borne by the contractor. Ultra Tech cement (Ultra tech) shall be preferably be used for water retaining structures.

7.3. In case of item of supply of pipes, valves, specials etc., 40% amount of supplied item will be paid to the contractor on receipt of material (after satisfactory third party inspection/Engineers approval), 60% amount will be released after lowering, laying, jointing and after satisfactory hydraulic testing and completion of balance works in all respect.

7.4. The contractor shall provide, at the site of work, satisfactory storage for not less than one month's average consumption of works and shall keep the cement of storage and 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 dates of receipt and proposed utilization of cement lying in the storage.

7.5. The Employer / Engineer shall at all the times have access to the stores and sites, method of storage, records and securities provided by the contractor. The contractor shall comply with instruction that will be given by Engineer, Engineer in charge of Corporation, in this behalf.

8. TIME FOR COMPLETION OF WORK

If at any stage of work, it is found that the execution of work is not as per the programme given in the Bar Chart, a fine shall be imposed on the contractor at the rate Rs. 10,000/- per day dealy in achieving the mile stone 4,5 & 6 provided in the Contract subjected to maximum of 10% of Contract Price. If the Contractor achieves 6^{th} mile stone (100 % completion of work) within the stipulated time, then the delay charges imposed on Contractor shall be refunded without any interest there on.

9. STRATA :

Strata for excavation are as per BOQ approximate based on trial pits and the Contractor shall have no right to claim extra if there is variations in the strata. The contractor will also have no claim if extra excavation is required to be done due to boulders and the Contractor will have to make such extra excavation good by filling the same by C.C. 1:3:6 (M-100) or by plum concrete with 60% plum in C.C.1:3:6 maximum

10. CHANGE IN SITE:

No claims shall be paid on account of reasonable change in site, alignment or orientation of the proposed work, within the work site marked on plan attached to the tender as the circumstances may call for.

11. TOOLS AND PLANT:

All tools, instruments and machinery and all other materials (not included in the Material Schedule 'A') shall be acquired by the Contractor. It is, however, open to the Engineer to lend or supply to the Contractor implements, machinery or other service not covered by the tender document which he can be and may consider desirable. For such tools, instruments, machinery and service provided, the Contractor will have to sign an agreement and pay Security Deposit and rental charges as may be fixed by the Engineer.

12. EXCAVATED MATERIALS:

All excavated stuff shall be Solapur Smart City Development Corporation s property and shall be disposed off at lead and lift by the Contractor in a manner as directed by the Engineer. All expenses related to disposal of surplus / unserviceable materials shall be borne by the Contractor.

13. DAMAGES TO UNDER/ABOVE GROUND UTILITY

During the course of excavation and laying of the pipe line utmost care of existing main, electrical and telephone cables and private water connections/sewage connections shall be taken. Any damage to existing main electrical and telephone cable and private water/ sewage connection, etc, occurs during the course of execution, same shall be restored at the cost of the contractor. In case the repairs are done by owner, the cost of such repair will be recovered from the contractor.

Rates for all type of materials are inclusive of GST and all taxes levied by Central Government, State Government or local bodies.

Rates for supply of specials and valves are inclusive of excise duty (Central), GST, Third party inspection charges, storage charges, overhead charges and transportation of materials up to site and stacking. Rates mentioned in the tender are inclusive of all Central Govt, State Govt. and Local taxes, duties and cess etc.

14. Though the contractor is required to do refilling before hydraulic testing to avoid traffic hurdle, no payment for refilling of the trenches of pipe line shall be payable till satisfactory hydraulic testing is given. Re-excavation required if any during testing shall be done by contractor at his own cost.

15. The works of cross connections to existing lines are to be arranged in such a way as no major shutdowns are required to be taken and work should be completed within minimum period of time, without interrupting the major water supply in the area.

16. All the bills in R A bill format shall be submitted to the Engineer with a copy to SCDCL by the contractor. The bills will be checked and scrutinized by Employer and will be submitted to the SCDCL for Recording, Passing and Payment.

17. **Th**e bills vetted and submitted by the Engineer will be normally cleared and payment will be released within a period of 15 days from the receipt of such vetted bills by the Engineer or executing agency as the case may be. Such payment will be subject to availability of funds with the Employer.

18. Extension of time limit will be granted by Engineer in charge/ Employer after obtaining approval/consent of competent authority of SCDCL.

19. Engineer and Engineer's Representative

19.1. Engineer's Duties and Authority

a. The Engineer shall carry out the duties specified in the Contract.

b. The Engineer may exercise the authority specified in or necessarily to be implied from the Contract, provided, however, that in respect of the items mentioned in following paragraph (d) of this section, the Engineer shall obtain specific approval of the Employer..

c. Except as expressly stated in the Contract, the Engineer shall have no authority to relieve the Contractor of any of his obligations under the Contract.

d. Notwithstanding anything contrary in this document, the Engineer shall obtain specific approval of the Employer in respect of the following:

i. Approving subletting of the work.
ii. Granting claims to the Contractor.
iii. Ordering suspension of the work.
iv. Determining an extension of time.

v. Reduction of Compensation for Delay as per Sub-Clause 8.0
vi. Ordering variations.
vii. Ordering any work/test beyond the scope of the Contract.
viii. Determining rates for the varied works.
ix. Any variations in the Contract condition.

19.2. Engineer's Representative

The Engineer's Representative may be appointed by and be responsible to the Engineer and shall carry out such duties and exercise such authority as may be delegated to him by the Engineer under Sub-Clause 19.1.

19.3. Engineer's Authority to Delegate

The Engineer may from time to time delegate to the Engineer's Representative any of the duties and authorities vested in the Engineer and he may at any time revoke such delegation. Any such delegation or revocation shall be in writing and shall not take effect until a copy thereof has been delivered to the Employer and the Contractor.

Any communication given by the Engineer's Representative to the Contractor in accordance with such delegation shall have the same effect as though it had been given by the Engineer. Provided that:

a. Any failure of the Engineer's Representative to disapprove any work, materials or Plant shall not prejudice the authority of the Engineer to disapprove such work, materials or Plant and to give instructions for the rectification thereof; and

b. If the Contractor questions any communication of the Engineer's Representative he may refer the matter to the Engineer who shall confirm, reverse or vary the contents of such communication.

19.4. Appointment of Assistants

The Engineer or Engineer's Representative may engage any number of persons to assist the Engineer's Representative in the carrying out of his duties under Sub-Clause 19.1. He shall notify to the Contractor the names, duties and scope of authority of such persons. Such assistants shall have no authority to issue any instructions to the Contractor save in so far as such instructions may be necessary to enable them to carry out their duties and to secure their acceptance of materials, Plant or workmanship as being in accordance with the Contract, and any instructions given by any of them for those purposes shall be deemed to have been given by the Engineer's Representative.

19.5. Instructions in Writing

Instructions given by the Engineer shall be in writing, provided that if for any reason the Engineer considers it necessary to give any such instruction orally, the Contractor shall comply with such instruction. Confirmation in writing of such oral instruction given by the Engineer, whether before or after the carrying out of the instruction, shall be deemed to be an instruction within the meaning of this Sub- Clause. Provided further that if the Contractor, within 7 days, confirms in writing to the Engineer any oral instruction of the Engineer and such confirmation is not contradicted in writing within 7 days by the Engineer, it shall be deemed to be an instruction of the Engineer.

The provision of this Sub-Clause shall equally apply to instructions, given by the Engineer's Representative and any assistants of the Engineer or the Engineer's Representative appointed pursuant to Sub-Clause 19.2.

A site order book shall be maintained on the site and it shall be the property of the Employer and the Contractor shall promptly sign orders given therein by the Engineer or his representative or his assistant and comply with them. The compliance shall be reported by Contractor to the Engineer in good time so that it can be checked.

19.6. Engineer to Act Impartially

Wherever, under the Contract, the Engineer is required to exercise his discretion by:

a. giving his decision, opinion or consent,

b. expressing his satisfaction or approval,

c. determining value, or

d. Otherwise taking action which may affect the right and obligations of the Employer or the Contractor. He shall exercise such discretion impartially with in the terms of the Contract and having regard to all the circumstances. Any such decision, opinion, consent, expression of satisfaction, or approval, determination of value or action may be opened up, reviewed or revised as provided in Contract.

20. Assignment and Subcontracting

20.1.1. Assignment of Contract

The Contractor shall not, without the prior consent of the Employer (which consent, notwithstanding the provisions of Sub-Clause, shall be at the sole discretion of the Employer), assign the Contract or any part thereof, or any benefit or interest therein or thereunder, otherwise than by:

a. A charge in favour of the Contractor's bankers of any monies due or to become due under the Contract,

b. Assignment to the Contractor's insurers (in cases where the insurers have discharged the Contractor's loss or liability) of the Contractor's right to obtain relief against any other party liable.

20.1.2. Subcontracting

The Contractor can if so wish; subcontract the work of Chamber construction and pavement reinstatement, the subcontractor’s credentials to be submitted alongwith the bid. This shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any Subcontractor, his agents, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents, servants or workmen. Provided that the Contractor shall not be required to obtain such consent for:

a. The provision of labour,

b. The purchase of materials which are in accordance with the standards specified in the Contract, or

c. The subcontracting of any part of the Works for which the Subcontractor is named in the Contract.

20.1.3. Assignment of Subcontractor's Obligations

In the event of a Subcontractor having undertaken towards the Contractor in respect of the Work executed, or the goods, materials, Plant or services supplied by such Subcontractor, any continuing obligation extending for a period exceeding that of the Defects Liability Period under the Contract, the Contractor shall at any time, after the expiration of such Period, assign to the Employer, at the Employer's request and cost, the benefit of such obligation for the unexpired duration thereof.

21. Permissions from Statutory Authorities

All permissions required from Statutory Authorities etc. shall be the responsibility of Contractor. Employer shall assist in terms of recommendations and issuing letters only.

VOLUME IV

(Schedule B)

Bills of quantities

Laying new pipe lines, making connection to existing lines providing new valves, specials and carrying out flow measurments.

Sr.No.	Description	Unit	Qty	Basic Rate	Municipal Area Weightage @ 5%	Final Rate with Municipal Area Weightage	Total Cost in INR	Reference
1	**Providing DI Pipes** (Push on Joints pressure pipes of DI of following class and Dia meters onfirming to the Indian Standared Specification inclusive cost of jointing materials (Rubble asket of EPDM Quality)Including all satutory duties and taxes such as GST levied by GOI and GOM in all respect,Third Party Inspection charges of TPI gency approved by MJP including transit insurance,Railway Frieght,Unloading from railway wagon,loading to truck,Transportation to departmental store/site of work,unloading,stacking etc.complete as directed by Engineer in chrge (IS:1536:2001 for pipes and IS:158:1369and 15:12820:1989 or latest edition/revision with amendments for rubber gaskets).(IS:8329:2000 latest version) **D.I. K-7**							
A	**Zone ESR 1004**							
i	Dia.400 mm	Rmt	100	3662		3662	366200	MJP,16-17,Pg.No.84,Sr.No.3-vii
B	**Civil Chowk**							
ii	Dia.250 mm	Rmt	11	1952		1952	21472	MJP,16-17,Pg.No.84,Sr.No.3-iv
iii	Dia.150 mm	Rmt	15	1156		1156	17340	MJP,16-17,Pg.No.84,Sr.No.3-ii
C	**Bhartiya Chowk to Ranga Chowk**							
iv	Dia.100 mm	Rmt	60	798		798	47880	MJP,16-17,Pg.No.84,Sr.No.3-i
2	**Lowering laying and jointing with SBR rubber gasket** C.I. S/S pipes of various classes with CI/MS specials of following diameter in proper position,grade and alignment as directed by Engineer-in-charge including cost of jointing material and rubber rings labour etc,Complete							
	C.I. L.A. Class/**Mortar lined D.I. K-9/K-7**							

Sr.No.	Description	Unit	Qty	Basic Rate	Municipal Area Weightage @ 5%	Final Rate with Municipal Area Weightage	Total Cost in INR	Reference
A	**Zone ESR 1004**							
i	Dia.400 mm	Rmt	100	194	9.7	203.7	20370	MJP,16-17,Pg.No.82,Sr.No.2-ix
B	**Civil Chowk**							
ii	**Dia.250 mm**	Rmt	11	132	6.6	138.6	1525	MJP,16-17,Pg.No.82,Sr.No.2-vi
iii	Dia.150 mm	Rmt	15	77	3.85	80.85	1213	MJP,16-17,Pg.No.82,Sr.No.2-iv
C	**Bhartiya Chowk to Ranga Chowk**							
iv	Dia.100 mm	Rmt	60	57	2.85	59.85	3591	MJP,16-17,Pg.No.82,Sr.No.2-ii
3	**Supply of CI Mechanical joint Double Stocket** with Flanged **Tees** dimenisonlly described in Table -19 of IS - 13382/1992 complete with sealing rubber gasket of S.B.R. dimensionally described in IS-12820/1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C. I. pipes.							
	C.I. L.A. Class/Mortar lined D.I. K-9/K-7							
i	**400x400x400 mm**	No.	1	28083	1404.15	29487.15	29488	MJP,16-17,Pg.No.224,Mech-Jts.-8-33
ii	300x300x300 mm	No.	1	17664	883.2	18547.2	18548	MJP,16-17,Pg.No.224,Mech-Jts.-8-226
iii	250x250x250 mm	No.	1	10654	532.7	11186.7	11187	MJP,16-17,Pg.No.224,Mech-Jts.-8-15
4	**Supply of C.I. mechanical compression collar coupling** suitable for C.I. spun pipes (as per IS-1536/2001) and complete with sealing rubber gasket of SBR, C.I., follower glands and M.S. nut bolts. The whole assembly should be mechanically and hydraulically tested to the provisions as laid down in IS: 1538/1993).							
i	Dia.400mm	No.	1	6597		6597	6597	MJP,16-17,Pg.No.220,Mech-Jts.-2-9
ii	Dia.300mm	No.	2	3439		3439	6878	MJP,16-17,Pg.No.220,Mech-Jts.-2-7

Sr.No.	Description	Unit	Qty	Basic Rate	Municipal Area Weightage @ 5%	Final Rate with Municipal Area Weightage	Total Cost in INR	Reference
iii	Dia.200mm		2	1677		1677	3354	MJP,16-17,Pg.No.220,Mech-Jts.-2-5
iv	Dia.150mm	No.	2	1469		1469	2938	MJP,16-17,Pg.No.220,Mech-Jts.-2-4
v	Dia 100mm	No.	4	817		817	3268	MJP,16-17,Pg.No.220,Mech-Jts.-2-2
5	**Supply of C. I. Mechanical Joint Double Socket 90° (1/4) Bends** as dimensionally described in Table-14 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C. I. pipes.							
	Civil Chowk							
i	Dia.150mm	No.	4	4615		4615	18460	MJP,16-17,Pg.No.220,Mech-Jts.-3-7
	ESR 1004							
ii	Dia.400mm	No.	2	25034		25034	50068	MJP,16-17,Pg.No.220,Mech-Jts.-3-6
6	Manufacturing,Suppling of C.I mechanical compression flanged/socket Tail Pieces (Popularly known as $I^{T.M}$ flange/socket tail piece) suitable for making flanged connection with the plain barrel of C.I. spun pipes (As per I.S. 1536/2001) & D.I. pipes (As per I.S. 8329/2000) The tail piece to be supplied complete with sealing rubber gasket of S.B.R.cast iron follower glands & mild steel nut-bolts.The whole assembly should be mechanically & hydraulically tested to the provision as laid down in I.S. 1538/1993. The rates are inclusive of cost of material,forwarding charges,saletax, loading, transportation & unloading at departmental store. etc complete as directed.							
	Bhartiya Chowk to Ranga Chowk							
i	Dia.100 mm	No.	5	1379		1379	6895	MJP,16-17,Pg.No.219,Mech-Jts.-1-7
	Civil Chowk							
ii	Dia.250 mm	No.	2	4850		4850	9700	MJP,16-17,Pg.No.219,Mech-Jts.-1-6

Sr.No.	Description	Unit	Qty	Basic Rate	Municipal Area Weightage @ 5%	Final Rate with Municipal Area Weightage	Total Cost in INR	Reference
iii	Dia 200 mm	No.	2	3215		3215	6430	MJP,16-17,Pg.No.219,Mech-Jts.-1-5
iv	Dia 150 mm	No.	3	2481		2481	7443	MJP,16-17,Pg.No.219,Mech-Jts.-1-4
	Kasturba Network							
v	Dia 250mm	No.	4	4850		4850	19400	MJP,16-17,Pg.No.219,Mech-Jts.-1-2
B	**Collector Banglow**							
vi	**Dia 600 mm**	No.	4	17677		17677	70708	MJP,16-17,Pg.No.219,Mech-Jts.-1-12
	ESR 1004							
vii	**Dia 400mm**	No.	4	9346		9346	37384	MJP,16-17,Pg.No.219,Mech-Jts.-1-9
7	**Providing and supplying double flange sluice valves** confirming for IS 2906/14846 including warn gear arrangement as per test pressure stainless steel spindle caps including all taxes transportation etc complete. **With by pass arrangement - PN-1.**							
	Civil Chowk							
i	250mm	No.	1	31239		31239	31239	MJP,16-17,Pg.No.199,Pipe Appurtenances.2b-vi
ii	100mm	No.	1	6339		6339	6339	MJP,16-17,Pg.No.200,Pipe Appurtenances.2b-ii
	Kasturba Network							
iii	250mm	No.	1	31239		31239	31239	MJP,16-17,Pg.No.200,Pipe Appurtenances.2b-vi
	Collector Banglow							
iv	600mm	No.	2	217054		217054	434108	MJP,16-17,Pg.No.200,Pipe Appurtenances.2b-xii
	Zone ESR 1004							

Sr.No.	Description	Unit	Qty	Basic Rate	Municipal Area Weightage @ 5%	Final Rate with Municipal Area Weightage	Total Cost in INR	Reference
v	400mm	No.	1	83194		83194	83194	MJP,16-17,Pg.No.200,Pipe Appurtenances.2b-ix
8	**Lowering, laying, jointing in position** following CIDF Reflux, butterfly valves and **sluice valves** including cost of all labors jointing material including nutbolts and giving satisfactory hydraulic testing etc complete (Rates for all class of valves)							
A	**Civil Chowk**							
i	250mm	No.	1	4334	216.7	4550.7	4551	MJP,16-17,Pg.No.202,Pipe Appurtenances,4-viii
ii	100mm	No.	1	2034	101.7	2135.7	2136	MJP,16-17,Pg.No.202,Pipe Appurtenances,4-iv
iii	**Kasturba Network**							
iv	250mm	No.	1	4334	216.7	4550.7	4551	MJP,16-17,Pg.No.202,Pipe Appurtenances,4-viii
B	**Collector Banglow**							
i	600mm	No.	2	8742	437.1	9179.1	18359	MJP,16-17,Pg.No.202,Pipe Appurtenances,4-xiv
	Zone ESR 1004							
ii	400mm	No.	1	6686	334.3	7020.3	7021	MJP,16-17,Pg.No.202,Pipe Appurtenances,4-xi
9	Supply of CI Mechanical joints Double Socket Reducers as described in Table-21 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I.Pipes							
A	**Civil Chowk**							
i	250x250	No.	1	10218		10218	10218	MJP,16-17,Pg.No.225,Mechanical Joints and Fittings,9-11
ii	200x200	No.	1	5821		5821	5821	MJP,16-17,Pg.No.225,Mechanical Joints and Fittings,9-5

Sr.No.	Description	Unit	Qty	Basic Rate	Municipal Area Weightage @ 5%	Final Rate with Municipal Area Weightage	Total Cost in INR	Reference
10	Making cross connection to existing distribution main of any type including excavation, breaking and removing exiting pipes, lowering, laying of specials and pipes in their position, refilling, closing the water supply in that area, dewatering and restarting the water supply, etc. complete as directed by Engineer-in-charge for following diameters of existing pipeline, irrespective of diameter of branch line (the number of joints involved will be paid separately depending upon the nature of joints and required pipes, valves and specials will be supplied free of cost at stores).							
i	Dia 400 mm	No.	2	5407	270.35	5677.35	11355	MJP,16-17,Pg.No.73,Section-H:Misc.-10-ix
ii	Dia.300 mm	No.	2	3777	188.85	3965.85	7932	MJP,16-17,Pg.No.73,Section-H:Misc.-10-vii
iii	Dia 250 mm	No.	2	3113	155.65	3268.65	6538	MJP,16-17,Pg.No.73,Section-H:Misc.-10-vi
iv	Dia 150 mm	No.	2	2539	126.95	2665.95	5332	MJP,16-17,Pg.No.73,Section-H:Misc.-10-iv
v	Dia 100 mm	No.	2	2054	102.7	2156.7	4314	MJP,16-17,Pg.No.73,Section-H:Misc.-10-ii
						A. Sub Total for Piping work	**1462584**	
Civil Work for Pipe laying and Road reinstatement of Road								
11	Dismantling of flexible pavements and disposal of dismantled materials up to a lead of 1000 metres, stacking serviceable and unserviceable materials separately etc. complete.	Cum	158.6	180	9	189	29972	SSR 2017-18, 3.10

Sr.No.	Description	Unit	Qty	Basic Rate	Municipal Area Weightage @ 5%	Final Rate with Municipal Area Weightage	Total Cost in INR	Reference
12	**Excavation** for foundation / **pipe trenches in earth, soils of all types, sand, gravel and soft murum**, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, manual dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. **Lift 0 to 1.5 M**	Cum	101.9	141	7.05	148.05	15093	MJP16-17,Pg.No.47,Excavation-1
13	**Excavation** for foundation / pipe trenches in **hard murum and boulders, W.B.M. road** including removing the excavated material upto a distance of 50 M beyond the area and lifts as below, stacking and spreading as directed by Engineer-in-charge, normal dewatreing, preparing the bed for foundation and excluding backfilling, etc. complete. **Lift 0 to 1.5 M**	Cum	101.9	180	9	189	19268	MJP16-17,Pg.No.47,Excavation-3
14	Excavation for foundation / pipe trenches in soft rock and old cement and lime masonry foundation asphalt road including removing the excavated material upto a distance of 50 M beyond area and lifts as below, stacking as directed by Engineer-in-charge, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. **Lift 0 to 1.5 M**	Cum	101.9	443	22.15	465.15	47419	MJP,16-17,Pg.No.47,Excavation-5
15	Filling in plinth and floors murum bedding in trenches with approved murum from excavated materials from foundation 15cm to 20cm layers including watering and compaction complete.	Cum	42.48	64	3.2	67.2	2855	MJP,16-17,Pg.No.51,Excavation-17
16	Refilling the trenches with available excavated stuff with soft material first over pipeline and then hard material in 15 cm layers with all leads and lifts including consolidation, surcharging, etc. complete.	Cum	543.7	64	3.2	67.2	36536	MJP,16-17,Pg.No.50,Excavation-15
17	Construction of granular sub-base by providing close graded material, spreading in uniform layers with motor grader / Paver on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per clause 401 -- By Mix in Place Method and Grading - I Material	Cum	56.64	1114	55.7	1169.7	66247	SSR 17-18,3.04

Sr.No.	Description	Unit	Qty	Basic Rate	Municipal Area Weightage @ 5%	Final Rate with Municipal Area Weightage	Total Cost in INR	Reference
18	Wet Mix Macadam -- Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density. Laying By Grader/Paver.	Cum	90.62	1421	71.05	1492.05	135205	SSR 17-18,3.23
19	BITUMINOUS CONCRETE:- Providing and laying bituminous concrete using crushed aggregates of grading 1, premixed with bituminous binder @ 5.20 per cent by weight of total mix and filler, transported to site with VTS , laid over a previously prepared surface, finished to the required grade, level, alignment, and rolling to achieve the desired compaction for 50 mm compacted thickness with VG-30 Bitumen,Excluding prime / tack coat. For Bitumen VG-30 bulk -- USING 80 TPH Batch mix type hot mix plant with SCADA, Sensor Paver, Intelligent Compactor with compaction analyzer and V-Sat attachment with Stone Dust filler	Cum	11.33	4814	240.7	5054.7	57255	SSR 17-18 ,3.48
20	Repairing existing drainage home connection/water connection/cable/pipe line repair etc.	LS	1	50000	0	50000	50000	
						Sub total of Civil work for piping	**459850**	
						Total Cost for Piping work and allied civil work	**1922434**	
						GST@12%	**40641.48**	
	Pressure Gauge Works							
21	Installation of the pressure gauges of required range with siphon tube, isolated cocks required for 12mm Dia GI pipe at designated locations and recording the log book, preparation, processing the field data and creating output in soft and hard format, handing over soft and hard field and processed data of the results to the client as directed by engineer in charge.	No.	150	L/S			50000	Lum Sum Cost

Sr.No.	Description	Unit	Qty	Basic Rate	Municipal Area Weightage @ 5%	Final Rate with Municipal Area Weightage	Total Cost in INR	Reference
22	Removing the pressure gauge and plugging the tap hole as directed by the engineer in charge etc. complete.	LS	150	50			7500	
	Subtotal of Pressure Gauge works						**57500**	
	Valve Chamber							
23	Valve Chamber with Precast RCC Covers Providing and constructing B.B. masonry Valve Chamber with 15 cm thick 1:3:6 proportion PCC bedding , including Excavation . B.B. masonry in CM 1:5 proportion precast RCC . frame and 200 mm thick cover in M30 Grade Cement Concrete including reinstatement of Pavement etc. complete as directed by Engineer-in-charge							
	Note: Wall thickness : 0.23 m for depth of1.2 M and 0.35 M for balance depth exceeding 1.2 M							
i	As above of 2.0 X 2.0 M internal size and depth upto 2.5 M with R.C.C Slab of 200mm thick in M30 grade cement concrete.							
ii	Add for every increase in depth of 30 cm or part thereof	30 cm depth		4424	221.2	4645	Payable or recovered for variation in depth during execution	
iii	Dismantling of flexible pavements and disposal of dismantled materials up to a lead of 1000 metres, stacking serviceable and unserviceable materials separately etc. complete.	Cum	94.35	180.00	9	189	17832.15	SSR 2017-18, 3.10
Iv	Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, manual dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. Lift 0 to 1.5 M	Cum	158.37	141.00	7.05	148.05	23446.679	MJP16-17,Pg.No.47,Excavation-1

Sr.No.	Description	Unit	Qty	Basic Rate	Municipal Area Weightage @ 5%	Final Rate with Municipal Area Weightage	Total Cost in INR	Reference
vi	Excavation for foundation / pipe trenches in hard murum and boulders, W.B.M. road including removing the excavated material upto a distance of 50 M beyond the area and lifts as below, stacking and spreading as directed by Engineer-in-charge, normal dewatreing, preparing the bed for foundation and excluding backfilling, etc. complete. Lift 1.5 to 3.0 M	Cum.	116.25	192.00	9.6	201.6	23436	MJP16-17,Pg.No.47,Excavation-3
vi	Excavation for foundation / pipe trenches in soft rock and old cement and lime masonry foundation asphalt road including removing the excavated material upto a distance of 50 M beyond area and lifts as below, stacking as directed by Engineer-in-charge, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. Lift 1.5 to 3.0 M	Cum.	116.25	463.00	23.15	486.15	56514.938	MJP,16-17,Pg.No.47,Excavation-5
vii	Providing dry/ trap/ granite/ quartzite/ gneiss rubble stone soling 15 cm to 20 cm thick including hand packing and compacting etc. complete.	cum	25.15	516.00	25.8	541.8	13626.27	SSR 2017-18, 21.38
viii	Providing and laying Cast in situ/Ready Mix cement concrete in M-10 of trap/ granite/ quartzite/ gneiss metal for foundation and bedding including bailing out water, formwork, laying/pumping, compacting, roughening them if special finish is to be provided, finishing if required and curing complete, with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/concrete Batch mix plant (Pan mixer) etc. complete. With natural sand/V.S.I. quality Artificial Sand	cum	10.93	3181.00	159.05	3340.05	36506.747	SSR 2017-18, 24.01
ix	Providing first class Burnt Brick masonry with conventional/ I.S. type bricks in cement mortar 1:6 in plinth including bailing out water manually, striking joints on unexposed faces, pointing with cement mortar 1:3 on exposed face and watering etc. Complete.	cum	43.81	4314.00	215.7	4529.7	198446.16	SSR 2017-18, 12.57
x	Providing and fixing 200 mm thick precast concrete cover with concrete frame casted in M-30 grade cement concrete	No	26.00	6500.00	325	6825	177450	RA

Sr.No.	Description	Unit	Qty	Basic Rate	Municipal Area Weightage @ 5%	Final Rate with Municipal Area Weightage	Total Cost in INR	Reference
xi	Providing and laying Cast in situ/Ready Mix cement concrete M-15 of trap/ granite/quartzite/gneiss metal for coping to plinth or parapet, moulded or chamfered as per drawing or as directedincluding steel centering, plywood/ steel formwork compacting, roughening them if special finish is to be provided, finishing uneven and honeycombed surface and curing etc. complete. The Cement Mortar 1:3 plaster is considered for rendering uneven and honeycombed surface only. Newly laid concrete shall be covered by gunny bag, plastic, tarpaulin etc. (Wooden centering will not be allowed.)	Cum	1.34	4205.00	210.25	4415.25	5916.435	SSR 2017-18, 24.16
	Sub total of Civil work for Chamber						**553175**	
Reinstatement of Flexible Pavement for Chambers								
24	Providing and filling in sand boxing in pipeline or for foundation with sand of approved quality including watering and compaction etc. Complete	Cum.	104.18	931.00	46.55	977.55	101841.503	MJP,16-17,Pg.No.51,Excavation-19
25	Construction of granular sub-base by providing close graded material, spreading in uniform layers with motor grader / Paver on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per clause 401 -- By Mix in Place Method and Grading - I Material	Cum.	8.98	1114.00	55.7	1169.7	10504.982	SSR 17-18,3.04
26	Wet Mix Macadam -- Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density. Laying By Grader/Paver.	Cum	14.37	1421.00	71.05	1492.05	21439.971	SSR 17-18,3.23

Sr.No.	Description	Unit	Qty	Basic Rate	Municipal Area Weightage @ 5%	Final Rate with Municipal Area Weightage	Total Cost in INR	Reference
27	BITUMINOUS CONCRETE:- Providing and laying bituminous concrete using crushed aggregates of grading 1, premixed with bituminous binder @ 5.20 per cent by weight of total mix and filler, transported to site with VTS , laid over a previously prepared surface, finished to the required grade, level, alignment, and rolling to achieve the desired compaction for 50 mm compacted thickness with VG-30 Bitumen,Excluding prime / tack coat. For Bitumen VG-30 bulk -- USING 80 TPH Batch mix type hot mix plant with SCADA, Sensor Paver, Intelligent Compactor with compaction analyzer and V-Sat attachment with Stone Dust filler	cum	1.796	4814	240.7	5054.7	9079.171	SSR 17-18,3.48
	Sub total of Civil work of reinstatement for Chamber						**142865.6**	

Cost Estimate

Sr. No	Description	Cost in INR
1	Providing and laying new Pipe lines ,fixing Valves ,Specials , making connections to existing water supply lines ,installation of temporary pressure gauges at the given locations ,hydraulic testing as per standard and as per scope of work ,Schedule-B,Specifications and drawings including all associated and incidental Works like excavation, murum bedding, backfilling with approved murum obtained from excavation ,compaction ,reinstatement of disturbed /diameged Pavement as per Schedule –B and Specifications of Road and Pavement works.	1979934.00
2	Providing and constructing B.B. masonry Chambers with Precast RCC Covers: Providing and constructing B.B. masonry Chamber with 15 cm thick 1:3:6 proportion PCC bedding, including Excavation. B.B. masonry in CM 1:5 proportion precast RCC. frame and 200 mm thick cover in M30 Grade Cement Concrete including reinstatement of Pavement as directed by Engineer-in-charge as per scope of work ,Schedule-B,Specifications and drawings including all associated and incidental Works like saturated sand filling around chambers ,compaction ,reinstatement of disturbed /diameged Pavement as per Specifications of Road and Pavement works.	696041.00
3	Carrying out Flow measurement (10 locations) by providing and installing Ultrasonic Clamp on type temporary flow meters as per scope of work and specifications.	459000.00
	Total Cost	**3134975.00**
4	Add GST @12% on Non MJP items	99537.71
	Grand Total in INR **Say**	**3234512.17** **3234550.00**

VOLUME V

(Specifications)

Contents

A) CIVIL & STRUCTURAL

1. PREAMBLE

These Specifications cover the items of work in structural and non- structural parts of the works coming under Preview of this document. All work shall be carried out in conformation with this. In general, provisions of Indian Standards, Indian Roads Congress Codes and other national standards have been followed. These specifications are not intended to cover the minute details. The work shall be executed in accordance with best modern practices. All codes and standards referred to in these specifications shall be the latest thereof.

2. INCLUSIVE DOCUMENTS:

The provision of Special Conditions of Contract, General Conditions of Contract, those specified on the tender as well as execution drawings and notes or other specifications issued in writing by the PMC / Engineer shall from part of these specifications.

3. ORDER OF PRECEDENCE, CLARIFICATION AND INTERPRETATION

When the various specifications and codes referred to in preceding portion are at variancewith these specifications and each other the following order of precedence will gen erally be accepted.

- Special conditions of contract, item wise technical specifications provided here with and execution drawings.
- Provisions of general specifications.
- I. S. Codes.
- IRC Codes, M. 0. S. T., Specifications etc.
- All works shall be carried out as per Maharashtra Govt. P.W. Dept. Handbook and other specifications of the Solapur City Development Corporation Limited or as directed.

The attention of the contractor is drawn to those clauses of IS codes which require either specification by Engineer or the mutual agreement between the supplier and purchaser. In such cases it is the responsibility of the contractor to seek clarification on any uncertainty and obtain previous approval of the Engineer before taking up the supply/ construction.

4. MEASUREMENT AND PAYMENTS

The methods of measurement and payment shall be as described under various items and in the bill of quantity. Where specific definitions are not given, the methods described in IS 1200 will be followed. Should there be any detail of construction or materials which has not been referred to in specification or in the bill of quantities and drawings but the necessity for which may be implied or inferred wherefrom, or which are usual or essential to the completion of the work in the trades, the same shall be deemed to be included in the rates and prices quoted by the contractor in the bill of quantities.

5. UNACCEPTABLE WORK

Work deemed to be defective shall be demolished and rebuilt. Defective materials shall be replaced and installed by the contractor at his own cost. In the event of such works being accepted by carrying out repairs etc. as specified by the engineer, the cost of repairs will be borne by the contractor. In the event of the work being accepted by giving 'Design Concession', arising out of but not limited to under sizing, under strength, shift in location and alignment, etc. And accepting design

stresses in members which are higher than those provided for in the original design or by accepting materials not fully meeting the specifications etc. the contractor will be paid for the works actually carried out by him at the suitable reduced rate of the tendered rates for the portion of the work thus accepted.

a) INSTRUMENTATION AND MONITORING

- Stability and Settlement of Adjacent Properties

  The Contractor shall be solely responsible for the stability of all-adjoining structures and facilities. The Contractor shall execute his work such that public roadways, private access road, underground utilities; principal building and permanent facilities in adjoining properties are adequately protected from the detrimental effects of instability and ground subsidence.

  The Contractor shall be required to assess the settlements and ground movements that he anticipates will occur around the site boundaries due to his work. His calculations and assumptions on which these assessments will be made shall form a part of his submission to the local authority for the purpose of obtaining statutory clearance and securing the permit to commence work. A copy of such calculations and assumptions shall be made available to the Engineer for his record.

- Limits on Ground Movement.

  The Contractor shall be responsible for restricting the maximum settlement and lateral movement of the ground adjacent to the site to lesser of either the statutory limit imposed by the Local Authority or 50 mm, measured from the initial pre-construction reference level or line. The Contractors' compliance to these limits shall not relieve him of his sole responsibility to make good at his own cost and in the manner prescribed by the Engineer and / or the local authority, all consequential damages to adjoining structures, roads and other properties arising from ground movements caused by excavation work.

b) DILAPIDATION SURVEY

Deleted

c) INSTRUMENTATION AND MONITORING

Deleted

6. EARTH WORK IN EXCAVATION AND BACK FILLING

CONTENTS

1. SCOPE

This part of the specification deals with general requirement for earth in excavation in different materials, site grading, filling in areas shown in drawings, filling back around foundations, plinths and approach ramps, conveyance and disposal of excess excavated soil or stacking them properly as shown on the drawings or as directed by the Engineer - in-charge and all operations covered within the intent and purpose of the specifications. The excavation in rock if permitted by blasting etc. shall be as per relevant specifications.

2. APPLICABLE CODES

The provisions of the latest Indian Standards listed below, but not restricted to from part of these specifications:

IS:783	Code of practice for lying concrete pipes.
IS:1200	Method of measurement of building and (Part I) Civil Engineering Works - Part I Earth Work.
IS:1498	Classification and identification of soils for general engineering purposes.
IS:2720	(All Parts) Methods of test for soils.
IS:2809	Glossary of terms and symbols relating to soil engineering.
IS:3764	Safety Code for excavation work
IS:4081	Safety Code for blasting and related drilling operations.
IS:4988	(All Parts) Glossary of terms and classifications of earth moving machinery.

3. GENERAL

3.1. The contractor shall furnish all tools, plant, instruments, qualified supervisory staff, labour, materials, any temporary works, consumable and everything necessary, whether or not such items are specifically stated herein, for completion of the job in accordance with the specification requirements.

3.2. The contractor shall carry out the surveys of the site before excavation and set out properly all lines and establish levels for various works such as earth work in excavation for grading, foundations, plinth filling, road drains, cable trenches, pipe lines, culverts, retaining walls etc.

3.3. The excavation shall be done to correct lines and levels. This shall include where required, proper shoring to maintain excavation and also the furnishing, erection and maintaining of substantial barricades around excavations and warning lamps at night for safety purposes.

3.4. The rates quoted shall include for dumping of excavated material in regular heaps, bunds, and rip rap with regular slopes as directed by the Engineer-in-charge within the lead specified and levelling the same so as to provide natural drainage. Rock/ soil excavation shall be properly stacked as directed by the Engineer-in-charge. As a rule all softer materials shall be laid along the centre of the heaps, the harder and more resistant materials, forming the casting on the sides and the top. Rock shall be stacked separately.

4. CLEARING

The area to be excavated / filled shall be cleared of all fences, trees, plant logs, stumps, bush, vegetation, rubbish, slush etc. and other objectionable matter. If any roots or stumps of trees are met during excavation, they shall be removed. The material so removed shall

be disposed off as directed by the Engineer-in-charge. Where earth fill is intended, the area shall be cleared of all loose or soft patches, top soil containing objectionable matter/ materials before filling commences. No separate payment shall be made for such clearing works.

5. PRECIOUS OBJECTS, RELICS, OBJECTS OF ANTIQUITIES ETC.

All gold, silver, oil, minerals, archaeological and other findings of importance or other materials of any description and all precious stones, coins, treasures trove, relics, antiquities and similar things which may be found in or upon the site shall be property of the Employer and the contractor shall duly preserve the same to the satisfaction of the Engineer-incharge and from time to time deliver the same to him.

6. EXCAVATION FOR STRUCTURES

6.1. Description

Excavation for structures shall consist of removal of materials for the construction of the Chambers,foundations, retaining walls, pipe trenches, and other similar structures in accordance with the requirements of this specification and the lines and dimensions shown on the drawings or as indicated by the Engineer-in-charge. The work shall include construction of shoring, bracing, draining and pumping; the removal of all logs, stumps, grubs and other deleterious matter and obstruction necessary for placing the foundations, trimming bottoms of excavation; backfilling, cleaning up the site and disposal of all surplus materials.

6.2. Setting Out

After the site has been cleared as per clause 4 above, the limits of excavation shall be set out true to lines, curves, slopes, grades and sections as shown on the drawings or as directed by the Engineer-in-charge. The contractor shall provide all labour, survey instruments and materials such string, pegs, nails, bamboo, stones, lime, mortar, concrete etc. required in connection with the setting out of works 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.

6.3. Excavation

Excavation shall be taken to the width of the lowest step of footing or the pile caps and the sides shall be left plumb where the nature of the soil allows it. Where the nature of the soil or the depth excavated trench/ pit does not permit vertical sides, the contractor at his own expense shall put up the necessary shoring, strutting and planking or cut slopes to a safe angle or both with due regard to the safety of personnel and the works and to the satisfaction of the Engineer-in-Charge. the depth to which the excavation is to be carried out shall be as shown on the drawings unless the type of material encountered is such as to require changes, in which case the depth shall be as ordered by the Engineer-in-Charge.

6.4. Dewatering and Protection

Where water is met within excavation due to stream flow, seepage, springs, rain or other reasons, the contractor shall take adequate measures such as bailing, pumping,

construction of diversion channels, drainage channels, bunds and other necessary works to keep the foundation trenches/ pits dry when so required and to keep the green concrete/ masonry against damage by erosion or sudden rise of water level. The method to be adopted in this regard and other details thereof shall be left to choice of the contractor but subject to the approval of the Engineer-in-charge. Approval of the Engineer-in-charge shall, however, not relieve the contractor of his responsibility for the adequacy of dewatering and protection arrangements and the safety of the works. Pumping from inside of any foundation enclosure shall be done in such a manner as to preclude the possibility for the movement of water through any freshly placed concrete. No pumping shall be permitted during the placing of concrete or any period of at least 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work by a watertight wall or similar means. At the discretion of the contractor and at his cost, cement grouting or other approved methods may be used to prevent or reduce seepage and to protect the excavation area. The contractor shall take all precautions in diverting channels and in discharging the drained water so as not to cause damage to the works or to adjoining property.

6.5. Preparation of Foundation

The bottom of the foundation shall be levelled both longitudinally and transversally or stepped as directed by the Engineer-in-charge. Before the footing is laid, the surface shall be slightly watered and rammed. In the event of the excavation having been made deeper than that shown on the drawing or as otherwise ordered by the Engineer-in-charge, the extra depth shall be made up with concrete of the foundation grade at the cost of the contractor. Ordinary filling shall not be used for the purpose to bring the foundation to level.

When rock or other hard strata is encountered, it shall be freed of all loose and soft materials, cleaned and cut to a firm surface either level, stepped, or serrated as directed by the Engineer-in-charge. All seams shall be cleaned out and filled with cement mortar or grout to the satisfaction of the Engineer-in-charge.

6.6. Slips and Blows

If there are any slips or blows in the excavation, these shall be removed by the contractor at his own cost.

6.7. Backfilling

To the extent available, selected surpluses soil from the excavation if other wise specified in Particular Specifications or in BOQ shall be used as backfill. Fill material shall be free from clods, salts, sulphates, organic or other foreign materials. 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 materials consisting of murrum or earth fill up the voids and the mixture used for filling.

If any selected fill is required to be borrowed, the contractor shall make arrangement for bringing the material from outside borrow pits. The material sources shall be subject

to the prior approval of the Engineer-in-Charge. The contractor shall make necessary access roads to such borrow areas at his own cost, if such access roads do not exist.
Use of surplus selected soil from excavated stuff for backfilling can be permitted only up to the original ground level. Above this level, only selected borrowed material shall be used.
Backfilling of the foundation/ pits shall be done as soon as the foundation work has been completed to the satisfaction of the Engineer-in-Charge and measured but not earlier than the full setting of the concrete or masonry of the foundation. Backfilling shall be carried out in such manner as to not cause undue thrust on any part of the structure. Backfilling shall be done in space around the foundations after clearing it of all debris and in layers of 150mm loose thickness, watered and compacted to the satisfaction of the Engineer-in-charge and to the original surface.

6.8. Disposal of Surplus Excavated Materials:

All the excavated material shall be the property of the employer. Unsuitable or surplus materials not intended for use in part of the works or for reuse in back filling shall be disposed off by contractor at his own cost including all lead and lifts .Contractor shall take necessary permission for disposal grounds..

7. MEASUREMENT AND RATES

Excavation shall not be measured separately for payment. For avoidance of doubt it is clarified that the cost of excavation and asscociated works are incidental to scope of work and deemd to have included in Price quoted by Contractor.

8. BACK FILLING

The working area including area around the chambers and pipe trenches will be backfilled by material specified in particular specification for filling /embankment for road work.
The material shall be free of clay, roots, vegetable matter or other injurious matter, samples of the material to be used for the filling shall be submitted for approval before use. Back filling shall not be measured seperatelyt for payment. For avoidance of doubt it is clarified that the cost of back filling and asscociated works are incidental to scope of work and deemd to have included in Price quoted by Contractor.

9. RUBBLE SOLING

Rubble used for packing under floors, foundations etc. shall be hard, durable rock, free from veins, black trap, flaws and other defects. The size of the rubble shall be 150 mm — 200 mm unless otherwise specified in the item description in the Schedule of Quantities and the Engineer shall be approving the quality.

Rubble shall be laid closely in position on the sub-grade. All interstices between the stones shall be wedged in with smaller stones of suitable size well driven to ensure tight packing and complete filling of interstices. Such filling shall be carried out simultaneously with the placing in position of rubble stone and shall not lag behind.
Small interstices shall be filled with murrum, well watered and rammed.

Rubble Soling shall not be measured separately for payment. For avoidance of doubt it is clarified that cost of Rubble Soling and asscociated works are incidental to scope of work and deemd to have included in Price quoted by Contractor.

7. PLAIN AND REINFORCED CEMENT CONCRETE

CONTENTS

1. GENERAL

These specifications cover the requirement of plain, reinforced and pre-stressed concrete for use in various components of structures. For all items of concrete in any portion of the structure or its associated works controlled concrete shall be used unless otherwise specified. When ordinary concrete of the mix is shown on drawings or directed by the Engineer, the same may be used.

The provision of the latest revision of the following IS Codes shall from a part of this specification to the extent they are relevant.

IS – 226 Specification for structural steel (standard quality)

IS – 269 Specification for ordinary and low heat Portland cement

IS – 280 Specification for mild steel wire for general engineering purpose

IS – 303 Plywood for general purposes

IS – 383 Specification for coarse and fine aggregate

IS – 432 (All Parts) Specifications for mild steel and medium tensile steel bars and hard- drawn steel wire for concrete reinforcement.

Part – 1 Mild steel and medium tensile bars

Part – 2 Hard drawn steel wire

IS – 455 Specification for Portland blast furnace slag cement

IS – 456 Code of practice for plain and reinforced concrete for general building

IS – 460 Specification for test sieves

IS – 516 Methods of test for strength of concrete

IS – 1786 Standard sand for testing of cement

IS – 650 Hot rolled mild steel, medium tensile steel and HYSD bars for concrete reinforcement

IS –1139 Part II Method of measurement of building works

IS – 1199 Sampling and analysis of concrete

IS - 1343 Code of practice for pre-stressed concrete

IS – 1489 Specification for Portland pozzolana cement

IS – 1542 Sand for plaster

IS – 1566 Specification for hard - drawn steel wire fabric

IS – 1732 Dimensions for round and square steel bars for structural and general engineering purposes.

IS – 1786 Plain hard drawn steel wire pre-stressed concrete (Part I) Cold drawn stress relieved wire.

IS – 1785 Specification for high strength deformed steel bars and wires for concrete reinforcement

IS – 1791 Batch type concrete mixers

IS – 2062 Wieldable structural steel

IS – 2386 (8 Parts) Method of test for aggregates for concrete

IS - 2502 Code of practice for bending and fixing of bars for concrete reinforcement.

IS – 2505 Immersion type concrete vibrators

IS – 2506 Screed board concrete vibrators

IS – 2722 Specification for portable swing weigh batcher (Single and double bucket type)

IS – 2751 Code of practice for welding of MS bars

IS – 2911 Code of practice for design and construction of pile foundation

IS – 3366 Pan Vibrators
IS – 3370 (All Parts) Code of practice for concrete structure for the storage of liquids.
IS – 3558 Code of practice for the use of immersion vibrators for consolidating concrete.
IS – 4656 Form vibrators for concrete
IS – 5525 Recommendation for detailing of reinforcement in reinforced concre te works.
IS – 5640 Method of test for determining aggregate impact value of soft, coarse aggregate.
IS – 5816 Methods of test for splitting strength of concrete cylinder
IS – 6006 Uncoated stress relieved strand for pre-stressed concrete.
IS – 6461 Cement concrete: glossary of terms
IS – 6925 Methods of tests for determination of water soluble chlorides in concrete admixtures.
IS – 8041 Specifications for rapid hardening Portland Cement
IS – 8043 Specifications for hydrophobic Portland cement
IS – 8112 Specification for high strength ordinary Portland cement.
IS – 9103 Admixtures for concrete.
IS – 1893 Criteria for earthquake resistant design of structures.
IS-13920 Ductile detailing of reinforced concrete structures subjected to earthquake forces
IS-4326 Earthquake resistant design of buildings
IS-800 Criteria for design of steel structures
IS-4990 Specifications for plywood for concrete shuttering works
IS-2750 Specifications for steel scaff oldings
IS-4014 Code of practice for steel tubular scaffoldings

Other codes and specifications

Other IS codes pertaining to the items of cement concrete work in structural work and not listed above shall also be deemed to come under the preview of this clause. All Indian Roads Congress Standards, Specifications and codes of practice also come under this purview.

2. GRADE OF CONCRETE

Concrete of minimum grade M-20 design mix shall only be used for all reinforced and plain cement concrete works unless otherwise specified. Nominal mix may be permitted at the discretion of the Engineer-In-Charge only for the lean mix (M10) used for PCC for the bedding concrete, all other concrete shall be done with the approved mix design.

3. STRENGTH REQUIRMENT OF CONCRETE

Where Ordinary Portland Cement conforming to IS: 269 or Portland Blast Furnace Cement conforming to IS: 456 is used, the compressive strength requirements for various grades of concrete controlled as well as ordinary shall be as given in Table 1. Where rapid hardening Portland cement is used, the 28 days compressive strength requirements specified in Table 1 shall be met at 7 days.

For controlled concrete, the mix shall be so designed as to attain in preliminary tests strength at least 33 percent higher than that required on work tests, for concrete up to and including M25 and 25 % higher for higher strengths. Preliminary tests need not be made in case of 'ordinary concrete'.

Table- 1		
Grade of Concrete	**Compressive works test strength in N/sq.mm on 150mm cubes after testing conducted in accordance with IS: 516**	
	Min at 7 days	Min at 28 days
M-10	7	10
M-15	10	15
M-20	13.5	20
M-25	17	25
M-30	20	30
M-35	23.5	35
M-40	27	40
M-45	30	45
M-50	33.5	50

Note: In all cases, the 28 days compressive strength specified in Table 1 shall alone be the criterion for acceptance or rejection of the concrete.

Where the strength of a concrete mix, as indicated by tests, lies between the strength for any two grades specified in table 1, such concrete shall be classified for all purposes as a concrete belonging to the lower of the two grades between which its strength lies.

4. MATERIALS

4.1. Cement

All types and brands of cement shall be subjected to the approval of the Engineer in-charge.

a) Following types of Cement shall be used.

I. All cement used for the work shall be ordinary Portland cement or such other cement as may be permitted by the Engineer-in-charge. Portland cement shall comply with requirements of the latest issue of IS 269. High alumina cement, rapid hardening cement and Portland Slag cement etc. can be used only when permitted by the Engineer-in-charge. Such cements shall be in accordance with relevant IS codes. Portland Pozzolana cement when permitted by the Engineer-in-charge shall conform to IS 1489.

II. Cement which has remained in bulk storage at the mill for more than 6 months, or which has remained in bags at the dealer's storage for over 3 months,

or which has been stored at project site for more than 3 months shall be re-tested before use. Cement shall also be rejected if it fails to conform to any of the requirements of these specifications.

III. The Cement to be used in the work shall be of grade not less than Grade 43 which shall be got approved by the Engineer —in-charge.

IV. The following other types of cement may be used in works if specified or with prior approval of the Engineer in Charge in writing purpose. Specialist literature shall be consulted for guidance regarding use of these types of cement.

a) 43 Grade ordinary Portland cement conforming to IS 8112
b) 53 Grade ordinary Portland cement conforming to IS 12269
c) Portland slag cement conforming to IS 455
d) Portland pozzolana cement (fly ash based) conforming to IS 1489 (Part-1)
e) Portland pozzolana cement (calcined clay based) conforming to IS 1489 (Part —II)
f) Sulphate resisting Portland cement conforming to IS 12330

V. Fly ash when used for partial replacement of cement, shall conform to the requirements of IS: 3812 (part I)-1966.

4.2. Fine Aggregates

Fine aggregates shall consist of natural sand, manufactured sand, or an approved combination thereof and shall conform to IS: 383. The grading zone of sand proposed for use shall be supplied by the contractor and got approved by the Engineer-incharge. The sand shall be of siliceous material, sharp, hard, strong and durable and shall be free from adherent coatings, clay, dust, alkali, organic material, deleterious matter, lumps, etc.

Either natural or manufactured sand shall be prepared for use by such screening or washing, or both, as necessary, to remove all objectionable foreign matter. Natural sand shall be washed, unless specific written authority is given by the Engineer-incharge to use sand that meets specifications and standards of cleanliness without washing. The cost of screening and washing must be borne by the contractor. The fine aggregate shall be taken from a source approved by the Engineer-in-charge.

Sometimes Sand is obtained from crushed stone screening but often contains a high percentage of dust and clay. It tends to be flaky and angular. This type produces harsh concrete and should be avoided.

Sea sand should not be used unless approved by the EIC. If approved, the required treatment shall be done at the contractor's cost.

Sand shall be hard, durable, clean and free from adherent coatings and organic matter and shall not contain any appreciable amount of clay, Sand shall not contain harmful impurities such as iron, pyrites, coal particles, lignite, mica shale or similar laminated material, alkali, and organic impurities in such form or quantities as to affect the strength of durability of concrete or mortar. Also it should not contain any material liable to attack the steel reinforcement.

When tested as per IS 2386 Part I and Part II, fine aggregate shall not exceed permissible quantities of deleterious materials as given in table 1 of Annexure.

Fine aggregate shall be thoroughly washed at site with clean fresh water such that the percentage of all deleterious materials is within the permissible limits laid down.

4.3. Coarse Aggregates

Coarse aggregates shall consist of hard, strong, durable particles of crushed stone and shall be free from thin elongated soft pieces, organic or other deleterious matter. It shall not have adherent coatings. It will be from a source approved by the Engineer-in-charge.

Coarse aggregate shall conform to IS: 383

Coarse aggregate shall be washed if necessary to remove all vegetable and other perishable substances and objectionable amounts of other foreign matter, the cost of washing and screening being borne by the contractor.

Size of Coarse Aggregates

Following shall be the maximum nominal size of coarse aggregate for the different items of work:

Item of Construction	Maximum Nominal size of Coarse Aggregate
I. RCC works in, retaining walls, columns, footings, Slabs, beams, corbels, brackets, struts, hangers, Chajjas, lofts, lintels, etc.	20mm
II. PCC Works	20mm
III. For any other item of construction not covered by items (I) to (II) shall be as specified in the drawings or as desired by the Engineer-in-Charge in case it is not specified on the drawing.	

For heavily reinforced concrete members as in the case of ribs of main beams, the nominal maximum size of aggregate shall usually be restricted to 5 mm less than the minimum lateral clear distance between the main bars, or 5 mm less than the minimum cover to the reinforcement, whichever is smaller. However, if required under special circumstances, the Engineer-in-Charge may permit nominal maximum aggregate size of 25% more than this critical spacing/ cover, provided that proper vibrating is ensured.

4.4. Reinforcing Steel

Reinforcing steel shall be clean and free from loose mill scales, dust, loose rust and coats of paints, oil, grease or other coating, which may impair or reduce bond.

High strength deformed bars for use as reinforced in concrete shall be of grade Fe 500 (As per the structural Consultant) and conforming to IS 1786.

Chemical composition shall conform to IS 1786 when made as a relevant part of IS 228. Permissible limits shall be as shown in table 12 of the Annexure.

4.5. Water

Water used for mixing and curing shall be free from injurious amounts of deleterious materials. Potable waters are generally considered satisfactory for mixing and curing concrete.

Where water can be shown to contain an excess of acid, alkali sugar or salt, Engineer may refuse to permit its use.

As a guide, the following concentrations represent the maximum permissible values:

1) To neutralize 200 ml sample of water, using phenolphthalein as indicator, it should not require more than 2 ml. or 0-1 normal NaOH. The details of test shall be as given in IS 3025.
2) To neutralize 200 ml sample of water, using methyl orange as an indicator, it should not require more than 10 ml of 0.1 normal HCL. The details of test shall be as given in IS 3025.
3) Percentage of solids, when tested in accordance with the IS 3025, shall not exceed the following:

Particular	**Permissible Limit Solids**
Organic	2000 mg/I
Inorganic	3000 mg/I
Sulphates (as SO4)	500mg/I
Alkali Chlorides (as CI)	2000 mg/I for plain concrete work and 1000 mg/I for reinforced concrete work.
Suspended matter	2000 mg/I

The P.H. value of water shall generally be not less than 6.0

4.6. Admixtures

No materials other than the essential ingredients, i.e., cement, aggregates and water, shall ordinarily be used in the manufacture of concrete or mortar. But the Engineer-in-charge may permit the use of approved mixtures confirming to IS: 6925 for imparting special characteristics to the concrete, on satisfactory evidence that its use does not in any way adversely affect the properties of concrete particularly its strength, volume changes, durability and has no deleterious effect on the reinforcement. Admixtures where allowed will generally be conforming to relevant ASTM standards and IS: 9103.

4.7. Storage of Materials

i. Cement

The contractor shall make arrangements to the satisfaction of Engineer-in-charge for the storage of cement to prevent deterioration due to moisture and/or intrusion of foreign matter. Bulk cement shall be stored in approved waterproof bin or silo. Bagged cement shall be stored in a suitable weather tight warehouse in a manner to provide easy access for identification and inspection of each consignment. Stored cement shall meet the test requirements as per IS - 269 at any time after storage, when a retest is ordered by Engineer-in-charge. Each consignment shall be stacked separately with the date of receipt of flagged on it, not more than 12 bags being stacked height, the bags being arranged with header and stretchers.

Normally consignments shall be used in the order of receipt at site unless otherwise directed. In case of large concrete pours the Engineer-in-Charge will decide on the batch of cement to be used taking into consideration the quantity of cement with particular reference to the concerned concrete pours. Any additional work in handling and storage of cement contingent upon this requirement shall be to the contractors' account and no extra claim will be entertained. Cement shall be protected from exposure to moisture in transit,

in storage at the works and until; it enters the concrete mixes. The contractor shall keep accurate record of the deliveries of the cement and of its use in the work.

ii. Aggregates

Coarse and fine aggregates shall be stacked separately in such manner as to prevent contamination by foreign materials. All aggregates shall be stored on concrete or masonry platforms. Each size shall be kept separate with wooden, steel, concrete, or masonry bulk heads, or shall be stored in separate stacks, taking care to prevent the materials at the edges of the stock piles from getting intermixed. Stacks of fine and coarse aggregates shall be kept sufficiently apart. The aggregates shall be stored in easily measurable stacks of suitable heights as may be directed by the Engineer-in-Charge.

iii. Reinforcing Steel

Reinforcing steel shall not be stored directly on the ground. These shall be stored under cover and shall be protected from rusting, oil, grease and distortions as directed by the Engineer-in-Charge.

5. Proportioning Concrete

5.1. Ordinary Concrete

The ordinary concrete mix shall generally be specified by volume. For cement, which normally comes in bags and used by weight, volume shall be worked out taking 50 kg. of cement as 0.035 cubic meters in volume, shaking, ramming or hammering shall not be done. Proportioning of sand shall be as per its dry volume and in case it is damp, allowance for bulking shall be made as per IS : 2386 (Part III),Ingredients required for ordinary concrete containing one kg. Bag of cement for different proportions of mix shall be as given in Table 3.

Table- 3

Grade of Concrete	Total qty. of dry aggregates by volume per 50 kg cement to be taken as the sum of individual vol. of fine and coarse aggregate (max.)	Proportion of fine aggregate to coarse aggregate.	Quantity of water per 50 Kg of cement (max.)
1	2	3	4
M-10	300 Litres	Generally 1:2 for fine aggregate to coarse aggregate by volume but subject to upper limit of 1:1.5 and lower limit of 1:2.5 *	34 Litres
M-15	220 Litres		32 Litres
M-20	160 Litres		30 Litres
M-25	100 Litres		27 Litres

- The proportions of the aggregate shall be adjusted from upper limit to lower limit progressively as the grading of the fine aggregates becomes finer and the maximum size of coarse aggregate becomes larger.
- The amount of water should be kept minimum required for proper workability. The quantity given in col. 4 is not to be exceeded.

The minimum quantity of cement to be used shall not less than 210 Kg/cum for plain concrete and not less than 340 Kg/cum for reinforced concrete structural members subject to a maximum limit of 540 Kg/cum.

5.2. Quantity of Water

The quantity of water shall be just sufficient to produce a dense concrete of required workability and strength for the job. An accurate and strict control shall be kept on the quantity of mixing water.

In the case of reinforced concrete work, workability shall be such that the concrete surrounds and properly grips, all reinforcement. The degree of consistency, which shall depend upon the nature of work and the methods of vibration of concrete, shall be determined by regular slump tests. The following slumps shall be adopted for different types of works.

Sr. No.	Type of work	Slump
1	Mass concrete in RCC foundations, footings and retaining walls.	110
2	Beams, slabs and columns simply reinforced	120
3	Thin RCC section or section with congested steel	125

Note: With use of ordinary concrete the slump requirement specified above would not be applicable.

6. MIXING CONCRETE

For all works concrete shall be mixed in a mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction. Mixing shall be continued till materials are uniformly distributed and a uniform colour of the entire mass is obtained and each individual particle of the coarse aggregate shows a complete coating of mortar containing its proportionate amount of cement. In no case shall the mixing be done for less than 2 minutes after all ingredients have been put into the mixer. In hand mixing quantity of cement shall be increased by 10% above that specified in clause 5.2 above, the cost of increased cement being borne by the Contractor. Hand mixing will be permitted only under exceptional conditions and the contractor must take the permission of the Engineer-in-charge in advance. Mixers, which have been out of use more than 30 minutes, shall be thoroughly cleaned before putting in a new batch. Unless otherwise agreed to by the Engineer-in-charge, the first batch of concrete from the mixer shall contain only two thirds of the normal quantity of coarse aggregate. The mixing plant shall be thoroughly cleaned before changing from one type of cement to another.

6.1. All structural concrete shall be weigh batched preferably by using a batching plant. All ingredients for concrete shall be batched by weight using a weigh batcher of approved make conforming to IS: 2722. Batching shall be to an accuracy of 0.50kg and the weigh batcher shall be tested for accuracy of calibration before commencement of the works and at least once a week thereafter or more frequently if so required by the Engineer.

6.2. Use of Ready Mixed Concrete (RMC) may be permitted at the discretion of the Engineer-In-Charge without any extra cost.

7. CURING OF CONCRETE

7.1. Protection and Water Curing

Immediately after compaction, concrete shall be protected against harmful effect of weather, including rain, running water, shocks, vibration, traffic, rapid temperature changes and premature dying out. It shall be covered with wet sacking, Hessian or other similar absorbent material approved by the Engineer-in-charge soon after the initial set, and shall be kept continuously wet for a period of not less than 21 days from the date of placement. Masonry work over the foundation concrete may be started after 48 hours of its laying but the curing of concrete shall be continued for a minimum period of 21 days.

8. MORTARS

8.1. Mortars shall be prepared by mixing fine graded aggregate with cement, in the proportion specified for respective items of work as detailed in the BOQ. Mixing of mortars shall be done by mechanical mixers only. Hand mixing may be permitted in specified cases on the written permission of the EIC.

8.2. Mortars shall be specified by proportion only and not by strength, volumetric mixing shall be based on dry volumes of each ingredient. For convenience, measurement shall correspond to volume of one cement bag i.e. 0.035 cu. m. Boxes shall be of size of 40 x 35 x 25 cm. These shall be marked as mortar mixing boxes by red paint and shall be used throughout the contract. Hand mixing or mechanical mixing proportions shall be done with the use of these boxes.

9. RATE

Concrete shall not be measured separately for payment. For avoidance of doubt it is clarified that cost of Concrete whether precast or cast in-situ and asscociated works are incidental to scope of work and deemd to have included in Price quoted by Contractor. .

10. STEEL REINFORCEMENT

10.1. Bending of Reinforcement

Reinforcing steel shall conform accurately to the dimensions shown on relevant drawings and conforming to IS: 2502

The contractor shall make bar bending schedules, based on the drawings furnished to him and submit the same for the Engineer's approval at no extra cost. Approval by the

Engineer does not relieve the contractor of his responsibility to ensure correctness in respect of details / placing.

Bars shall be bent cold to the specified shape and dimensions or as directed by the Engineer-in-Charge using a proper bar bender, operated by hand or power to attain proper radii of bends.

Bars shall not be bent or straightened in a manner that will injure the material.

Bars bent during transport or handling shall be straightened before being used on work; they shall not be heated to facilitate bending.

Unless otherwise specified, a U type hook at the end of each bar shall invariably be provided. The radius of the bend shall not be less than twice the diameter of the round bar for mild steel plain bars and not less than four times the diameter for high strength deformed bars. In case of bars with diameters greater than 25mm, the minimum radius should be three times the diameter for mild steel bars and six times the diameter for high strength deformed bars the length of the straight part of the bar beyond the end of the curve shall be at least four times the diameter of the bar. In the case of bars, which are not round, and in the case of deformed bars, the diameter shall be taken as the diameter of a circle having an equivalent effective area. The hook shall be suitably encased to prevent any splitting of the concrete.

10.2. Placing of Reinforcement

All reinforcing bars shall be accurately placed in the exact position shown on the drawings, and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm in size and conforming to IS: 280, and by using stays, blocks or metal chairs, spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals. Bars will not be allowed to sag between supports nor displaced during concreting or any other operation over the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports will not extend to the surface of concrete, except where shown on the drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing will not be allowed. Pieces of broken stone, brick or wooden blocks shall not be used. Layers of bars shall be separated by spacer bars, precast mortar blocks or other approved devices.

Reinforcement after being placed in position shall be maintained in a clear condition until completely imbedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed.

To protect reinforcement from corrosion, concrete cover shall be provided as indicated on the drawings. All bars protruding from concrete to which other bars are to be spliced and which are likely to be exposed for an indefinite period shall be protected by a thick coat of neat cement grout.

In the case of columns and walls, vertical bars shall be kept in normal position with timber templates having slots accurately cut in for bar position. Such templates shall be removed after the concreting has progressed up to a level just below them. Bars crossing each other, where required, shall be secured by annealed binding wire of size not less than 1 mm and conforming to IS : 280 in such a manner that they do not slip over each other at the time of fixing and concreting

As far as possible, bars of full length shall be used. In case this is not possible, overlapping of bars shall be done as directed by the Engineer-in-Charge. When practicable,

overlapping bars shall not touch each other, but be kept apart by 25 mm or 1.25 times the maximum size of the coarse aggregate in the concrete between them, whichever is greater. Where this is not feasible, overlapping bars shall be bound with annealed steel wire, not less than 1 mm thickness twisted tight. The overlaps shall be staggered for different bars and located at points along the span where neither shear nor bending moment is maximum.

Bars of less than 3.0 M length shall not be used as main reinforcement.

10.3. Welding of Bars

When permitted or specified on the drawings, joints of reinforcement bars shall be butt-welded so as to transmit their full strength. Welded joints shall preferably be located at points where the reinforcement steel will not be subject to more than 75 percent of the maximum permissible stresses and the welded joints should be staggered such that at any one section, not more than 33 percent of the bars are welded. Only electric arc welding using a process which excludes air from the molten metal and conforms to any or all other special provisions for the work will be accepted. Suitable means shall be provided for holding the bars securely in position during welding. It must be ensured that no voids are left in welding and when welding is done in 2 or 3 stages, the previous surfaces shall be cleaned properly. Ends of the bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before welding. Only competent welders shall be employed on the work.

The M. S. Electrodes used for welding shall conform to IS: 814. Welded pieces of reinforcement shall be tested. Specimens shall be taken from the actual site and their number and the frequency of tests shall be as directed by the Engineer-inCharge.

10.4. M.S. STEEL

Rolled mild steel and medium tensile steel plain round bars used in concrete shall conform to IS 432 Part I. Steel received shall conform to the following IS with regards to manufacturing and chemical composition.

1. M.S. bar Grade I — Steel designation Fe 410-S of IS 226
2. M. S. Bar Grade II — Steel designation Fe 410-0 of IS 1977
3. Medium Tensile Steel designation Fe 540 W-HT IS 961 Steel bars

National sizes and tolerances shall be as specified in IS 432 Part I. Physical requirements shall be determined in accordance with IS 1608, read in conjunction with IS 226. For ready reference of minimum requirements, properties are tabulated in table 11 of the Annexure.

10.5. TOR STEEL

High strength deformed bars for use as reinforced in concrete shall be of grade Fe 500 conforming to IS 1786.

Chemical composition shall conform to IS 1786 when made as a relevant part of IS 228. Permissible limits shall be as shown in table 12 of the Annexure.

Nominal sizes, cross sectional areas and their mass shall be as specified in IS 1786, allowing due consideration for tolerance specified therein.

Material received at site shall have ISI certification mark. Each bundle or coil containing the bars shall be suitably marked with ISI certification mark. Also bars shall be marked to identify categories. This shall be done as per IS 1387.

In case bars are without ISI certification mark, the manufacturer shall give a certificate stating process of manufacturer, chemical composition and mechanical properties. Each certificate shall indicate the number or identification mark of the batch production / cast to which it applied. Corresponding number or identification mark should be found on the material.

Each batch brought at site shall be tested prior to use for respective specification / Physical properties. Cost of all such tests shall be borne by the contractor. Material acceptable as per IS shall be allowed into the works. The contractor shall remove all rejected material from site within 3 days of rejection. If the same is not done, the EIC shall impose a penalty of Rest. 500/- per metric ton per day. This will be without any appeal and shall not be subjected to arbitration.

Reinforcement bars received at site shall be stored on hard concrete platform and clear of the ground with the use of timber sleeper, concrete sleeper or any other means. Reinforcement material shall be kept covered by tarpaulins or plastic to avoid corrosion and other contamination. It is advised to follow storage methods as described in IS 4082.

10.6. COVER BLOCKS

Cover blocks shall be of non-corrosive material such as plastic but not wooden or broken bricks or stone. Especially PVC made cover spacers shall be used in the Works.

Concrete cover spaces may me permitted by the EIC. Such concrete spaces shall be cast from concrete and not cement mortar. Strength of these blocks shall be equal to the strength of concrete in use. These should be fully cured prior to use in works.

10.7. BINDING WIRE

Binding wire shall be 16 or 18 gauge galvanized wire conforming to IS 280. Binding shall be done with double wire. It shall be free from rust, oil, paint, grease, loose mill scale or any other deleterious material undesirable for the reinforcement and concrete or which may prevent adhesion of concrete with reinforcement.

10.7.1. Deformed bars for concrete reinforcement and rolled mild steel and medium tensile steel conforming to IS 1139 shall be allowed in construction provided they are approved by the EIC.

10.7.2. Unit weight of reinforcement per meter shall be as follows:

1)	6 mm	0.22 Kg/m
2)	8mm	0.40 Kg/m
3)	10mm	0.62 Kg/m
4)	12mm	0.89Kg/m
5)	16mm	1.58 Kg/m
6)	18mm	2.00 Kg/m
7)	20mm	2.47 Kg/m
8)	22mm	2.98 Kg/m

9)	25mm	3.85 Kg/m
10)	28mm	4.83 Kg/m
11)	32mm	6.31 Kg/m
12)	40mm	9.85 Kg/m

10.8. Measurement

Reinforcement shall not be measured separately for payment.

For avoidance of doubt it is clarified that cost of reinforcement and asscociated works are incidental to scope of work and deemd to have included in Price quoted by Contractor.

8. PIPE LINE WORKS/SPECIALS AND VALVES

Works of providing and laying pipe lines, connection to existing pipelines ,specials and Valves shall be carried out as per specifications of Maharashtra Jivan Pradhikaran Limited (MJP). DI Pipes should be socket and spigot type with rubber ring confirming to latest version of IS 8329. Hydraulic testing should be done at 1.5 times the working pressure as per Indian standards.

Measurment and Rate
Contractor shall carry out the work of providing and laying of pipe lines, connection to existing pipelines, providing and fixing specials and valves as specified in Schedule- B and drawing with all associated and incidental works like making trench, murum bedding, back filling compaction, reinstatement of pavement as per specifications of Road and Pavements are deemed to have included in Price quoted by Contractor.

9. STRUCTURAL STEEL WORKS

1. SCOPE

These specifications cover the requirements of material, workmanship, and protective measures etc., of structural steel work in general. Specifications for special items of work used in structural steel construction are given separately.

2. GENERAL

The provisions of the latest Indian Standards listed below, but not restricted to, form part of these specifications:

IS 104 Ready mixed paint, brushing, zinc chrome, priming

IS 123 Ready mixed paint, brushing, finishing, semi-gloss, for general Purposes, to Indian Standard Colours and red oxide (Colour unspecified)
No. 445 Venetian Red
No.449 light Purple brown
No.446 Red Oxide
No. 451 Chocolate
No.448 Deep Indian red
No.473 Gulf Red and Red Oxide (Colour Unspecified)

IS 226 Structural Steel (Standard Quality)

IS 800 Code of practice for use of structural steel in general building construction.

IS 813 Scheme for symbols for welding.

IS 814 Covered electrodes for metal are welding of structural steel (Part 1 and 11).

IS 815 Classification and coding of covered electrodes for metal are welding of structural steels.

IS 816 Code of practice for use of metal arc welding for general construction in mild steel.

IS 817 Code of practice for training and testing of metal arc welders.

IS 822 Code of procedures for inspection of welds.

IS 823 Code of procedure for manual metal are welding of mild steel.

IS 961 Structural steel (high tensile).

IS 1024 Code of practice for use of welding in bridges.

IS 1148 Hot rolled steel riveting bars (up to 40 mm diameters) for structural purposes.

IS 1387 General requirements for the supply of metallurgical material.

IS 1477 Part I, Code of practice for painting of ferrous metals in buildings - pre-treatment.

IS 1599 Method for bend test for steel products other than sheets, strip, wire and tube.

IS 1 608 Method for tensile testing of steel products.

IS 1731 Dimensions for steel flats for structural and general engineering purposes.

IS 1852 Rolling and cutting tolerances for hot-rolled steel products.

IS 191 5 Code of practice for steel bridges.

IS 2074 Ready Mixed paint, air drying red-oxidezine chrome, priming

IS 2102 Allowable deviations for dimensions without specified tolerances.

IS 3757 High tensile friction grip bolts.

IS 4000 Code of practice for assembly of structural joints rising high tensile friction grip fasteners.

IS 7318 Part I Fusion welding of steel.

Other I.S. Codes and I.R.C. codes pertaining to the items of structural steel not specifically listed shall also be deemed to come under the purview of this clause.

3. MATERIALS, INSPECTION and TESTING

All supplies of structural steel and other materials specified shall be supported by manufacturers test certificates showing that the materials meet the requirements of these specifications.

The engineer-in-charge may require getting further samples tested and all the cost of taking samples and testing the same by the approved agency shall be borne by the Contractor.

4. FABRICATION

4.1. **Fabrication Drawings and Approval:**

The fabrication drawings shall be prepared on the basis of design drawings supplied by the designer. The fabrication drawings showing details of connection are required to be supported by the calculations showing adequacy of the connections. The fabrication drawings and calculations shall be prepared by qualified consulting engineer and fabricators. All charges required to be made by the Engineerin-Charge shall be incorporated at no extra cost.

4.2. Workmanship:

Workmanship shall be equal to the best general practice in current fabrication practice. The methods followed in cutting, straightening, finishing and shaping, bindings of members and holing for rivets, bolts or pins etc., and any other operations shall be performed in such a way as not to adversely affect the structural members in any way. The machinery and equipment's as well as the method of working, shall be approved by the Engineer-in-charge. The fabrication work shall be carried out by the qualified operators.

4.3. WELDING:

Welding and weld procedure qualifications should be done in accordance with applicable provisions of the IS standards. All the welders should be got qualified before employing them on the job and re-qualified at frequent intervals.

5. TEMPORARY STORAGE

a) No dragging of steel shall be permitted. All steel shall be stored 30 cm above ground on suitable packing to avoid damage during the monsoons. Steel shall be stored in the order of erection with erection marks visible. Long members shall be supported on skids placed near enough together to prevent injury from deflection. Storage areas shall be prepared and maintained by the Contractor. Any steel stored near excavations shall be removed immediately to a safe distance to avoid burial under debris.

b) Adequate handling facilities shall be available at Storage place. The temporary protective paint shall not be damaged and if so damaged shall be immediately made good.

6. PAINTING

6.1. Surface Preparation

Steel surface to be painted shall be prepared in thorough manner with a view to ensuring complete removal of mill scale. Primary coat shall be applied as soon as practicable after the surface preparation is completed. All slag from welds shall be removed before painting. Care shall be taken to brush the surface clean prior to painting. Surfaces shall be maintained dry and free from dirt and oil. Working out- doors in frosty or humid weather shall be avoided. The undercoat and finishing coat shall be of the same manufacturer. Successive coats of paints shall be of different shades and colours and each shall be allowed to dry thoroughly before the next is applied. Particular care shall be taken with the priming and painting of edges corners, welds and rivets.

6.2. Priming

The rates quoted by the Contractor shall include the following:

a) Applying one coat (40 microns) of red oxide zinc chromate primer paint coating to all surfaces of steel that are scratched in transit or unloading prior to storage before erection.

b) Applying one coat (40 microns) of red oxide zinc chromate primer paint and two coats of finishing paint as specified in schedule to all surfaces which will be inaccessible after erection, except surfaces coming in contact with concrete. It should be noted that all steel work such as Trusses, Purlins etc., are considered inaccessible.

c) After steel has been erected, all burrs and abraded spots, scratched surfaces, field welds, bolt heads and nuts shall receive one coat of primer paint. Before the paint is applied the surface shall be dry and free from dust, dirt, scale and grease. No paint shall be applied to bolt or field welds until these bolts or field welds have been approved by the Engineer-in-Charge.

d) All steel material except surfaces coming in contact with concrete shall receive one coat of primer paint after erection after having been thoroughly cleansed of dust and foreign matter. No paint shall be applied when humidity is such as to cause condensation on the surfaces to be painted. Paint shall be stirred frequently to keep the pigment in suspension.

6.3. Final Paint:

The final painting of structural steel shall be as specified by the Engineer-InCharge or as specified in schedule

After materials have been accepted by the Contractor as being improper condition for erection, he shall be responsible for their safety and protection from loss or damage of any nature until the completion of work. The contractor shall be similarly responsible for surplus materials until they are returned and accepted by the Engineerin-Charge.

7. ERECTION:

7.1. Preliminaries:

a) The Contractor shall complete all preliminary works at site, well before the arrival of structural steel, such as keeping in readiness electrical winches, mobile cranes, gin poles, compressors, all tools and tackles, rivet guns, welding sets,

torque wrenches etc. and work that may be necessary so as to start erection immediately after the arrival of steel at site.

b) The contractor shall furnish at his own expenses, the necessary noninflammable staging and hoisting or equipment's required for the erection work and shall remove and take them away after the completion of the job. The contractor shall also provide necessary passage ways, fences, safety belts, helmets, lights and other fittings to the satisfaction of the Engineer-in-Charge and for protection of his men and materials.

7.2. **Approval of Erection Scheme:**

All structures shall be erected as shown on drawings. The contractor shall carry out all erection work in the sequence required by the Engineer-in-Charge. The method of erection and complete erection scheme shall be subject to the approval of the Engineer-in-Charge and shall be modified as required by the Engineer-in-Charge. This, however, will not relieve the Contractor of the responsibility for safe and expeditious completion of the work, its quality and accuracy.

7.3. Workmanship:

a) Unless specified herein, all erection work will be carried out in accordance with the latest edition of Indian Standard code of practice for use of structural steel in General Building Construction IS 800 and AISC code wherever applicable.

b) Drifts should be used only for drawing the work into position and must not be used to such an extent so as to destroy the holes. Drifts of a larger size than the nominal diameter of the holes or burrs must be rectified to the satisfaction of the Engineer-in-Charge. Correction of minor reasonable amount of reaming and cutting of excess stock from field rivets, if any, shall be considered as a part of erection. Any error in shop work which prevents proper fit on a moderate amount of reaming and slight chipping or cutting shall be immediately reported to the Engineer-in-Charge. The contractor's work shall also include straightening and repairing of materials slightly damaged and drilling some holes in members where required. This shall all be included in the unit rate quoted.

c) Structural steel frames shall be erected plumb and true to tolerances indicated elsewhere in these specifications. All steel columns and beams shall be checked for plumb and level individually before and after connections are made. Temporary bracings shall be introduced wherever necessary to take care of all loads to which the structure may be subjected including erection equipment and the operation thereof. Such bracings shall be left in place as long as may be required for safety. Proper size steel cables, slings etc., shall be used to avoid any damage due to accidents.

d) As erection progresses, the work shall be securely bolted to take care of all dead load, wind and erection stresses. No final welding or bolting shall be done until the structure has been properly aligned and approved by the Engineer-in-Charge.

e) The Engineer-in-Charge shall be immediately informed of any errors observed/found in the fabricated steel which prevents proper assembling and fitting up of parts in field by a moderate amount of repairing.

f) The contractor shall protect all existing plants, embedded parts, all piping, conduits, equipment and facilities against damage during erection. The contractor shall perform his work in a manner which in no way endangers the operations of any existing plant or structures or hinders other construction activities.

g) Holes may be required to be drilled at site for installing equipment or steel furnished by other manufacturers or other contractors. The information for this will be supplied to the Contractor by the Engineer-in-Charge before or after erection of the steel.

h) In case of any faulty erection, all such dismantling and re-erection required will be at Contractor's cost.

i) Shim stock of mild steel plates required for erection will be set, levelled and prepared for grouting. Where flat bearing beams occur, bearing plates shall be set, levelled and prepared for grouting.

7.4. Tolerance:

The erection shall be carried out to the requirements stated in Section 7 (h) of AISC Code Standard practice, except that Structural Steel members be erected plumb with a tolerance not exceeding in 1000. Column splices and other compression joints which depend upon contact bearing, upon completion, shall bear with respect to the centred of the contact area.

At least 65% of the entire contact area shall be in full bearing and the separation of any remaining portion shall not exceed 0.5 mm except locally at toes of flanges where a 50% greater separation is permissible. Otherwise corrective measures as specified by the Engineer-in-Charge shall be taken.

7.5. Connection:

a) H.S.F.G. Bolts :

The Contractor shall obtain the prior written approval of the Engineerin-Charge for the method proposed to be adopted for tightening the High Strength Friction Grip bolts. For preliminary assembly and before use of these bolts he shall use his own erection bolts.

b) Bolting / Riveting:

In general bolts and rivets will conform to the relevant Indian Standards. The methods of establishing connections use of equipment, etc., shall be as approved by the Engineer-in-charge.

c) Welding :

Welding where specified shall be performed by the shielded electric are, gas or other approved methods, using coated electrodes and/or low hydrogen electrode conforming to IS:814. The welding process and the qualification of the welding operators shall conform to IS: 81 7 and IS: 823 and shall be got approved before commencement of any work of welding.

All field assembly and welding shall be executed in accordance with the requirements for shop fabrications excepting which manifestly apply to shop

conditions only. Where the steel has been delivered, painted, the paint shall be removed before field welding for a distance of at least 50 mm on either side of the joints. All welds should be free from defects like blow holes, lack of penetration, slag intrusion etc. All welds shall be cleaned of slab or flux and shall show uniform smoothness of weld metal, feather edges without overlap and free from porosity. Where a thick weld is required the weld metal shall be deposited in successive layers. Each layer except the last shall be preened moderately before the next layer is applied. The contractor shall be responsible for the quality of the work performed by his welding group.

If required, the Engineer-in-Charge may test the welds by nondestructive tests. Any defective welds shall be made good by the Contractor at no extra cost and the cost of non-destructive testing for such defective welds shall be borne by the Contractor.

d) Specification for pin and pinned connections:

Pin Material:

Rolled steel pins and rollers, including those made from slabs shall comply with the requirements of IS: 226 - Specification and structural steel and IS: 2062 - Specification for structural steel (fusion welding quality) or IS: 961 - Specification for high tensile structural steel.

Forged steel pins shall have a tensile strength of 44 to 50 kg/Sq.mm. or 57 to 63 kg/sq.mm to conform to IS:1875 - Specification for carbon steel billets, blooms and slabs for forging. Steel casting for cast steel pins shall conform to grade 1 or 3 of IS: 1 030.

Pin Holes:

Pin holes shall be bored true to gauge, smooth, straight, at right angle with the axis of the member and parallel with each other unless otherwise required, in built up members the boring shall be done after the members have been welded. The specified dia. of pin shall be its minimum dia. Hole dia. can be maximum + 0.5 mm more than pin dia.

Pins:

The pins shall be parallel throughout and shall have a smooth surface free from flaws. At ends of pins there shall be slot to facilitate in driving the pin.

Pins more than 175mm in length of diameter shall be forged and annealed offer pins shall be provided on both sides of the pin.

10. MASONRY — CONCRETE BLOCK WORK

1. SCOPE

These specifications cover the use of Concrete Block Masonry for the structural / non structural purposes.

2. Manufacture

2.1. Physical requirements:

All blocks shall be sound and free of cracks or other defects. For exposed construction face or faces shall be free of chips, or other imperfections, and the overall dimensions of the blocks shall be in accordance to tolerance as specified. Minimum compressive strength shall be as per table 2 below, maximum permissible water absorption shall not exceed the limit specified in I.S.: 2185, dimensional variations shall conform to I.S. 2185. The minimum compressive strength at 28 day being the average of eight blocks, and the minimum compressive strength at 28 days of Individual blocks, when tested in the manner described in Appendix B, of IS: 12440-1988, shall be as prescribed in Table 1.

Table- 1 COMPRESSIVE STRENGTH OF CONCRETE STONE MASONRY BLOCKS

Class Designation	Minimum average Compressive Strength of blocks (N/mm2)	Minimum strength of individual blocks N/mm2
5	5.0	3.5
6	6.0	4.2
7	7.0	5.0
9	9.0	6.3
10	10.0	7.5

For 100 mm wide blocks (for 100 mm thick walls), the minimum strength may be 3.5 N/mm2

2.2. Testing:-Tests as indicated in Appendices A to F of IS 2185 shall be conducted on samples of units selected according to the sampling procedure given here under to ensure conformity with the physical requirements as specified.

2.3. Sampling:- A sample of 20 blocks shall be taken from every consignment of 5000 blocks or part thereof of the same size and same batch of manufacture. From these samples, the blocks shall be taken at random for conducting the test.

2.4. The blocks shall be taken at regular intervals during the course of work, preferably while being loaded or unloaded. In case samples are to be taken from the stacks, blocks shall be taken at random from across the top of the stacks, the sides accessible and from the interior of the stacks.

2.5. The blocks shall be kept under cover and protected from extreme conditions of temperature, relative humidity and wind until they are required for test. The test shall be conducted as soon as the sample has been taken.

2.6. Number of Tests:- All the 20 blocks shall be checked for dimensions and inspected for visual defects. Out of the 20 blocks, 3 blocks shall be subjected to the test for block density, 8 blocks to the test for compressive strength, 3 blocks to the test for water absorption and 3 blocks to the test for drying shrinkage and later to the test for moisture movement. The remaining 3 blocks shall be reserved for retest for drying shrinkage and moisture movement if a need arises.

2.7. Blocks shall be approved if requirements of conditions mentioned in 11.2 to 11.5 (as given below) of IS 2185 (Part I) are satisfied.

a) The number of blocks with dimensions outside the tolerance limit and / or with visual defects, among those inspected shall not be more than two.

b) For Block density and compressive strength, the mean value determined shall be greater than of equal to the minimum limit specified in Table 2 of IS 2185 (Part I) and reproduced as Table 27 of Annexure.

c) For drying shrinkage and moisture movement, all the test specimens shall satisfy the requirements of the test. If one of more specimens fails to satisfy the requirements, the remaining 3 blocks shall be subjected to these tests. All blocks shall satisfy the requirements. Drying shrinkage shall not exceed 0.1 percent.

d) For water absorption, the mean value determined shall not be more than 10 percent by mass.

2.8. Hollow and solid concrete block masonry:- Hollow and solid concrete blocks- Shall conform to the requirements of IS: 2185--1979.

Specification for hollow and solid concrete blocks except with regard to the mix of cement concrete and sizes of aggregates which shall be as indicated. Hollow blocks shall be sound, free from cracks, broken edges, honey combing and other defects that would interfere with the proper placing of block or impair the strength or performance of construction.

Concrete Block-hollow (open or closed cavity) or solid shall be referred to by its nominal dimensions. The nominal dimensions of concrete block shall be, as follows:

Length 400, 500 or 600 mm

Height 200 or 100 mm

Width 50, 75, 100, 150, 200, 250 or 300mm

In addition, block shall be manufactured in half lengths of 200, 250 or 300 mm to correspond to the full lengths. The maximum variation in the length of the units shall be not more than ±5mm and maximum variation in height and width of unit, not more than ±3mm.

3. WORKMANSHIP

3.1. In total dry climate top and sides may be slightly moistened to avoid absorption of water from mortar.

3.2. Joints shall not be bigger than 10mm and will be perfectly horizontal and vertical. Joints shall be raked 10mm deep while mortar is wet.

3.3. Cut blocks shall not be used. Special solid pre-cast blocks at site shall be cast well in advance to be used as spacers and to adjust breaking of vertical joints.

3.4. Cracks in block masonry are due to shrinkage or expansion of blocks or due to settlement, thermal expansion or changes in moisture content in the structural members enclosing the block walls.

The following measures are recommended to prevent formation of cracks.

a) While curing, the block masonry should be lightly sprinkled with water and not made excessively wet.

b) Expansion joints shall be provided in walls exceeding 30 m in length.

c) Reinforcement should be provided in the bed joints in block work, one course above and course below windows and above doors in order to distribute the shrinkage/ temperature stresses occurring at the corners of openings, more uniformly throughout the walls.

d) R.C.C. band (Patlis) 100 mm thick and width equal to block masonry and having 8 mm dia. two bars with 8 mm dia links @ 300 mm c/c shall be provided at every 1000mm interval in the block masonry. The gap between the topmost layer of block and the soffit of the beam shall be packed by lightly hammering flat pieces of shahabad/ kota tiles and then the gaps will be covered by weld mesh before closing them by cement plaster. The weld mesh will be extended at least 150 mm on the R.C.C. beam and 150 mm on block masonry and nailed to them with strong nails.

e) Provisions for door and window frames: - A course of solid concrete block masonry shall be provided under door and window openings (or a 10em thick pre-cast concrete sill block under windows). The solid course shall extend for at least 20cm beyond the opening on either side. For jambs of very large doors and windows either solid unit are used, or the hollows shall be filled in with concrete of mix 1:3:6 using 12.5 mm nominal size aggregates.

f) Provisions for Roof/ceiling: - The course immediately below the roof slab shall be built with solid blocks: The top of the roof course shall be finished smooth with a layer of cement and coarse sand mortar 1:3, 10mm thick and covered with a thick coat of white wash or crude oil, to ensure free movement of slab.

g) Intersecting walls: - When two walls meet or intersect and the courses are to be laid up at me same time, a true masonry bond between at least 50% of the units at the intersection is necessary. When such intersecting walls are laid up separately, pockets with 20mm maximum vertical spacing shall be left in the first wall laid. The corresponding course of the second wall shall be built into these pockets. Fixtures, fittings, etc. shall be built into the masonry in cement and coarse sand mortar 1:3 while laying the blocks where possible. Hold fasts shall be built into the joints of the masonry during laying. Holes, chases, sleeves, openings, etc of the required size and shape shall be formed in the masonry with special blocks while laying, for fixing pipes, service lines, passage of water etc. After service lines, pipes etc are fixed, voids left, if any, shall be filled up with cement concrete 1:3:6(1 cement 3 coarse sand: 6 stone aggregate 20mm nominal size) and neatly finished.

4. MEASUREMENT

Hollow or solid cement concrete block work shall not be measured separately. For avoidance of doubt it is clarified that cost of block masonary and associated works are incidental to scope of work and deemd to have included in Price quoted by Contractor.

11. BRICK WORK

1. SCOPE

These specifications cover the use of Brick Masonry for the structural purposes.

2. GENERAL

The provision of the latest Indian Standards listed below form part of these specifications:

IS: 1077	Specifications for common burnt clay building bricks
IS: 1200	Measurement for Building works
IS: 1725	Specifications for solid cement blocks used in general building construction.
IS: 1905	Code of practice for structural use of buildings Masonry walls.
IS:2116	Sand for masonry mortars.
IS:2180	Specification for heavy duty burnt clay building bricks
IS:2185	Specification for concrete masonry units: Hollow and solid concrete blocks.
IS:2212	Code of practice for brick work.
IS:2222	Specification for burnt clay perforated building bricks.
IS:2250	Code of practice for preparation and use of masonry mortar.
IS:2691	Specification for burnt clay facing bricks.
IS:3115	Specification for lime based blocks.
IS:3414	Code of practice for design and installation of joints in buildings.
IS:3466	Specification for masonry cement.
IS:3861	Method of measurement of plinth, carpet and rent able areas of buildings.
IS:3952	Specification for burnt clay hollow blocks for walls and partitions.
IS:4098	Specification for lime-puzzolona mixture
IS:4139	Specification for sand lime bricks
IS:4441	Code of practice for use of silicate type chemical resistant mortars.
IS:4442	Code of practice for use of sulphur type chemical resistant mortars.
IS: 5495	Size and shape for fire bricks

Other I.S. Codes not specifically mentioned here but pertaining to the use of bricks for structural purposes forms part of these specifications.

3. MATERIALS

3.1. Bricks

Bricks shall be of regular and uniform size, shape and colour, uniformly well burnt throughout but not over burnt. They shall have plane rectangular faces with parallel sides and sharp straight and right angled edges. They shall be free from cracks or other flaws. They shall have a frog of 10 mm. depth on one of their flat faces.

They shall give a clear metallic ringing sound when struck. They shall show a fine grained, uniform homogeneous and dense texture on fracture and be free from lumps of lime, laminations, cracks, air holes, soluble salts causing efflorescence or other defects which may in any way impair their strength, durability, appearance or usefulness for the

purpose intended. They shall not have any parts under-burnt. They shall not break when thrown on the ground on their flat face in a saturated condition from a height of 60 cm.

Size of bricks

a) The size of the conventional bricks may vary from 8 3/4" x 4 3/16" x 2 5/8" to 9" x 4 1/4" x 3". Only bricks of one standard size, shall be used on one work unless specially permitted by the Engineer. The following tolerances are permitted in the standard conventional size adopted on a particular work:

Length - plus or minus 3 mm (about 1/8")
Breadth - plus or minus 1.5 mm (about 1/16")
Depth - plus or minus 1. 5 mm (about 1/16")

b) When metric bricks are used they shall comply with I. S: 1077 - 1976.

Absorption

After immersion in water, absorption by weight shall not exceed 20% of the dry weight of the brick when tested according to IS: 1077-1976

Compressive Strength

The load to crush the brick when dry shall not be less than 50 Kg/sq.cm and when thoroughly soaked shall not be less than 35 Kg/sq.cm. Please see table given below for details

Class Designation	Average compressive strength			
	Not less than		Not less than	
	N/mm2	(Kgf/cm2)	N/mm2	(Kgf/cm2)
10 (100)	10.0	100	12.50	125
7.5 (75)	7.5	75	10.00	100
5 (50)	5.0	50	7.50	75
3.5 (35)	3.5	35	5.00	50

3.2. Mortars

Cement and sand shall be mixed in specified proportions given on the drawings. Cement shall be proportioned only by weight, by taking its unit weight as 1440 kg per cubic metre and the sand shall be proportioned by volume after making due allowance for bulking. The required quantity of water shall then be added and the mortar mixed to produce workable consistency.

The mixing shall be done intimately in a mechanical mixer unless hand-mixing is specifically permitted by the Engineer. If hand mixing is done, the operation shall be carried out on a clean watertight platform and cement and sand shall be first mixed dry in the required proportion to obtain a uniform colour and then the mortar shall be mixed for at least two minutes after addition of water. The mortar so prepared shall be used within 30 minutes of adding water. Only such quantity of mortar shall be prepared as can be used within 30 minutes. The mortar remaining unused after that period or mortar, which has partially hardened or is otherwise damaged shall not be retempered or remixed. It shall be destroyed or thrown away.

In case of cement mortar that has stiffened because of evaporation of water the same shall be retempered by adding water as frequently as needed to restore the requisite consistency, but this retempering shall be permitted only within thirty minutes from the time of addition of water at the time of initial mixing.

Necessary tests to determine compressive strength of the mortar, for consistency of the mortar and its water retentively shall be carried out in accordance with IS-2250. The frequency of testing shall be one cube for every 2 cubic metre of mortar prepared subject to a minimum of 3 cubes for a day's work.

4. CONSTRUCTION

4.1. Soaking of Bricks

Bricks shall be soaked in water for a minimum period of one hour before use so that they will be saturated and will not absorb water from the mortar. When bricks are soaked they shall be removed from the tank sufficiently in advance so that at the time of lying they are skin-dry. Such soaked bricks shall be stacked on a clean place where they are not spoil by dirt, earth, etc,

4.2. Laving of Bricks

All brick work shall be laid in English bond, even and true to line, plumb, level and all joints accurately kept. The bricks used on the face shall be selected whole ones of uniform size and with true rectangular face. Brick shall be laid with frogs up, if any, on a full bed of mortar. When laying, bricks shall be slightly pressed so that the mortar gets into all the surface pores of bricks to ensure proper adhesion. All joints shall be properly flushed and packed with mortar so that no hollow spaces are left.

Before laying bricks in foundation, a layer of not less than 12 mm of mortar shall be spread to make the surface on which the brickwork will be laid even. Immediately thereafter, the first course of bricks shall he laid.

The brickwork shall be built in uniform layers, corners and other advanced work shall be raked back. Brickwork shall be done true to plumb or in specified batter. No part of it, during construction, shall rise more than one meter above the general construction level, to avoid unequal settlement and improper joining. The height of brick works constructed shall not exceed one metre in a day.

Toothing may be done where future extension is contemplated but shall be used as an alternative to raking back.

4.3. Joints

The thickness of joints shall not exceed 10mm and this thickness shall be uniform throughout.

4.4. Joining with existing structure

When fresh masonry is to be placed against existing surfaces of structures, these shall be cleaned of all loose material, roughened and wetted as directed by the Engineer so as to affect a good bond with the new work.

4.5. Curing

Green work shall be protected from rain by suitable covering. Masonry work in cement or composite mortar shall be kept constantly moist on all faces for a minimum period of seven days. The top of the masonry work shall be left flooded with water at the close of the day. During hot weather all finished or partly completed work shall be covered or wetted in such manner as will prevent rapid drying of the brick work.

4.6. Scaffolding

The scaffolding shall be sound and strong to withstand all loads likely to come upon it and will be double or single as is warranted for the particular work. The holes, which provide resting space for horizontal members, shall not be left in masonry under one metre in width or immediately near the skew backs of arches. The holes left in the masonry work for supporting the scaffolding shall be filled and made good with 1:4:8 cement concrete.

4.7. Condition of Equipment

All equipment used for mixing or transporting mortar and bricks shall be clean and free from set mortar, dirt or other injurious foreign substances.

4.8. Finishing of Surfaces

For a surface which is to be subsequently plastered or pointed the joints shall be squarely raked out to a depth of 15mm while the mortar is still green. The raked joints shall be well brushed to remove dust and loose particles and the surface shall be thoroughly washed with water, cleaned and wetted.

5. Weep Holes

In case of abutment retaining walls and wing walls, weep holes as shown on the drawings or directed by the Engineer shall be provided in the masonry to drain moisture from the backfilling Weep holes shall be 8 cm wide, 15 cm high and shall extend through the full width of the masonry with slope of about 1 vertical to 20 horizontal towards the draining face.

The spacing of weep holes shall be as shown on the drawings with the lowest one at about 15cm above the low water level or ground level whichever is higher or as directed by the Engineer.

6. Measurement for Payment

a) Brick Masonary shall not be measured separately for payment. For avoidance of doubt cost of brick masonary and following associated works are incidental to scope of work and deemd to have included in Price quoted by Contractor.

b) Associated works: shall include the cost of all labour, materials, tools and plant, scaffolding and other expenses incidental to the satisfactory completion of the work as described herein above and as shown on the drawings. The rate for work shall also include:

c) Dewatering required for completing this item and till the mortar of masonry pointing and plastering is properly set.

d) watering the masonry and

e) cleaning the site round the brick-work so as to restore the area to its original condition.

f) The rate for work shall also include full compensation for using specially moulded bricks on the face of walls with batter and provision of weep holes.

12. PLASTERING AND POINTING

1. SCOPE

These specifications cover the use of plastering for masonry and RCC work, pointing for brick and stone masonry work.

2. APPLICABLE INDIAN STANDARDS

The provision of the latest revisions of the following IS codes shall form a part of this specification to the extent they are relevant.

IS: 269	Specification for ordinary rapid hardening and low heat Portland cement
IS: 712	Building Lines
IS: 1200	(Part XII) Method of measurement of building and Civil Engg. Works – Plastering and Pointing
IS: 1542	Specification for sand for plaster
IS: 1630	Mason's Tools for Plaster work and pointing work.
IS: 1661	Code of practice for application of cement lime plaster finishes
IS: 10067	Material Constants for Building Works

Other I. S. Codes, not specifically mentioned here, but pertaining to plastering work, form part of these specifications.

3. GENERAL

3.1. Cement Mortar

Cement mortar shall have the proportion of cement to sand as specified and shall comply with relevant clauses of concrete specifications.

Cement: Cement shall conform to IS: 269 Ordinary Portland cement shall be used. The weight of ordinary Portland cement shall be taken as 50 kg per bag. The Contractor shall ensure that the cement is of sound and requiring quality before using it. Any cement which has deteriorated caked or which has been damaged shall not be used. The specifications covered under the section Concrete' shall be applicable in addition.

Water: Water for mixing cement mortar or concrete shall not be salty or brackish and shall be clean, reasonably clear and free from objectionable quantities of silt and races of oil, acid and injurious alkali, salts, organic matter and other deleterious material which will either weaken the mortar or concrete or cause efflorescence. Sea water shall not be used. Water fit for drinking shall generally be found suitable for mixing cement mortar. Water fit curing mortar or concrete shall not be too acidic or alkaline. It shall have pH value above 6. Sea water shall not be used for curing purpose.

Fine Aggregate: All fine aggregate shall conform to IS: 383 - 1963 and relevant portion of IS: 515-1959. Sand shall be clean, well graded, hard, strong, durable and gritty particles free from injurious amounts of dust, clay, kankar nodules, soffit or flaky particles, shale, alkali, salts, organic matter loam mica or other deleterious substances and shall be

approved by the Engineer. The maximum size of particles shall be limited to 5 mm (about 3/16"). If the fine aggregate contains more than 4 per cent of clay, dust or silt, it shall be washed.

The fine aggregate for cement mortar for masonry and first coat of plaster should generally satisfy the following grading:

IS Sieve	Percentage by wt. passing sieve
4.75 mm	100
2.36 mm	80 - 95
1.18mm	70 - 90
600 microns	40 — 85
300 microns	5 - 50
150 microns	0 -10

The fineness modulus shall not exceed 3.00.

The fine aggregate for cement mortar for fine joints of ashlar masonry, pointing and second coat of plaster may have the following grading:

IS Sieve	Percentage by wt. passing sieve
4.75 mm	100
2.36 mm	80 - 95
1.18mm	70 - 90
600 microns	40 - 85
300 microns	5 - 50
150 microns	0 -10

The fineness modulus shall not exceed 1.6 IS: 2116 - 1980 shall generally apply for sand for plaster. The fine aggregate should be stacked carefully on a clean, hard surface so that it will not get mixed up with deleterious foreign materials.

3.2. Scaffolding,

Scaffolding shall be double and shall be erected with steel sections or pipes of adequate strength so as to be safe for construction operations. The contractor shall take all measures to ensure the safety of the work and working people. Any instructions of the Engineer in this respect shall also be complied with. The contractor shall be entirely responsible for any damage to properly or injury to persons resulting from ill erected scaffolding, defective ladders and materials or otherwise arising out of his default in this respect. Proper scaffolding shall be provided to allow easy approach to every part of the work. Overhead work shall not be allowed.

3.3. Tools and Accessories

Tools and accessories used in plaster work shall conform to IS: 1630. All tools shall be cleaned by scrapping and washing at the end of each day's work or after use. Metal tools shall be cleaned after each operation. All tools shall be examined to see that they are thoroughly cleaned before plastering is begun.

3.4. Programme of work in relation to plastering

The programme of other building operations before, during and after plastering shall be according to the instructions contained in clause 9 of IS: 1661.

3.5. General Precaution in plastering

All general precautions as specified in IS. 1661, Clause 9, shall be taken and preparation of the background shall be done as laid down in IS: 1661, Clause 13. Care shall be taken to see that other parts of the work or adjacent works are not damaged while plastering.

3.6. Preparatory work

All joints in the face work that is to be plastered shall be raked out to depth equal to not less than the width of the joints or as directed by the Engineer. The raking shall be done taking care not to allow by chipping of masonry. In new work the raking out shall be done when the mortar in the joints is still green. Smooth surfaces of concrete, old plaster, etc. must be suitably roughened to provide necessary bond for the plaster. All dirt, soot, oil paint or any other material that might interfere with satisfactory bond shall be removed. In the case of stone masonry, scrubbing on the walls to receive the plaster shall not be more than 12 mm (1 %"). The surface to be plastered shall be cleaned and scrubbed with fresh water and kept wet for 6 hours prior to plastering. It shall be kept damp during the progress of the work. The plastering shall not be commenced unless the preparatory work is passed in writing by the Engineer.

In hand mixed mortar, cement and sand in the special proportions shall be thoroughly mixed dry on a clean impervious platform. Fresh and clean water as specified above shall be added gradually and thoroughly mixed to form a stiff plastic mass of uniform colour so that, each particle of sand shall be completely covered with a film of wet cement. The water cement ratio may be as under or as directed by the Engineer.

Cement	Sand	Water-Cement Ratio	Qty of Water per 50 kg of cement (Litres)
1	1	0.25	12.5
1	1- 1/2	0.28	19
1	2	0.3	15
1	2- 1/2	0.35	17.5
1	3	0.4	20
1	4	0.53	26.5
1	5	0.6	30
1	6	0.7	35
1	8	0.9	45

Machine mixed mortar shall be prepared in an approved mixer. Water cement ratio shall be as per hand mixed mortar. The mortar so prepared shall be within 30 minutes of adding water should be used in the work. The mortar remaining unused after that period mortar which has partially hardened or is otherwise damaged shall not be retempered or remixed. It shall be destroyed or thrown away.

3.7. Gauges

Patches of plaster 15cm x 15cm shall be put on about 3 m apart as gauges to ensure even plastering in one plane.

3.8. Workmanship

Plastering:

In all plaster work the mortar shall be firmly applied with somewhat more than the required thickness and well pressed into the joints and on the surface and rubbed and levelled with a flat wooden rule to give required thickness. Long straight edges shall be freely used to give perfectly plane and even surface. All corners must be finished to their true angles or rounded as directed by the Engineer. The surface shall be finished to plane or curved surface as shown on the plan or directed by the Engineer, and shall present a neat appearance. The mortar shall adhere to the masonry surface intimately when set and there should be no hollow sound when struck. Cement plastering should be done in squares or strips as directed. Plastering shall be done from top downward.

First or Backing Coat

The first coat of the specified thickness shall be applied as described above. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days depending upon weather conditions. The surface shall not be allowed to dry during this period.

4. SAND FACED PLASTER IN CEMENT MORTAR

4.1. Base Coat:

The base coat plaster shall be of cement mortar 1:4. Waterproofing compound of approved make shall be added according to the makers' instructions to make the mortar waterproof. The plaster with this mortar shall be laid as specified above with a thickness of not more than 12 mm for brick work and concrete surfaces, and 15 mm for rubble stone masonry. Keys shall be formed on the surface by thoroughly combing it with wavy horizontal lines about 12 mm apart and about 3 mm deep when the mortar is still plastic. The base coat shall be cured for not less than 2 days.

4.2. Sand Faced Treatment

The cement mortar for sand faced plaster shall have washed Kharasalis or similar type of approved sand with slightly larger proportion of coarse material. The proportion of cement to sand shall be 1:4. The water is added gradually to make the mixture homogeneous. The thickness of finishing coat shall not exceed 7 mm. After application, the surface should be finished with a wooden flat, lined with cork and tapped gently to retain a coarse surface

texture. When the finishing coat has hardened, the surface shall be kept moist continuously for 14 days.

5. ROUGH COAT CEMENT PLASTER WITH CEMENT MORTAR

5.1. Base Coat

The first coat of plaster shall be of cement mortar of 1:4 mix and applied according to the relevant provisions of IS: 1661 Clause 14. 1. The finished thickness of the first coat shall be 12 mm for brick masonry or concrete surface and 1 5 mm for rubble stone masonry. The plaster shall be laid by throwing the mortar (by using a strong whipping motion) on the prepared surface with a trowel in a uniform layer, and pressed to form a good bond. The surface shall be roughened.

5.2. Second Coat

The second coat shall be the rough coat mixture consisting of aggregate, which may vary in size from 5 to 8 mm and may consist of specially graded mixture mixed with fine sand and cement. The proportion of cement to sand and aggregate shall be 1:11/2:3. It shall be flung upon the first coat with large trowels to form an even protective coat. The second coat must be applied while the first coat is still soft and plastic. The work shall generally conform to clause 16.5 of IS: 166. The thickness of the coat shall be about 12 mm.

5.3. Curing

The plastered/ pointed face shall be kept continuously wet for 7 days suitably protected from all damage.

6. MEASUREMENT AND RATE

Plaster/ pointing shall not be measured separately for payment. For avoidance of doubt it is clarified that cost of Plaster/ Pointing is incidental to scope of work and deemd to have included in Price quoted by Contractor.

13. INTERLOCKING PAVING BLOCKS

The cement used in the manufacture of high quality pre-cast concrete paving blocks shall be conforming to IS 8112 (43 grade Ordinary Portland cement) or IS 12269 (Ordinary Portland Cement). The minimum cement content in concrete used for making Paver blocks should be 380 Kg/cum.

The fine and coarse aggregates shall consist of naturally occurring crushed or uncrushed materials which apart from the grading requirements comply with IS-383-1970. The fine aggregate used shall contain a minimum of 25% natural silicon sand. Lime stone aggregates shall not be used. Aggregates shall contain no more than 3% by weight of clay & shall be free from deleterious salts and contaminants..Contractor shall make good the affected paver block pavement area as per the requirement specified below.

The water shall be clean and free from any deleterious mater. It shall meet the requirements stipulated in IS: 456-2000. Any other materials/ingredients used in the concrete shall conform to IS specifications.

Paver Block Characteristics

The concrete pavers should have perpendicular ties; the same should be retained until the laying.

The surface should be of anti skid and anti glare type.

The Paver should have uniform chamfers to facilitate easy drainage of surface run off.

The pavers should have uniform interlocking space of 2mm to 3mm to ensure compacted sand filling after vibration on the Paver surface.

The concrete mix design should be followed for each batch of materials separately and automatic batching plant is to be used to achieve uniformity in strength and quality.
The pavers shall be manufactured in single layer only.

Skilled labour should be employed for laying blocks to ensure line and level of laying, desired shape of the surface and adequate compaction of the sand in the joints.

The pavers shall be of cement grey colour without any pigment.

The bedding sand shall consist of clean well graded sand passing through 4.75 mm sieve and suitable to concrete manufacture. The bedding should be from either a single source or blended to achieve the following grading.

Contractor shall be responsible to ensure that single sized, gap graded sands or Sands containing an excessive amount of fines or plastic fines are not used.The sand use for bedding shall be free of any deleterious soluble salts or other contaminants likely to cause

efflorescence. The sand shall be of uniform moisture content and within 4% -8% by weight when spread and shall be protected against rain when stockpiled prior to spreading. Saturated sand shall not be used. The bedding sand shall be spread loose in a uniform layer as per drawing. The compacted uniform thickness shall be of 50mm and within + 5 mm. Thickness variations shall not be used to correct irregularities in the base course surface. The spread sand shall be carefully maintained in a loose dry condition and protected against pre-compaction both prior to and following screeding. Any pre-compacted sand or screeded sand left overnight shall be loosened before further laying of paving units take place. Sand shall be slightly screeded in a loose condition to the pre determined depth only slightly ahead of the laying of the paving unit. Any depressions in the screeded sand exceeding 5mm shall be loosened, raked and re-screeded before laying of paving units.

Laying of Paving Units:

Paving units shall be laid matching with surrounding design pattern throughout the pavement. Once the laying pattern has been established, it shall continue without interruption over the entire pavement surface. Cutting of blocks, the use of infill concrete or discontinuities in laying pattern is not be permitted in other than approved locations.

Paving units shall be placed on the un-compacted screeded sand bed to the nominated laying pattern, care being taken to maintain the specified bond throughout the job. The first row shall be located next to an edge restraint. Specially manufactured edge paving units are permitted or edge units may be cut using a power saw, a mechanical or hydraulic guillotine, bolster or other approved cutting Machine.

Paving units shall be placed to achieve gaps nominally 2 to 3mm wide between adjacent paving joints. No joint shall be less than 1.5 mm nor shall more than 4 mm. frequent uses of string lines be used to check alignment. In this regard, the "laying face" shall be checked at least every two meters as the face proceeds. Should the face become out of alignment, it must be corrected prior to initial compaction and before further laying job is proceeded with. In each row, all full units shall be laid first. Closure units shall be cut and fitted subsequently such losure units shall consist of not less than 25% of a full unit. To infill spaces between 25mm and 50mm wide, a concrete having screened sand, coarse aggregate mix and strength of 45 N/Sq.mm shall be used. Within such mix the nominal aggregate size shall not exceed one third the smallest dimension of the infill spaces. For smaller spaces dry packed mortar shall be used. Except where it is necessary to correct any minor variations occurring in the laying before the paving units shall not be hammered into position. Where adjustment of position necessary care shall be taken to avoid premature compaction of the sand bedding.

Joint Filling

As soon as practical after compaction and in any case prior to the termination of work on that day and prior to the acceptance of construction traffic, sand for joint filling shall be spread over the pavement. The jointing sand shall be broomed to fill the joints. Excess sand shall then be removed from the pavement surface and the jointing sand shall be compacted

with not less than one (1) pass the plate vibrator and joints refilled with sand to full depth. This procedure shall be repeated until all joints are completely filled with sand. No traffic shall be permitted to use the pavement until al joints have been completely filled with sand and compacted. Both the sand and paving units shall be dry when sand is spread and broomed into the joints to prevent premature setting of the sand.

14. ROADS AND PAVEMENTS

1. GENERAL:

For reinstatement of disturbed /diamaged pavement during Chamber Construction / laying pipe lines and allied works, Contractor shall follow **MoRTH** specification in addition to particular requirement specified here under:

Embankmnet construction/filling around chambers: The area around chamber chall be filled with saturated sand and compacted with mechanical compactor to ensure 100% compaction in restricted area before receiving the road crust layers.

Embankment Construction/ back filling in pipe line trench: Back filling in trenches will be done by approved excavated material available from excavation of trenches.
Reinstatement of Pavement shall include providing, laying 200 mm thick Granular sub base (GSB), providing and laying 320 mm thick Wet Mix Macadum (WMM), providing and laying 40 mm thick bitumen concrete (BC)

Measurment and Rate

Reinstatement of disturbed /diamaged pavement ,including filling the excavated trenches with approved excavated material ,sand filling around Chambers are incidental to scope of work and deemd to have included in Price quoted by Contractor.

B) FLOWMETER SPECIFICATIONS

1. TECHNICAL SPECIFICATIONS FOR FLOW METERS

Type	Clamp-On type Ultrasonic Flow Meter (Refer Data sheet for more details)
Purpose	To measure the instant flow and totalized flow in the designated pipeline and providing Reports with time stamping.
Power Source	Battery Operated; battery life minimum of 12 hours
Accessories Requirement	All required accessories including SS Strapping chain, conductive gel, pipe surface cleaner, power supply bank, carry case, transmitter temporary mounting stand etc.
Material of pipelines on which flows are to be measured	CI, DI, PVC, MS (Refer attached Data Sheet for more details) (All pipelines are underground)
Accuracy	+- 1% at site
Diameter Range	100mm to 800mm
Other Conditions	1. Flow meters should be calibrated from an accredited organization; the calibration certificate should not be more than one year old 2. Flow meters should be capable of measuring bi-directional flows 3. Flow meters should measure instantaneous flows and cumulative flows and should have facility to download records 4. Experience staff for operation of flow meters knowing correct methods of installation on various pipes should be made available

DATA SHEET FOR FLOW METER TO BE FILLED BY FLOWMETER

Sr. No.	Parameter	Specification
1	Type	**Clamp - On** Type Ultrasonic Flow Transmitter
2	Purpose	For Temporary Flow Measurement
3	Make	VTS
4	Model No	VTS
5	Valid Calibration Certificate	Required from National Accredited body / VTC
6	Tag no	Refer Table-1
7	Line Size / MOC of Pipe	Refer Table-1 and CI, DI, PVC, MS
8	Service Media	Water
9	Required Flow Range	VTC
10	Operating Pressure	VTC
11	Operating Temperature	VTC
12	No of Path	Single Path or VTC
13	Number of Sensors requirement	VTS

Sr. No.	Parameter	Specification
14	Measurement Principle	Transit Time
15	Sensor Assembly	Clamp-On Type with SS Strapping and other accessories as required.
16	Mounting of Sensors	On pipe surface with conductive Gel
17	Accuracy	± 2% of full scale of flow range at Site.
18	Repeatability	± 0.25 % or better / VTC
19	Response Time	Less than 5 sec or VTC
20	Range ability	Suitable for 100 mm to 800 mm Dia pipe / VTC
21	Sensor body material	SS 316 or VTS
22	Transmitter enclosure class	IP 65 / VTS
23	Cable length between sensor& transmitter	As per site requirement / VTS
24	Power Supply / Consumption	Battery Operated; battery life minimum of 12 hours / VTC OR standby battery should be available.
25	Output Requirement	Instant Flow and Totalized Flow Reading. Shall be stored in nonvolatile memory with time stamping for Reporting.

TABLE 1: Tagging Details for flow meter.

Sr. No	Tag No.	Line Material/ Line size (mm)	Pros. Fluid. Viscosity Density (cp)	No. of Path	No of Sensors per Unit	Measuring Range- (m3/hr)
1	F-HL	750 DI	Clear Water	VTC	VTC	VTS
2	F2	525 CI	Clear Water	VTC	VTC	VTS
3	F10	300 CI	Clear Water	VTC	VTC	VTS
4	F7	450 CI	Clear Water	VTC	VTC	VTS
5	F16	525 CI	Clear Water	VTC	VTC	VTS
6	F20A	450 CI	Clear Water	VTC	VTC	VTS
7	F20B	400 DI	Clear Water	VTC	VTC	VTS
8	F13	500 DI	Clear Water	VTC	VTC	VTS
9	F21	250 CI	Clear Water	VTC	VTC	VTS
10	F19	400 CI	Clear Water	VTC	VTC	VTS

VTS: Vendor to Confirm

VTC: Vendor to Specify

Note: The Location of flow meter is given above in Table no 2.

VOLUME VI

(Drawings)

Contents

VOLUME VI

List of Drawings

Sr. No.	Drawing No	Drawing Name	Revision
1	WTE – 2297-00-W-1.01-R2 Sheet 1 of 1	FLOW METER LOCATION FOR ZONE 1, 2, 3, 4, 5, 10, 11, 12 and 24	Rev 2
2	WTE – 2297-00-W-1.02-R1 Sheet 1 of 1	FLOW METER LOCATION FOR ZONE 7, 8 & 9	Rev 1
3	WTE – 2297-00-W-1.03-R1 Sheet 1 of 1	FLOW METER LOCATION FOR ZONE 13	Rev 1
4	WTE – 2297-00-W-1.04-R1 Sheet 1 of 1	FLOW METER LOCATION FOR ZONE 16 & 20	Rev 1
4	WTE – 2297-00-W-1.05-R1 Sheet 1 of 1	FLOW METER LOCATION FOR ZONE 17	Rev 1
5	WTE – 2297-00-W-1.06-R1 Sheet 1 of 1	FLOW METER LOCATION FOR ZONE 21	Rev 1
6	WTE – 2297-00-W-1.10-R1 Sheet 1 of 1	FLOW METER LOCATION FOR ZONE 19	Rev 1

VALVE OPERATION

ZONE 1

1. CHAKRI VALVE SHALL OPEN FROM 4.30 AM TO 3.30 PM ON 'X' DAY.
2. PROPOSED 600MM VALVE ON 525MM CI PIPE NEAR COLLECTOR BUNGALOW SHALL OPEN FROM 4.30am TO 3.30 PM ON 'X' DAY.
3. CIVIL HOSPITAL VALVE SHALL CLOSE ON 'X' DAY

ZONE 2

1. CHAKRI VALVE OPEN FROM 4.30 AM TO 3.30 PM ON 'X' DAY.
2. PROPOSED 600MM VALVE ON 525MM CI PIPE NEAR COLLECTOR BUNGALOW SHALL OPEN FROM 4.30am TO 3.30 PM ON 'X' DAY.
3. CIVIL HOSPITAL VALVE SHALL CLOSE ON 'X' DAY
4. LIK VALVE SHALL OPEN FROM 5.00AM TO 8.00AM ON 'X' DAY
5. KUMBHAR VES VALVE, A1 VALVE AND VIJAPUR VES VALVE SHALL CLOSE DURING OPERATION OF LIK VALVE.

ZONE 3

1. CHAKRI VALVE OPEN FROM 4.30 AM TO 3.30 PM ON 'X' DAY.
2. PROPOSED 600MM VALVE ON 525MM CI PIPE NEAR COLLECTOR BANGLOW SHALL OPEN FROM 4.30am TO 3.30 PM ON 'X' DAY.
3. CIVIL HOSPITAL VALVE SHALL CLOSE ON 'X' DAY
4. KUMBHAR VES VALVE SHALL OPEN FROM 5.00AM TO 8.00AM ON 'X' DAY.
5. LIK VALVE, VIJAPUR VES VALVE , AND A1 VALVE SHALL CLOSE DURING OPERATION OF KUMBHAR VES VALVE.

ZONE 4

1. CHAKRI VALVE OPEN FROM 4.30 AM TO 3.30 PM ON 'X' DAY.
2. PROPOSED 600MM VALVE ON 525MM CI PIPE NEAR COLLECTOR BUNGALOW SHALL OPEN FROM 4.30am TO 3.30 PM ON 'X' DAY.
3. CIVIL HOSPITAL VALVE SHALL CLOSE ON 'X' DAY
4. KUMBHAR VES VALVE SHALL OPEN FROM 5.00AM TO 1.00PM ON 'X' DAY.
5. A1 VALVE SHALL OPEN FROM 10.30AM to 1.00 PM ON 'X' DAY
6. LIK VALVE, VIJAPUR VES VALVE , SHALL CLOSE DURING OPERATION OF KUMBHAR VES VALVE AND A1 VALVE.

ZONE 5

1. CHAKRI VALVE OPEN FROM 4.30 AM TO 3.30 PM ON 'X' DAY.
2. PROPOSED 600MM VALVE ON 525MM CI PIPE NEAR COLLECTOR BANGLOW SHALL OPEN FROM 4.30am TO 3.30 PM ON 'X' DAY.
3. CIVIL HOSPITAL VALVE SHALL CLOSE ON 'X' DAY
4. VIJAPUR VES VALVE SHALL OPEN FROM 1.00PM TO 3.30PM ON 'X' DAY.
5. LIK VALVE, KUMBHAR VES VALVE , AND A1 VALVE SHALL CLOSE DURING OPERATION OF VIJAPUR VES VALVE.

ZONE 10

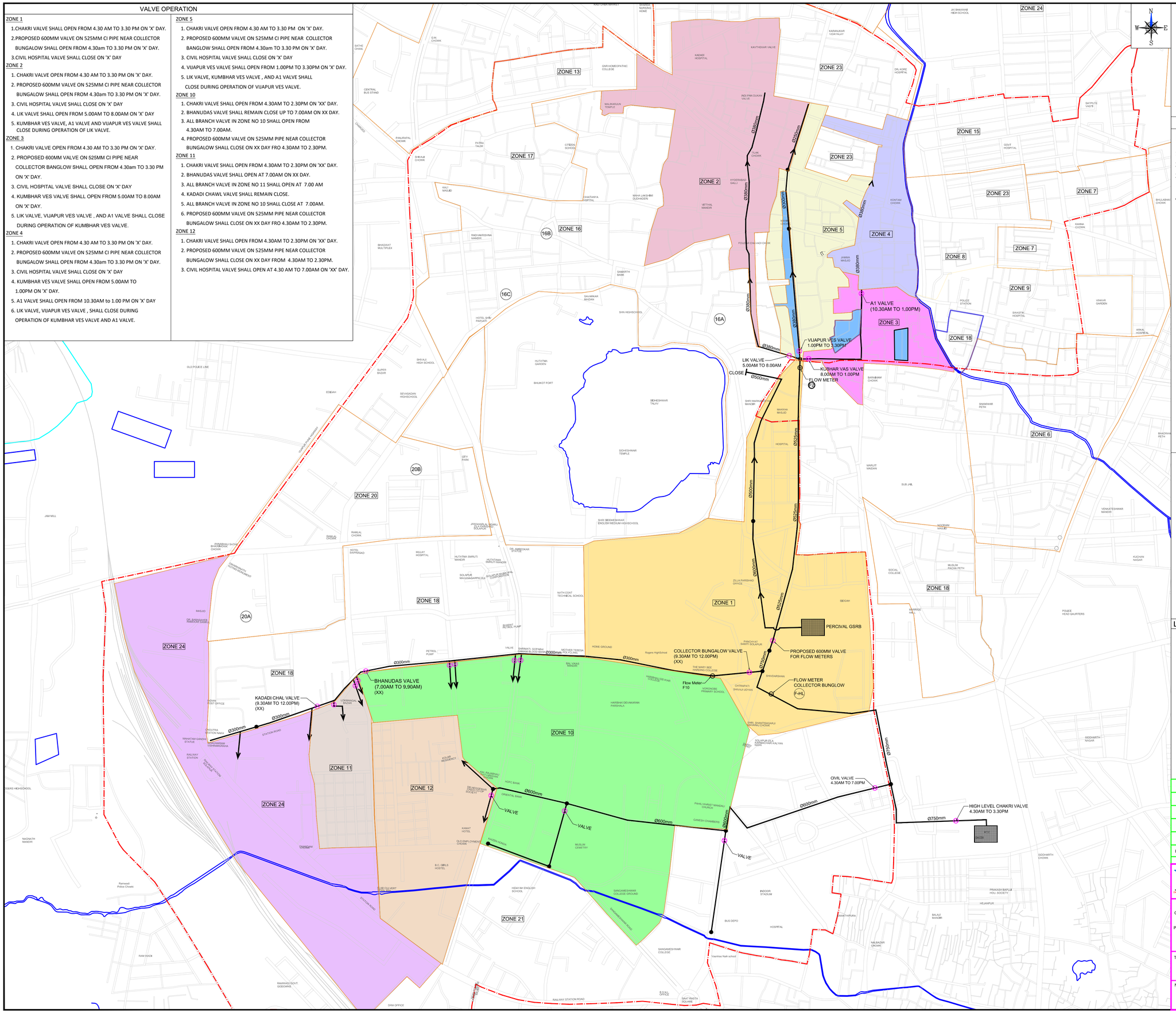
1. CHAKRI VALVE SHALL OPEN FROM 4.30AM TO 2.30PM ON 'XX' DAY.
2. BHANUDAS VALVE SHALL REMAIN CLOSE UP TO 7.00AM ON XX DAY.
3. ALL BRANCH VALVE IN ZONE NO 10 SHALL OPEN FROM 4.30AM TO 7.00AM.
4. PROPOSED 600MM VALVE ON 525MM PIPE NEAR COLLECTOR BUNGALOW SHALL CLOSE ON XX DAY FRO 4.30AM TO 2.30PM.

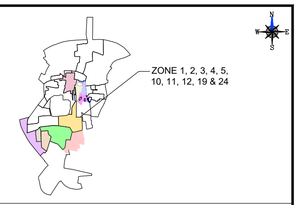
ZONE 11

1. CHAKRI VALVE SHALL OPEN FROM 4.30AM TO 2.30PM ON 'XX' DAY.
2. BHANUDAS VALVE SHALL OPEN AT 7.00AM ON XX DAY.
3. ALL BRANCH VALVE IN ZONE NO 11 SHALL OPEN AT 7.00 AM
4. KADADI CHAWL VALVE SHALL REMAIN CLOSE.
5. ALL BRANCH VALVE IN ZONE NO 10 SHALL CLOSE AT 7.00AM.
6. PROPOSED 600MM VALVE ON 525MM PIPE NEAR COLLECTOR BUNGALOW SHALL CLOSE ON XX DAY FRO 4.30AM TO 2.30PM.

ZONE 12

1. CHAKRI VALVE SHALL OPEN FROM 4.30AM TO 2.30PM ON 'XX' DAY.
2. PROPOSED 600MM VALVE ON 525MM PIPE NEAR COLLECTOR BUNGALOW SHALL CLOSE ON XX DAY FROM 4.30AM TO 2.30PM.
3. CIVIL HOSPITAL VALVE SHALL OPEN AT 4.30 AM TO 7.00AM ON 'XX' DAY.





KEY PLAN

NOTES :-

1. ALL DISTRIBUTION NETWORK IS NOT SHOWN FOR CLARITY OF DRAWING.
2. THE DRAWING IS NOT TO SCALE.
3. THE LOCATION OF FLOW METER AND VALVE SHOWN ARE INDICATIVE ONLY. ACTUAL LOCATION SHALL BE SHOWN BY CLIENT.
4. THE LOCATION OF PRESSURE GUAGES WILL BE SHOWN BY ENGINEER IN CHARGE OF TIME OF PRESSURE READINGS. HOWEVER LOCATION ARE NOT SHOWN FOR CLARITY.

LEGEND :

- VALVE
- E.S.R. / G.S.R.
- FM FLOW METER
- ROAD
- RAILWAY
- ZONE BOUNDARY
- ABD BOUNDARY
- X 1ST DAY WATER SUPPLY
- XX 2ND DAY WATER SUPPLY
- XXX 3RD DAY WATER SUPPLY
- XXXX 4TH DAY WATER SUPPLY

Rev.	Date	Description	Drawn	Chk.	App.
4					
3					
2	07.03.18	CHANGE IN DESCRIPTION OF TITLE	BR	GNG	MS
1	26.02.18	FOR TENDER	BR	GNG	MS
0	05.02.18	FOR TENDER	KP	GNG	MS

File name :- WTE-2297-W-1.01 ZONE 1,2,3,4,5,10,11,12,24 REV 2.dwg

Wadia Techno Engg. Services Ltd. Mumbai

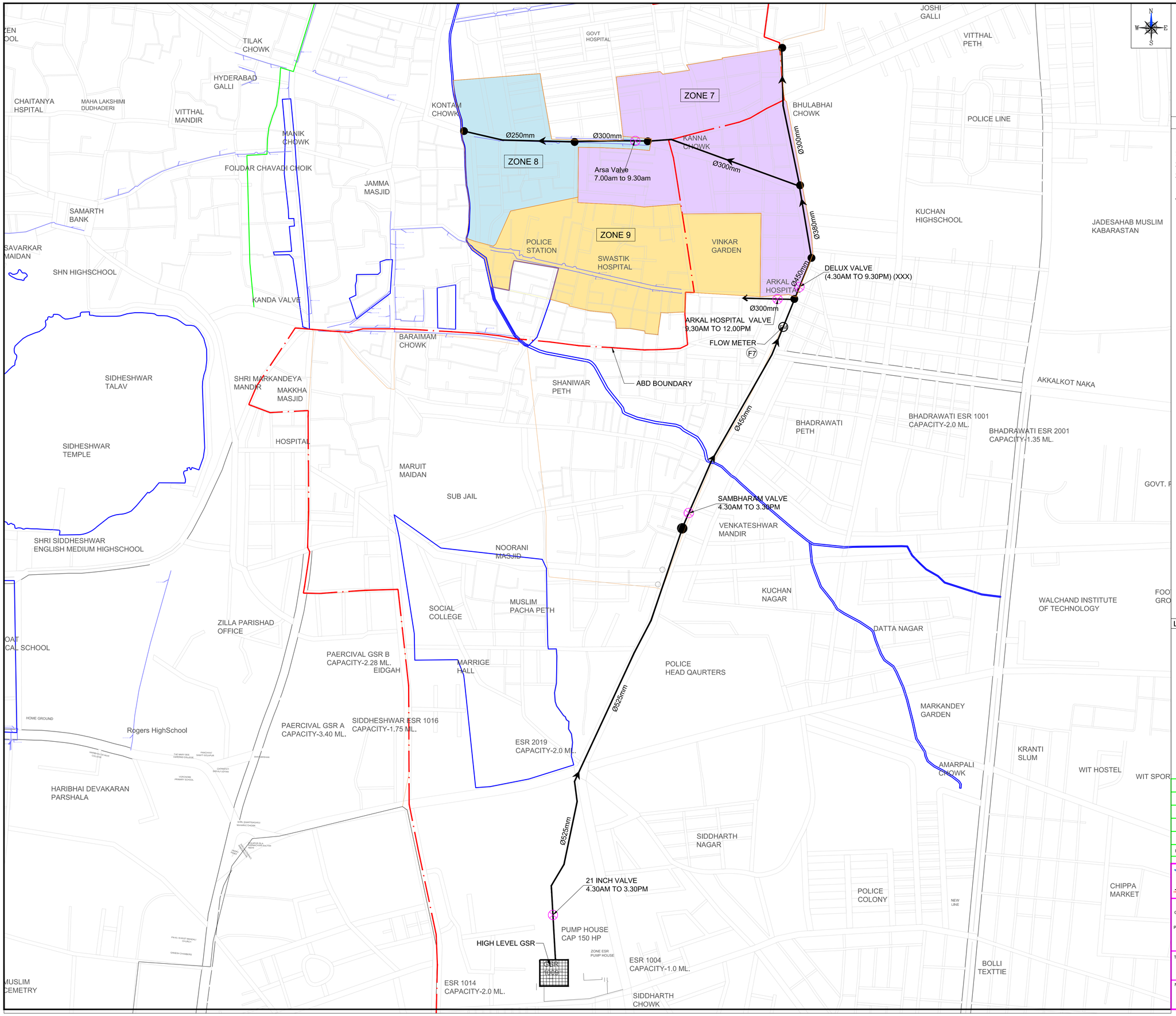
Louis Berger

Client : SOLAPUR CITY DEVELOPMENT CORPORATION LTD.

Project : TO DESIGN, DEVELOP, MANAGE & IMPLEMENT URBAN INFRASTRUCTURE SERVICES PROJECTS UNDER SMART CITY MISSION (SCM) IN SOLAPUR CITY

Title : FLOW METER LOCATION FOR ZONE 1, 2, 3, 4, 5, 10, 11, 12 and 24

North	Scale	Job no.	Code	Discipline	Drg.no.	Rev.	Sheet	Of
	A 1 NTS	WTE-2297	00	W	1.01	R2	1	1



KEY PLAN

NOTES :-

1. ALL DISTRIBUTION NETWORK IS NOT SHOWN FOR CLARITY OF DRAWING.
2. THE DRAWING IS NOT TO SCALE.
3. THE LOCATION OF FLOW METER AND VALVE SHOWN ARE INDICATIVE ONLY. ACTUAL LOCATION SHALL BE SHOWN BY CLIENT.
4. THE LOCATION OF PRESSURE GUAGES WILL BE SHOWN BY ENGINEER IN CHARGE OF TIME OF PRESSURE READINGS. HOWEVER LOCATION ARE NOT SHOWN FOR CLARITY.

ZONE 7
VALVE OPERATION
1. SAMBHARAM VALVE SHALL OPEN FROM 4.30AM to 12 NOON ON XXX DAY.
2. DELUX VALVE SHALL REMAIN OPEN FROM FROM 4.30AM TO 7.00AM ON XXX DAY
3. ARKAL VALVE AND ARSAVALVE SHALL REMAIN CLOSE DURING OPERATION OF DELUX VALVE .

ZONE 8
VALVE OPERATION
1. SAMBHARAM VALVE SHALL OPEN FROM 4.30AM to 12 NOON ON 'XXX' DAY.
2. DELUX VALVE SHALL REMAIN OPEN FROM 4.30AM TO 9.30AM ON 'XXX' DAY.
3. ARSAVALVE SHALL OPEN AT 7.00AM AND CLOSE AT 9.30AM
4. ARKAL VALVE AND BRANCH VALVES BETWEEN DELUX VALVE AND ARSA VALVE SHALL REMAIN CLOSE AT 7.00AM.

ZONE 9
VALVE OPERATION
1. SAMBHARAM VALVE SHALL OPEN FROM 4.30AM to 12 NOON ON 'XXX' DAY.
2. ARKAL VALVE SHALL OPEN AT 9.30AM and CLOSE AT 12 NOON.
3. DELUX VALVE SHALL CLOSE TA 9.30AM ON 'XXX' DAY.

ALLIED PIPING WORK:

FOUR NUMBERS OF 100MM PIPE NEED TO BE INTERCONNECTED FROM BHARTIYA CHOWK TO RANGA CHWOK.

LEGEND :

- VALVE
- E.S.R. / G.S.R.
- FM FLOW METER
- ROAD
- RAILWAY
- ZONE BOUNDARY
- ABD BOUNDARY
- X 1ST DAY WATER SUPPLY
- XX 2ND DAY WATER SUPPLY
- XXX 3RD DAY WATER SUPPLY
- XXXX 4TH DAY WATER SUPPLY

Rev.	Date	Description	Drawn	Chk.	App.
4					
3					
2					
1	07.03.18	CHANGE IN DESCRIPTION OF TITLE	BR	GNG	MS
0	05.02.18	FOR TENDER	KP	GNG	MS

File name :- WTE-2297-W-1.02 ZONE 7,8,9 REV 1.dwg

Wadia Techno Engg . Services Ltd. Mumbai

Louis Berger

Client : SOLAPUR CITY DEVELOPMENT CORPORATION LTD.

Project : TO DESIGN, DEVELOP, MANAGE & IMPLEMENT URBAN INFRASTRUCTURE SERVICES PROJECTS UNDER SMART CITY MISSION (SCM) IN SOLAPUR CITY

Title: FLOW METER LOCATION FOR ZONE 7, 8 & 9

North	Scale	Job no.	Code	Discipline	Drg.no.	Rev.	Sheet	Of
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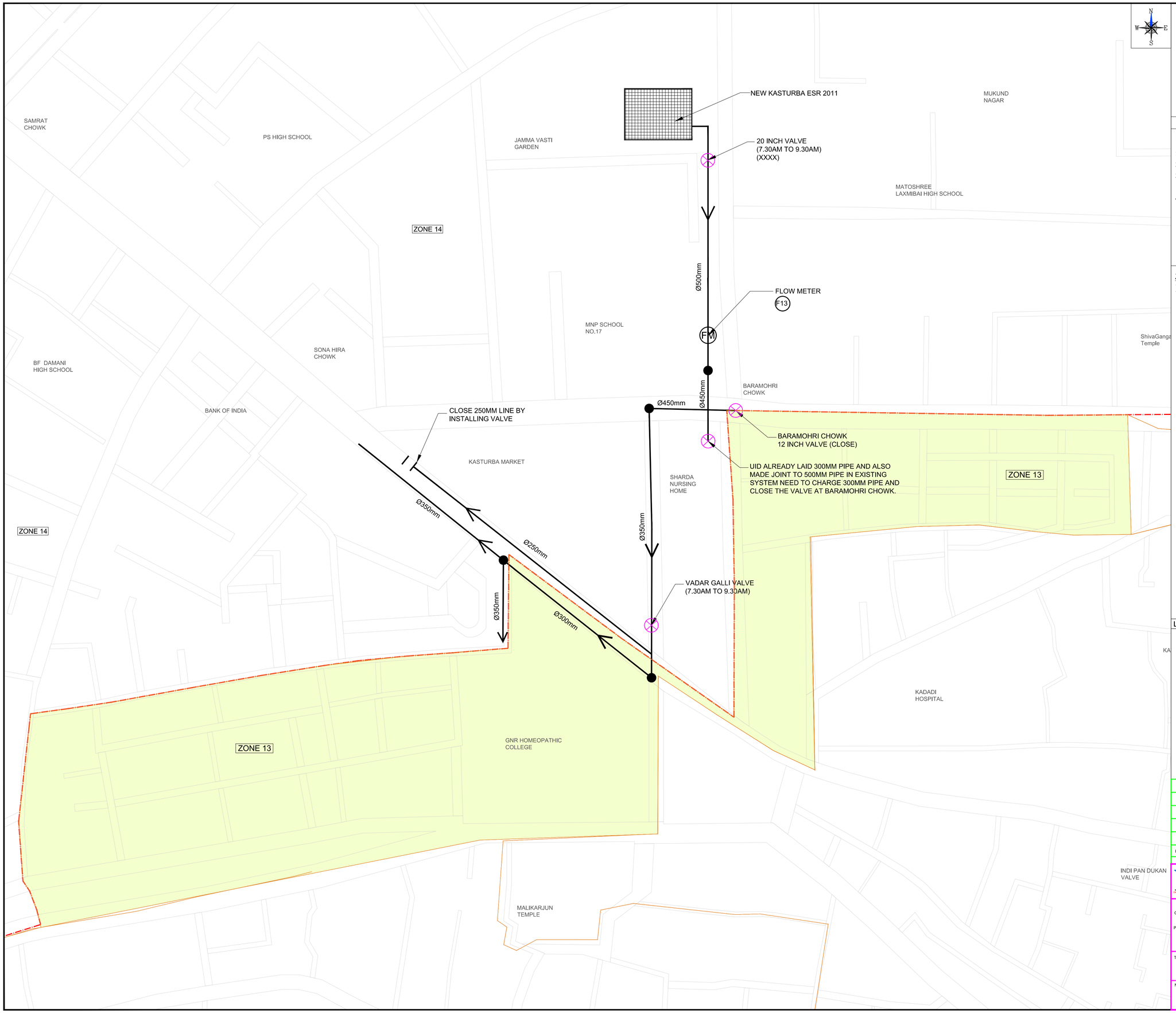

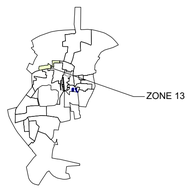

KEY PLAN

NOTES :-

1. ALL DISTRIBUTION NETWORK IS NOT SHOWN FOR CLARITY OF DRAWING.
2. THE DRAWING IS NOT TO SCALE.
3. THE LOCATION OF FLOW METER AND VALVE SHOWN ARE INDICATIVE ONLY. ACTUAL LOCATION SHALL BE SHOWN BY CLIENT.
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ZONE 13.

VALVE OPERATION

1. ZONE 13 FOR FLOW MEASUREMENT IN ABD AREA ONLY, ON 250MM LINE NEAR PANJAB NATIONAL BANK NEED TO PROVIDE VALVE AND CLOSE. UID ALREADY LAID THE 300MM PIPE AND ALSO MADE A JOINT TO 500MM PIPE IN EXISTING SYSTEM. ONLY NEED TO CHARGE 300MM PIPE AND CLOSE THE EXISTING VALVE AT BARAMORI CHOWK ON 300MM PIPE.

LEGEND :

- VALVE
- E.S.R. / G.S.R.
- FM — FLOW METER
- ROAD
- RAILWAY
- ZONE BOUNDARY
- ABD BOUNDARY
- X — 1ST DAY WATER SUPPLY
- XX — 2ND DAY WATER SUPPLY
- XXX — 3RD DAY WATER SUPPLY
- XXXX — 4TH DAY WATER SUPPLY

Rev.	Date	Description	Drawn	Chk.	App.
4					
3					
2					
1	07.03.18	CHANGE IN DESCRIPTION OF TITLE	BR	GNG	MS
0	05.02.18	FOR TENDER	KP	GNG	MS

File name :- WTE-2297-W-1.03 ZONE 13 REV 1.dwg

Wadia Techno Engg. Services Ltd. Mumbai

Louis Berger

Client : SOLAPUR CITY DEVELOPMENT CORPORATION LTD.

Project : TO DESIGN, DEVELOP, MANAGE & IMPLEMENT URBAN INFRASTRUCTURE SERVICES PROJECTS UNDER SMART CITY MISSION (SCM) IN SOLAPUR CITY

Title : FLOW METER LOCATION FOR ZONE 13

North	Scale	Job no.	Code	Discipline	Drg.no.	Rev.	Sheet	Of
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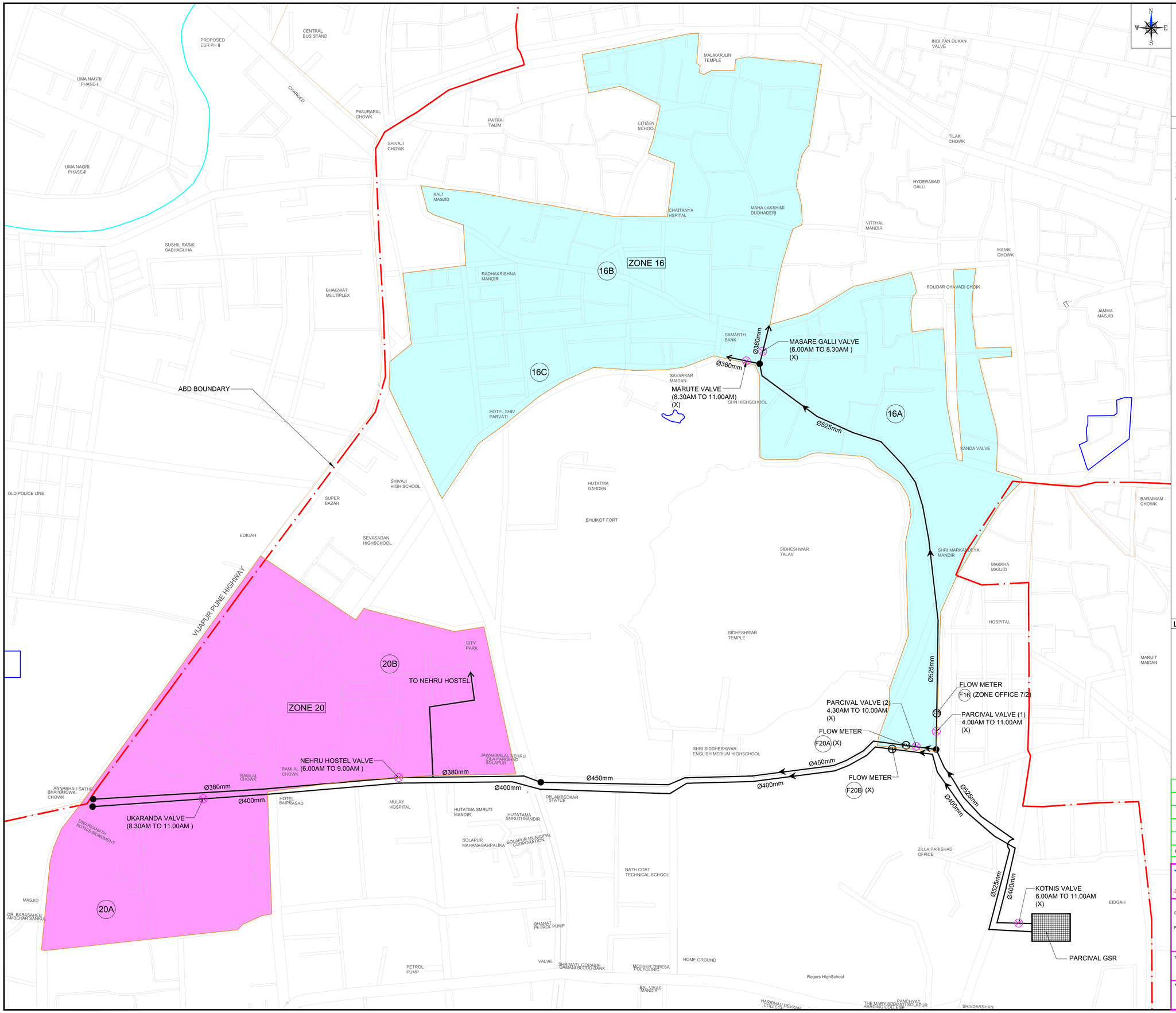

KEY PLAN

NOTES :-

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ZONE 20:-
VALVE OPERATION
1. PARCIVAL VALVE (2) ON 450CI AND 400 DI SHALL OPEN FROM 4.30AM TO 11.00AM.

ZONE 16:-
VALVE OPERATION-
1. PERCIVAL VALVE NO 1 SHALL OPEN FROM 4.00AM TO 11.00AM ON X DAY.
2. ZONE 16 IS DIVIDED IN THREE SUB ZONES VIZ. 16A, 16B AND 16C AS PER VALVE OPERATION IN ZONE NO 16.
3. MASARE GALLI VALVE SHALL OPEN AT 6.00AM AND CLOSE AT 8.30 AM.
4. NARUTE VALVE SHALL OPEN AT 8.30AM AND CLOSE AT 11.00AM
5. MASARE GALLI VALVE SHALL CLOSE DURING OPERATION OF NARUTE VALVE.

LEGEND :

- VALVE
- E.S.R. / G.S.R.
- FM FLOW METER
- ROAD
- RAILWAY
- ZONE BOUNDARY
- ABD BOUNDARY
- X 1ST DAY WATER SUPPLY
- XX 2ND DAY WATER SUPPLY
- XXX 3RD DAY WATER SUPPLY
- XXXX 4TH DAY WATER SUPPLY

Rev.	Date	Description	Drawn	Chk.	App.
4					
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2					
1	07.03.18	CHANGE IN DESCRIPTION OF TITLE	BR	GNG	MS
0	05.02.18	FOR TENDER	KP	GNG	MS

File name :- WTE-2297-W-1.04 ZONE 16,20 REV 1.dwg

Wadia Techno Engg . Services Ltd. Mumbai

Louis Berger

Client : SOLAPUR CITY DEVELOPMENT CORPORATION LTD.

Project : TO DESIGN, DEVELOP, MANAGE & IMPLEMENT URBAN INFRASTRUCTURE SERVICES PROJECTS UNDER SMART CITY MISSION (SCM) IN SOLAPUR CITY

Title: FLOW METER LOCATION FOR ZONE 16 & 20

North	Scale	Job no.	Code	Discipline	Drg.no.	Rev.	Sheet	Of
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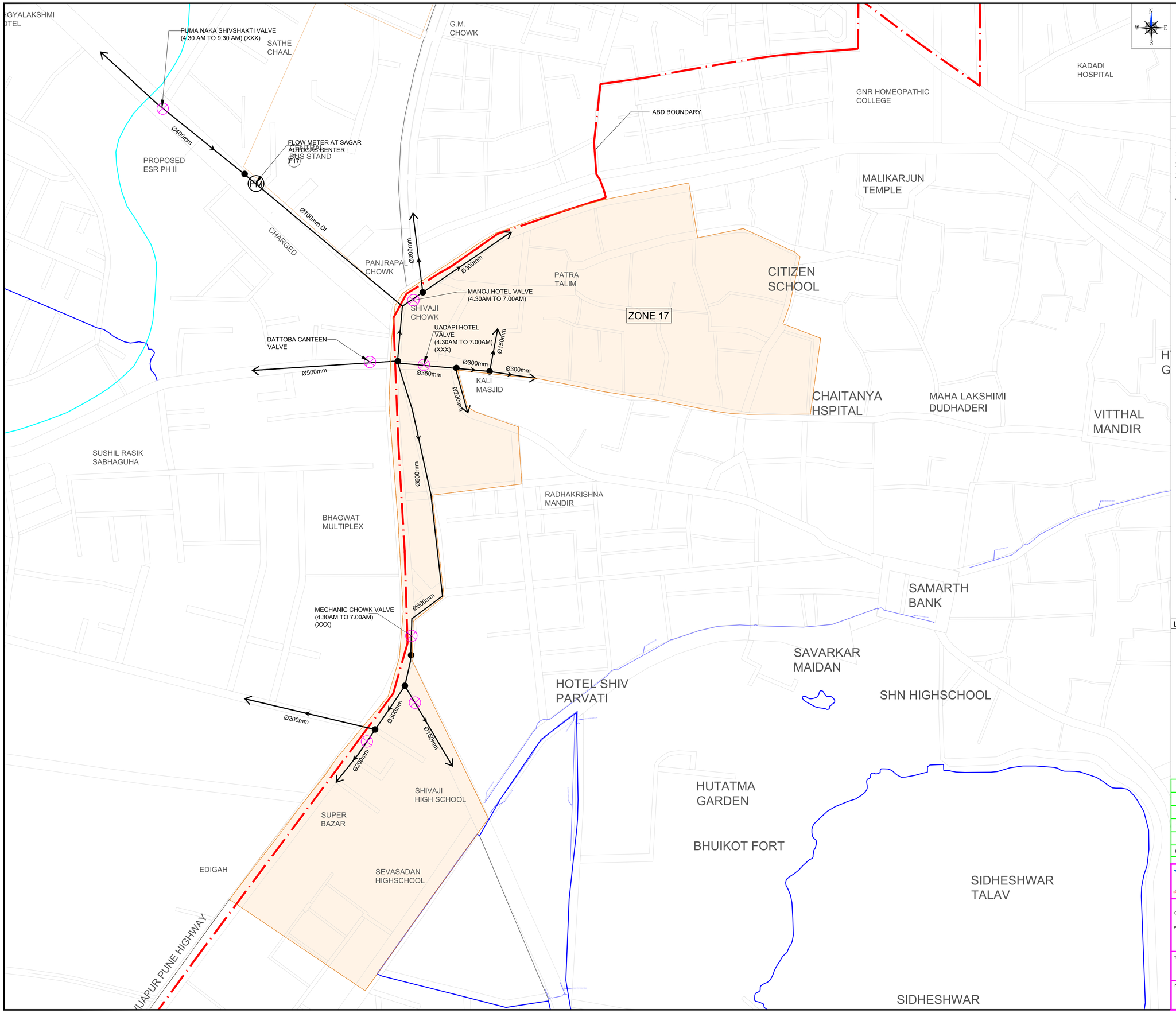

KEY PLAN

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LEGEND :

- VALVE
- E.S.R. / G.S.R.
- FLOW METER
- ROAD
- RAILWAY
- ZONE BOUNDARY
- ABD BOUNDARY
- X 1ST DAY WATER SUPPLY
- XX 2ND DAY WATER SUPPLY
- XXX 3RD DAY WATER SUPPLY
- XXXX 4TH DAY WATER SUPPLY

Rev.	Date	Description	Drawn	Chk.	App.
4					
3					
2					
1	07.03.18	CHANGE IN DESCRIPTION OF TITLE	BR	GNG	MS
0	05.02.18	FOR TENDER	KP	GNG	MS

File name :- WTE-2297-W-1.05 ZONE 17 REV 1.dwg

Wadia Techno Engg . Services Ltd. Mumbai

Louis Berger

Client : SOLAPUR CITY DEVELOPMENT CORPORATION LTD.

Project : TO DESIGN, DEVELOP, MANAGE & IMPLEMENT URBAN INFRASTRUCTURE SERVICES PROJECTS UNDER SMART CITY MISSION (SCM) IN SOLAPUR CITY

Title: FLOW METER LOCATION FOR ZONE 17

North	Scale	Job no.	Code	Discipline	Drg.no.	Rev.	Sheet	Of
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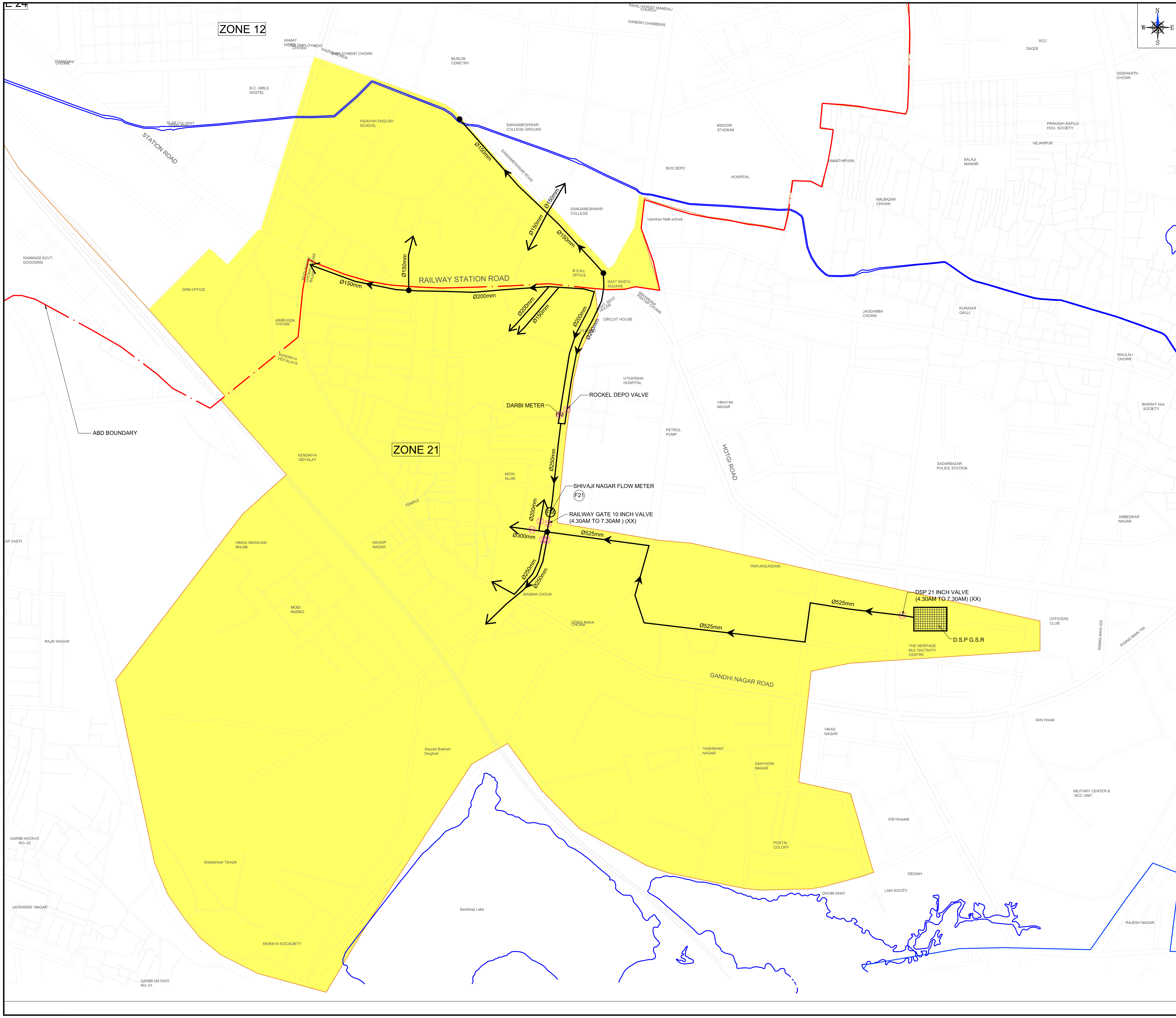
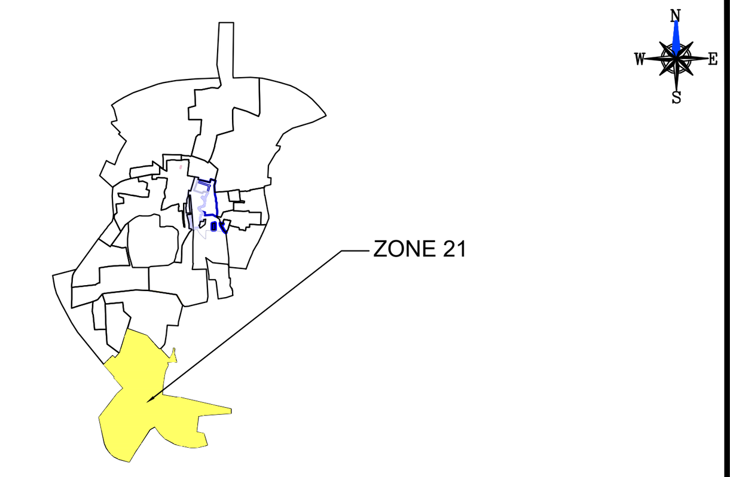

ZONE 12
ZONE 21
RAILWAY STATION ROAD
STATION ROAD
HOTGI ROAD
GANDHI NAGAR ROAD
ABD BOUNDARY
DARBI METER
ROCKEL DEPO VALVE
SHIVAJI NAGAR FLOW METER
F21
RAILWAY GATE 10 INCH VALVE
(4.30AM TO 7.30AM) (XX)
DSP 21 INCH VALVE
(4.30AM TO 7.30AM) (XX)
D.S.P G.S.R
Ø150mm
Ø200mm
Ø250mm
Ø300mm
Ø525mm
SAAT RASTA SQUARE
MASHA CHOUK
MODI SLUM
KENDRIYA VIDYALAY
HINDU SMASHAN BHUMI
NAVDIP NAGAR
MODI HUDKO
TRIPURSUNDARI
THE HERITAGE MULTIACTIVITY CENTRE
YASHWANT NAGAR
SAHYADRI NAGAR
POSTAL COLONY
Sayyed Bukhari Darghah
Siddeshwar Temple
Sambhaji Lake
MORAYA SOCACIETY
UTKARSH HOSPITAL
VINAYAK NAGAR
PETROL PUMP
CIRCUIT HOUSE
B.S.N.L OFFICE
SANGAMESHWAR COLLEGE
SANGAMESHWAR COLLEGE GROUND
HIDAYAH ENGLISH SCHOOL
B.C. GIRLS HOSTEL
MUSLIM CEMETRY
INDOOR STADIUM
BUS DEPO
HOSPITAL
KAMATHIPURA
NALBAZAR CHOWK
JAGDAMBA CHOWK
BALAJI MANDIR
KURASHI GALLI
SADARBAZAR POLICE STATION
AMBEDKAR NAGAR
OFFICERS CLUB
MAULALI CHOWK
SIDDHARTH CHOWK
PRAKASH BAPUJI HOU. SOCIETY
HEJANPUR
DRM OFFICE
JAMBVEER CHOWK
RAMWADI GOVT. GODOWNS
RAJIV NAGAR
GARIBI HATAVO NO-02
GARIBI HATAVO NO-01
UATKARSH NAGAR
VIKAS NAGAR
ESI Hospital
EIDGAH
LAKI SOCITY
DHOBI GHAT
Girls Hostel
MILITARY CENTER & NCC UNIT
RAJESH NAGAR
GANESH CHAMBERS
Vasntrao Naik school



KEY PLAN

NOTES :-

1. ALL DISTRIBUTION NETWORK IS NOT SHOWN FOR CLARITY OF DRAWING.
2. THE DRAWING IS NOT TO SCALE.
3. THE LOCATION OF FLOW METER AND VALVE SHOWN ARE INDICATIVE ONLY. ACTUAL LOCATION SHALL BE SHOWN BY CLIENT.
4. THE LOCATION OF PRESSURE GUAGES WILL BE SHOWN BY ENGINEER IN CHARGE OF TIME OF PRESSURE READINGS. HOWEVER LOCATION ARE NOT SHOWN FOR CLARITY.

ZONE 21
VALVE OPERATION
1. RAILWAY GATE 10 INCH VALVE SHALL OPEN FROM 4.30 AM TO 7.30 AM ON 'XX' DAY DURING FLOW MEASUREMENT TASK.

LEGEND :

- VALVE
- E.S.R. / G.S.R.
- FLOW METER
- ROAD
- RAILWAY
- ZONE BOUNDARY
- ABD BOUNDARY
- X 1ST DAY WATER SUPPLY
- XX 2ND DAY WATER SUPPLY
- XXX 3RD DAY WATER SUPPLY
- XXXX 4TH DAY WATER SUPPLY

Rev.	Date	Description	Drawn	Chk.	App.
4					
3					
2					
1	07.03.18	CHANGE IN DESCRIPTION OF TITLE	BR	GNG	MS
0	05.02.18	FOR TENDER	KP	GNG	MS

File name :- WTE-2297-W-1.06 ZONE 21 REV 1.dwg

Wadia Techno Engg . Services Ltd. Mumbai

Louis Berger

Client : SOLAPUR CITY DEVELOPMENT CORPORATION LTD.

Project : TO DESIGN, DEVELOP, MANAGE & IMPLEMENT URBAN INFRASTRUCTURE SERVICES PROJECTS UNDER SMART CITY MISSION (SCM) IN SOLAPUR CITY

Title: FLOW METER LOCATION FOR ZONE 21

North	Scale	Job no.	Code	Discipline	Drg.no.	Rev.	Sheet	Of
	A 1 NTS	WTE-2297	00	W	1.06	R1	1	1