OFFICE OF THE UJJAIN MUNICIPAL CORPORATION, UJJAIN, DIST. - UJJAIN

TENDER DOCUMENT

LUMPSUM RATE TENDER FOR SURVEY, INVESTIGATION, DESIGN, CONSTRUCTION, TESTING AND COMMISSIONING OF SEWERAGE NETWORK & SEWAGE TREATMENT FOR UJJAIN CITY UNDER UJJAINMUNICIPAL CORPORATION, UJJAIN

NIT Number and Date :----------

Agreement Number and Date:_____

Name of Work: Sewerage Network & Sewage Treatment for Ujjain City under Ujjain Municipal Corporation, UJJAIN

Name of the Contractor : _____

Probable Amount of Contract

(Rs. In Figure) : Rs 36752.57Lacs

(Rs. In Words) : Rupees Thirty Six Thousand Seven Hundred Fifty Two Lakhs and Fifty Seven Thousand Only

Contract Amount

(Rs. In Figure) : _____

(Rs. In Words) : _____

Stipulated Period of Completion: 36 months including rainy season

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OFFICE OF THE UJJAIN MUNICIPAL CORPORATION, UJJAIN, DIST- UJJAIN

Section – 1

Notice Inviting e-Tenders

NIT No. **3407**/e-tendering Date: 19-04-2017

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

S.No.	Work	Probable Amount (Rs. In lakhs)	Completion Period (months)
1.0	Survey, Investigation, Design, Construction, Testing and Commissioning of Sewerage Network& Sewage Treatment in Ujjain City under Ujjain Municipal Corporation, Ujjain including, 1.0 Providing laying and jointing of sewerage pipelines including construction of manholes and sewer appurtenances. 2.0 Construction, supply, erection, testing and commissioning of Sewerage Treatment Plant including PLC-SCADA and RCC sumpwell alongwith providing and installation of pumps from sumpwell to STP. 3.0 Providing house sewer chambers and laterals for connecting sewer to consumer sewer lines 4.0 Providing and laying of HT feeder connection upto Sewerage treatment plant 5.0 Providing house sewerage connections	36752.57	36 months including rainy season

1. Interested Bidder can view the NIT on website http://www.mpeproc.gov.in.and www.mpurban.gov.in
2. The Bid Document can be purchased only Online from 00:00 hrs 21-04-2017 to 17:30 hrs 22-05-2017.
3. Amendment to NIT, if any, would be published on website only, and not in Newspaper.

The Bidder shall operate and maintain the Sewerage system of Ujjain City for 10 years after successful completion of the works as per Tender. The initial period of 5 years after completion shall be treated as Defect Liability Period (DLP).

COMMISSIONER
UJJAIN MUNICIPAL CORPORATION, UJJAIN

Notice Inviting e-Tenders

OFFICE OF THE UJJAINMUNICIPALCORPORATION,UJJAIN, DIST- UJJAIN

NIT No. **3407**/e-tendering Date: 19-04-2017

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

S.No.	Name of the work	Probable amount of contract (Rs. In Lacs)	Earnest Money Deposit (EMD) (In Rs)	Cost of Bid Document (In Rupees)	Category of Contractor	Time of Completion
1.0	Survey, Investigation, Design, Construction, Testing and Commissioning of Sewerage Network of Ujjain City in UJJAIN MUNICIPAL area including, 1.0 Providing laying and jointing of sewerage pipelines including construction of manholes and sewer appurtenances. 2.0 Construction, supply, erection and commissioning of Sewerage treatment plant and RCC sumpwell alongwith providing and installation of pumps from sumpwell to STP. 3.0 Providing house sewer chambers and laterals for connecting sewer to consumer sewer lines 4.0 Providing and laying of HT feeder connection upto Sewerage treatment plant 5.0 Providing house sewerage connection	36752.57	50,00,000/-	50,000/-	Valid Registration with the Government of Madhya Pradesh, PWD.	36 months including rainy season.

1. All details relating to the Bid Document(s) can be viewed and downloaded free of cost from the website mentioned in NIT.

2. Bid document can be purchased after making online payment of portal fees through Credit/Debit/Cash Card/internet banking.

3. At the time of submission of the Bid the eligible bidder shall be required to:

   i) pay the cost of Bid Document;

   ii) deposit the Earnest Money;

   iii) Submit a check list; (As required in Clause 12 of Bid Data Sheet)

   iv) Submit an affidavit duly Notarized as per Annexure – B

   v) Undertaking as per Clause no. 13 (Special Condition Regarding Conditional TENDER of Section – 3, Conditions of Contract, Part –II Special Conditions of Contract

   Details can be seen in the Bid Data Sheet

4. **ELIGIBILTY FOR BIDDERS:**

   (a) At the time of submission of the bid, the bidder should have valid registration with the Government of Madhya Pradesh, PWD. However, such bidders who are not registered with the Government of Madhya Pradesh and are eligible for registration can also submit their bids after having applied for registration with appropriate authority.

   (b) The bidder shall be required to have valid registration with MPPWD at the time of signing of the Contract.

   (c) Failure to sign the contract by the selected bidder, for whatsoever reason, shall result in forfeiture of the earnest money deposit.

5. **Pre-qualification –** Prequalification conditions, wherever applicable, are given in the Bid Data Sheet & Annexure - C.

6. **Special Eligibility -** Special Eligibility Conditions, if any, are given in the Bid Data Sheet & Annexure – D

7. The Bid Document can be Purchased only Online **00:00 hrs 21-04-2017** to 17:30 hrs **22-05-2017**. Other key dates may be seen in Bid data sheet.

8. Amendment to NIT, if any, would be published on website only, and not in Newspaper.

COMMISSIONER
UJJAIN MUNICIPAL CORPORATION

SECTION 2

INSTRUCTIONS TO BIDDERS (ITB)

A. GENERAL

1. SCOPE OF BID

The detailed scope of work, hereinafter referred to as "Work" is "Survey, Investigation, Design, Construction Testing and Commissioning of waste water collection, treatment and disposal system(Sewerage Project) and its operation and maintenance for a period of 10 years after completion of construction work. The initial period of 5 years after completion shall be treated as Defect Liability Period (DLP). A brief description of project is as given below,

Background

Population of Ujjain town under Ujjain Municipal Corporation, Ujjain

- Population (as per 2011 census) is515,215
- The estimated population for the 2020 is 6,13,830
- The estimated population for the 2035 is 7,35,840
- The estimated population for the 2050is 8,58,585
- The number of households in MUNICIPALCORPORATION (2020) are about122766
- The number of households in MUNICIPALCORPORATION (2033) are about 147168
- The number of households in MUNICIPALCORPORATION (2048) are about 171717
- The UJJAIN MUNICIPAL CORPORATION, UJJAIN has developed/completed water supply project and the water @ 135 litres per capita per day (lpcd) is available for next 30 years period.

With the water availability ensured @ 135 lpcd it is very important to have an integrated sewerage system in town for collection, treatment and safe disposal of generated waste water. At present there is no sewerage system in the town and the sewage from households is generally collected in the individual septic tanks or otherwise disposed off directly to the existing drains. The sewage from the households and septic tanks finally goes into open drains and Nallahas and then finally discharged into Kshipra River thereby polluting holy river and Ghats.

The above open drains/nallahs are creating nuisance for the common man. Therefore, an integrated sewerage system is proposed, wherein it is envisaged that sewage is collected systematically in well-designed sewers, transported upto the sewage treatment plant and it is treated in such a way that the effluent satisfies the parameters prescribed by Central Pollution Control Board of India. After Implementation of project, Treated Water will be reclaimed and is proposed to be used for horticulture, road side irrigation, road washing and irrigation purposes.

Project

Ujjain Municipal Corporation, Ujjain wants to execute sewerage project for the probable population of 2050. The project report prepared by the Municipal Corporation, Ujjain envisage following works in the project area,

i) Providing laying and jointing of sewerage pipelines including construction of manholes and sewer appurtenances.
ii) Construction, supply, erection and commissioning of Sewerage treatment plant and RCC sumpwell alongwith providing and installation of pumps from sumpwell to STP.
iii) Providing house sewer chambers and laterals for connecting sewer to consumer sewer lines
iv) Providing and laying of HT feeder connection up to Sewage treatment plant with PLC-SCADA
v) Providing House Sewerage Connection
vi) The construction shall be ensured in such a way that there is minimum possible inconvenience to the public and the traffic. The reconstruction of roads will be carried out to original surface and pavement conditions.

The tender is hereby invited for the execution of sewerage project wherein the successful Bidder has to lay the sewer lines for entire Ujjain City including all necessary works related to sewer lines, sewer appurtenances, sumpwells/sewage pumping stations, intermediate pumping and sewage treatment plant

including SCADA-PLC etc. and restore the roads to their original condition with respect to surface and pavement characteristics. The house connections shall also be covered under this project.

The essence of this sewerage project shall be,

a) Providing 100% coverage to un-sewered area of Ujjain town**.**
b) Providing flexibility of connecting existing sewer network in private colonies to proposed sewer network either at the outfall point or inlet of colony septic tank.
c) Providing flexibility to add the sewage from multistoried buildings to the proposed sewerage network with the provision of payment on the basis of per household monthly tariff.
d) The collection of sewage including house hold connections to achieve the desired flow in the sewer lines for generating minimum desired velocity in sewer lines.
e) Treatment of the sewage to prevailing standards so that the treated water may be reused / disposedof as per accepted practices.
f) Reconstruction of roads to its original conditions.

Therefore,

i) The bidder by the completion of construction shall ensure house hold connections to each house hold. The sewage connection shall be made upto the individual toilet outlet so as to collect the raw sewage. For making the individual sewage connection, due considerations shall be given to access to the house hold and accordingly side lanes and back lanes are to be identified and used. Existing useful sewer lines, if found, shall also be suitably integrated with the proposed sewerage system.

ii) As far as possible the entire system shall be designed and operated on the principles of gravity flow. The BOQ attached with the present invitation is based on detailed survey, investigation, tentative designing and estimation as given in the Detailed Project Report (DPR). The Bidder shall examine the DPR and its contents. For achieving the desired parameters and desired deliverables, the Bidder shall carryout necessary survey and investigations and would prepare the detail designs and drawings etc. as may be required for collection of sewage including pumping stations or other structures as required on best engineering practices and fulfilling the requirement of CPHEEO MANUAL, MOUD, DELHI. The Bidder shall also prepare detailed construction drawings as per actual working conditions including usage of back lanes and side lanes and minimum obstruction to existing utilities, roadways and railways.

iii) The Bidder shall make its own choice for process of Sewage Treatment but the technology for Sewage Treatment should be proven technology, in working position for the last 5 years in India for a capacity not less than the capacity of treatment proposed in the present project and this experience should be fulfilled by the Technology Provider. The proposed technology for the biological treatment in the proposed Sewage Treatment Plant should be based on,
    a. The availability of land already identified by the UJJAINMUNICIPALCORPORATION, UJJAIN
    b. Effluent characteristics should meet the standards set out by MoEF and CPCB for discharging the treated water in inland water resources or disposal on land.
    c. Reuse of the treated water in community purposes like horticulture/gardening, road side irrigation, road washing, irrigation purposes and fire-fighting etc. Also use for irrigation and industrial purposes should be explored.

The Bidder is required to take approval for all detailed designs and drawings for all components of this project from Engineer-in-Chief, Urban Administration and Development Department, Bhopal.

On successful completion of the project as per best engineering practices the bidder shall operate and maintain the system for next 10 years. The initial 5 years period upon completion of construction work of this project shall be defect liability period (DLP).

The Bidder shall also explore the possibility of power generation for running of Sewage treatment plant.

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

2. General Quality of Work:

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

3. PROCEDURE FOR PARTICIPATION IN E-TENDERING

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

4. ONE BID PER BIDDER

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

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

4.3 In case of Bid submitted by the Joint Venture all the members should be essentially registered with the Government of Madhya Pradesh, PWD.

5. Cost of Bidding

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

6. Site Visit and examination of works

The bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the work. All costs shall have to be borne by the bidder.

B. BID DOCUMENTS

7. CONTENT OF BID DOCUMENTS

The Bid Document comprises of the following documents:

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

10. Any other document(s), as specified.

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

9. Pre-Bid Meeting (where applicable)

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

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

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

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

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

10. Amendment of Bid Documents

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

10.2 All amendments shall form part of the Bid Document.

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

C. PREPARATION OF BID

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

12. DOCUMENTS COMPRISING THE BID

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

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

i) Registration number or proof of application for registration and organizational details in format given in the Bid Data sheet.

ii) Payment of the cost of Bid Document;

iii) Earnest Money;

iv) An affidavit duly notarized.

v) JV Agreement (Original) in case of JV.

vi) Undertaking as per Clause no. 13 (Special Condition Regarding Conditional TENDER of Section – 3, Conditions of Contract, Part –II Special Conditions of Contract

Part 2 – This shall be known as **Envelope B** and required to be submitted only in works where pre-qualification conditions and/or special eligibility conditions are stipulated in the Bid Data Sheet. Online

Envelop B shall contain a self-certified sheet duly supported by documents to demonstrate fulfillment of pre-qualification conditions.

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

13. LANGUAGE

The bid as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer shall be in English or Hindi. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in English. In such case, for the purposes of interpretation of the bid, such translation shall govern.

14. TECHNICAL PROPOSAL

14.1 Only, in case of bids with pre-qualification conditions defined in the Bid data sheet, the Technical Proposal shall comprise of formats and requirements given in the Bid Data Sheet.

14.2 All the documents / information enclosed with the technical proposals should be self-attested and certified by the Bidder. The Bidder shall be liable for forfeiture of his earnest money deposit, if any document / information are found false/fake/untrue before acceptance of Bid. If it is found after acceptance of the Bid, the sanctioning authority may at his discretion forfeit his performance security/guarantee, security deposit, enlistment deposit and take any other suitable action.

15. FINANCIAL BID

i. The bidder shall have to quote rates in format referred in Bid Data sheet, in Lumpsum, and not item wise. If the bid is in absolute amount, overall percentage would be arrived at in relation to the NIT amount. The overall percentage rate would apply for all items of work.

ii. Lumpsum offer shall be quoted in figures as well as in words. If any difference in figures and words found, lower of the two shall be taken as valid and correct.

iii. The bidder shall have to quote rates inclusive of all duties, taxes, royalties and other levies; and the Employer shall not be liable for the same. Excise exemption on pipe shall be available as per norms.

iv. The material alongwith the units and rates, which shall be issued, if any, by the department to the contractor, is mentioned in the Bid Data Sheet.

16. PERIOD OF VALIDITY OF BIDS

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

17. EARNEST MONEY DEPOSIT (EMD)

17.1 The Bidder shall furnish, as part of the Bid, Earnest Money Deposit (EMD), of the amount specified in the Bid Data Sheet.

17.2 The EMD shall be in the form of Fixed Deposit Receipt of a scheduled commercial bank, issued in favour of the name given in the Bid Data Sheet. The Fixed Deposit Receipt shall be valid for six months or more after the last date of receipt of bids. However, other forms of EMD may be allowed by the employer by mentioning it in the Bid Data sheet.

17.3 Bid not accompanied by EMD shall be liable for rejection as non-responsive.

17.4 EMD of bidders whose bids are not accepted will be returned within ten working days of the decision on the bid.

17.5 EMD of the successful Bidder will be discharged when the Successful Bidder has signed the Agreement and furnished the Bank Guarantee of required value for Performance Security& Additional Performance Security, if any.

17.6 Failure to sign the contract by the successful/selected bidder, for whatsoever reason, shall result in forfeiture of the Earnest Money Deposit.

D. SUBMISSION OF BID

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

E. OPENING AND EVALUATION OF BID

19 PROCEDURE

19.1 Envelope 'A' shall be opened first online at the time and date notified and its contents shall be checked. In cases where Envelop 'A' does not contain all requisite documents, such bid shall be treated as non-responsive, and Envelop B and/or C of such bid shall not be opened.

19.2 Wherever Envelop 'B' (Technical Bid) is required to be submitted, the same shall be opened online at the time and date notified. The bidder shall have freedom to witness opening of the Envelop 'B'. Envelop 'C' (Financial Bid) of bidders who are not qualified in Technical Bid (Envelop 'B') shall not be opened.

19.3 Envelope 'C' (Financial Bid) of the qualified bidders shall be opened online at the time and date notified. The bidder shall have freedom to witness opening of the Envelop 'C'.

19.4 After opening Envelop 'C' all responsive bids shall be compared to determine the lowest evaluated bid.

19.5 The Employer reserves the right to accept or reject any bid, and to annul the biding process and reject all the bids at any time prior to contract award, without incurring any liability. In all such cases reasons shall be recorded.

19.6 The Employer reserves the right of accepting the bid for the whole work or for a distinct part of it.

20. CONFIDENTIALITY

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

20.2 Any attempt by a bidder to influence the Employer in the evaluation of the bids or contract award decisions may result in the rejection of its bid.

F. AWARD OF CONTRACT

21. AWARD OF CONTRACT(ANNEXURE – L)

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

22. PERFORMANCE SECURITY

22.1 Prior to signing of the Contract, the bidder to whom LOA has been issued shall have to furnish Performance Security and Additional Performance Security of the amount, form and duration, etc. as specified in the Bid Data Sheet.

22.2 If the Bid, which results in the lowest evaluated bid price, is seriously unbalanced or front loaded in the opinion of the employer, the employer after evaluation, taking in to consideration the schedule of the estimated contract price may require Additional Performance Security from the successful bidder for such unbalanced bid price.

23. SIGNING OF CONTRACT AGREEMENT (ANNEXURE- M)

23.1 The successful bidder shall have to furnish Performance security and sign the contract agreement within 15 days of issue of LOA.

23.2 The signing of contract agreement shall be reckoned as intimation to commence the work within 14 days of the signing of contract. No separate work order shall be issued by the Employer to the contractor for commencement of work.

23.3 In the event of failure of the successful bidder to submit Performance Security and Additional Performance Security,if any,or sign the Contract Agreement, his EMD shall stand forfeited without prejudice to the right of the employer for taking action against the bidder.

24. CORRUPT PRACTICES

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

i. may reject the bid for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract; and

ii. may debar the bidder if he is being blacklisted by any Department of State Government or GOI for non-performance / substandard execution or any other reason what so ever in similar type of works.

iii. may debar the bidder declaring ineligible, either indefinitely or for a stated period of time, to participate in bids, if it at any time determines that the bidder has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for, or in executing, a contract.

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

a. "corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party;

b. "fraudulent practice" means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;

c. "coercive practice" means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

d. "Collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party.

[End of ITB]

Bid Data Sheet

General

S.No.	Particulars	Data	
1	Office inviting Tender	MUNICIPAL COMMISSIONER, UJJAIN MUNICIPAL CORPORATION, UJJAIN(M.P.)	
2	NIT No	3407	
3	Date of NIT	19-04-2017	
4	Bid document download available from date & time	From 21-04-2017 , 00:00 hrs	To 17:30 hrs 22-05-2017
5	Website link	http://www.mpeproc.gov.in	

For Section 1 - NIT

Clause reference	Particulars	Data	
2	Portal fees	As applicable	
3	Cost of bid document (in the form of Demand Draft)	Rs. 50,000-00	
	Cost of bid document payable to	MUNICIPAL COMMISSIONER, UJJAIN MUNICIPALCORPORATION, UJJAIN(M.P.)	
	Cost of bid document in favour of	MUNICIPAL COMMISSIONER, UJJAIN MUNICIPALCORPORATION, UJJAIN(M.P.)	
4	Affidavit	Annexure B	
5	Pre-qualifications required	Yes	
	If Yes, details	Annexure C	
6	Special Eligibility	Yes	
	If Yes, details	Annexure D	
7	Key Dates	Annexure A	

For Section 2 - ITB

Clause reference	Particulars	Data
1	Name of work	Sewerage Network & Sewage Treatment for Ujjain city under Ujjain Municipal Corporation, UJJAIN
2	Specifications	Annexure E
3	Procedure for participation in e-tendering	Annexure F
4	Whether Joint-venture is allowed	YES
	If yes, requirement for Joint venture	Annexure G
9	Pre bid meeting to held	YES
	If Yes, Date, Time & Place	Date:- 09-05-2017 Time from : 12:00 hrs. Place : Directorate, Urban Administration and Development, Bhopal

Clause reference	Particulars	Data
12	**Envelope –A** containing : i. Registration number or proof of application for registration and organizational details as per Annexure 'H' ii. Cost of Bid Document iii. EMD iv. An affidavit duly notarized as per Annexure –B v. JV Agreement in Original (In case of JV) vi. Undertaking as per Clause no. 13 of Section – 3, Part –II Special Conditions of Contract Should reach in physical form	Online at www.mpeproc.gov.in upto 23-05-2017 till 17:30 hrs and hard copy submission of technical proposal at the office of Superintending Engineer, Ujjain Municipal Corporation at Mela Karyalaya Bhawan, Ujjain upto 24-05-2017 till 17:30 hrs.
14	Envelope-B Technical Proposal	Annexure – I and Annexure – I (Format I-1 to I-5)
15	Envelope-C Financial Bid	Annexure – J
	Materials to be issued by the department	
16	Period of Validity of Bid	180 Days
17	Earnest Money Deposit	Rs. 50,00,000/-
	Forms of Earnest Money Deposit	i. FDR/e-FDR ii. Interest bearing securities of post office
	EMD valid for a period of	Not less than 180 days
	FDR (Fixed Deposit Receipt) must be drawn in favour of	COMMISSIONER MUNICIPA CORPORATION, UJJAIN (M.P.)
21	Letter of Acceptance (LoA)	**Annexure L**
22	Amount of Performance Security	1. 5% of the Capital cost of the project. Valid up to 3 months beyond the completion of design built component. 2. 5% of O & M and electrical cost, to be submitted before the completion of design built component valid up to 3 months beyond the end of O&M period.
	Additional Performance Security, if any	As per provision of clause 22.2 of ITB
	Performance security& Additional Performance Security in the format	Annexure M
	Performance security & Additional Performance Security in favor of	COMMISSIONER, UJJAIN MUNICIPAL CORPORATION, UJJAIN (M.P.)
	Performance security & Additional Performance Security valid up to	Valid contract period plus 3 months

Annexure – A

(See clause 1, 7 of Section 1 NIT)

KEY DATES

S.No	Works Department Stage	Bidder's Stage	Start		Expiry		Envelopes
			Date	Time	Date	Time	
1		Purchase of Tender-Online	21-04-2017	00:00 hrs	22-05-2017	17:30	
2		Bid Submission-Online	21-04-2017	00:00 hrs	23-05-2017	17:30 hrs	
3	Mandatory submission Open (Envelope -A)		25-05-2017	11:00 hrs			Envelope A
4	Technical proposal open (PQ Envelope-B)		25-05-2017	11:00 hrs			Envelope B
5	Financial Bid Open (Envelope C)		01-06-2017	11:00 hrs			Envelope C

Original Term Deposit Receipt of Earnest Money Deposit, Demand Draft for the cost of Bid Document and Affidavit shall be submitted by the bidder so as to reach the office as prescribed in Bid Data Sheet, at least one calendar day before specified start time and date in key dates for opening of technical proposal as per key dates in Bid Data Sheet.

Annexure – B
(See clause 3 of Section 1-NIT)

|| AFFIDAVIT ||

(To be contained in Envelope A)

(On Non-Judicial Stamp of Rs.50.00)

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

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

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

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

OR

Following close relatives are working in the department:
Name _____ Post _____ Present Posting _____

Signature with Seal of the Deponent (bidder)

I/ We, _____ above deponent do hereby certify that the facts mentioned in above paras 1 to 3 are correct to the best of my knowledge and belief.
Verified today _____ (dated) at _____ (place).

Signature with Seal of the Deponent (bidder)

Annexure – C
(See clause 5 of Section 1 NIT)

PRE-QUALIFICATIONS CRITERIA

A. Financial

i. Experience of having successfully executed*,

a) three similar works each costing not less than the amount equal to 20% of the probable amount of contract during the last 7 financial years; or
b) two similar works each costing not less than the amount equal to 30% of the probable amount of contract during the last 7 financial years; or
c) one similar work of aggregate cost not less than the amount equal to 50% of the probable amount of during the last 7 financial years;

In case of **Sewerage** related works similar works shall mean work related to sewerage project comprising of essentially either of the following components,

i. Providing, laying, jointing of sewer pipeline of any material or nature
ii. Construction of Sewage Treatment Plants (STP) /Common Effluent Treatment plants (CETP)/ Effluent Treatment plants (ETP)

d) For ascertaining the value of successfully executed works in support of experience of the Bidder in i(a), i(b) and i(c) under (A) Financial, the original cost of work can be adjusted as per increase in Whole Sale Price Index (WPI) as given by Reserve Bank of India, from the date of work order of the subjected work to till date. The certificate of the Chartered Accountant be produced for cost adjustment.

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

iii. The Bidder shall have positive net-worth as per the audited Balance Sheet of last financial year.

iv. Bid-Capacity – **(Deleted)**

B. Physical (Deleted)

(i) Physical qualifications for the work in case of Sewerage related works shall be as below,

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

C. Successful Bidder shall employ having 'A' Class Electrical License for Electrical Works issued by State Electricity Board M.P.

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

Annexure – D
(See clause 6 of Section 1 NIT)

SPECIAL ELIGIBILITY CRITERIA

a) Submit a Technology Tie-up Agreement with a technology provider for Biological Treatment Section proposed by him under this project. The technology provider should have provided technology and core equipment for Sewage Treatment plant in last 5 years for at least one MUNICIPAL Sewage Treatment Plant running successfully at present in India or a Country with similar weather conditions having capacity not less than this tender or more of the capacity of Sewage Treatment plant proposed in the project on the same technology.

Annexure – E
(See clause 2 of Section 2-ITB & clause 10 of GCC)

Specifications

Enclosed after Annexure – Y

Specifications for Sewage Related Jobs

Table of Contents

(The soft copy of the specifications in four parts namely (1) Water Supply, Sewerage and Tube Well Works (2) Building Water Supply, Drainage and Sanitary Installation (3) Roads & Bridge (4) Electrical Works shall form part of the technical specifications of this work & is available at UADD Website www.mpuraban.gov.in)

ANNEXURE-F
(See clause 3 of Section 2-ITB)

Procedure for participation in e-Tendering

1. Registration of Bidders on e-Tendering System

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

2. Digital Certificate:

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

Note:

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

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

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

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

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

3. Set Up of Bidder's Computer System:

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

4. Key Dates:

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

5. Preparation and Submission of Bids

The bidders have to prepare their online, encrypt their bid data in the Bid forms and submit Bid of all the envelopes and documents related to the Bid required to be uploaded as per the time schedule mentioned in the key dates of

the notice inviting e- Tenders after singing of the same by the Digital Signature of their authorized representatives.

6. Purchase of Bid Document

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

7. Withdrawal, Substitution and Modification of Bids

Bidder can withdraw and modify the bid before submission end date

ANNEXURE-G

(See clause 4 of Section 2-ITB)

JOINT VENTURE (J.V.)

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

1. Bids submitted by a joint venture of two or more firms as partners shall comply with the following requirements :

a. One of the partners shall be nominated as being Lead Partner, and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners;

b. The bid and, in case of successful bid, the Agreement, shall be signed so as to be legally binding on all partners;

c. The partner in charge shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture and the entire execution of the contract, including payment, shall be done exclusively with the partner in charge;

d. All the partners of the joint venture shall be liable jointly and severally for the execution of the contract in accordance with the contract terms, and a statement to this effect shall be included in the authorization mentioned under [c] above, as well as in the bid and in the Agreement [in case of successful bid];

e. Bidder shall submit the joint venture agreement indicating precisely the role and responsibilities of all the members of JV in respect of planning, design, construction equipment, key personnel, work execution, and financing of the project including Operation and Maintenance of the works. All members of JV should have active participation in execution during the currency of the contract. This should not be varied/modified subsequently without prior approval of the employer;

f. A copy of the Joint Venture Agreement entered into by the partners shall be submitted originally in envelope – A and scanned copy should also be uploaded online with the bid.

g. The joint venture agreement shall be registered at the time of agreement, so as to be legally valid and binding on all partners.

2. All the partners should meet out the minimum qualifying criteria required for the bid and collectively must meet the criteria specified in full. Failure to comply with this requirement will result in rejection of the joint venture's bid.
3. The performance security of joint venture shall be in the name of the partner Lead partner/joint venture.
4. Attach the power of attorney of the partners authorizing the Bid signatory(ies) on behalf of the joint venture
5. An individual Bidder cannot at the same time be member of a Joint Venture applying for this Bid. Further, a member of a particular Bidder Joint Venture cannot be member of any other Bidder Joint Venture applying for this bid.
6. A copy of the Joint Venture agreement entered into by the partners made on Rs. 1000/- Non-judicial stamp duly notarized shall be submitted with the bid. However at the time of agreement bidder shall get the joint venture agreement registered, so as to be legally valid and binding on all partners.
7. Furnish details of participation proposed in the joint venture as below:

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

7. The partners of J.V. should satisfy the qualification criteria as below,
   a. The Lead Partner must have the share of minimum 51% in the J.V.
   b. The other partner(s) must have a share of minimum 26% in the J.V.
   c. The lead partner and the other partners must also meet 51% and 26% of the all qualification criteria respectively except for the requirement of work experience described in Annexure 'C'. However both the partners must satisfy the full (100%)qualification criteria jointly. For this purpose the qualification of individual partners shall be added (for annual average turnover, for Bid Capacity Only).
   d. All the partners shall have the positive net worth as per audited balance sheet of last financial years

8. For the meeting the minimum qualification criteria of experience of similar nature work,
   i. Out of 3 similar works of value not less than the amount equal to 20% of Probable Amount of Contract(PAC), at least 2 works must be done by lead partner and one work to be done by other partner,

   Or

   ii. Out of 2 similar works of value not less than the amount equal to 30% of PAC, at least 1(one) work must be done by lead partner and 1 (one) work to be done by other partner,

   Or

   iii. In case of one similar work of value not less than the amount equal to 50% of PAC, the lead partner must satisfy the criteria. However the other partner must satisfy the criteria in (i) above i.e., at least one work of value not less than the amount equal to 20% of PAC.

ANNEXURE-H

(See clause 12 of Section 2 ITB & clause 4 of GCC)

ORGANIZATIONAL DETAILS
(To be enclosed with technical proposal)

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

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

Signature of Bidder with Seal
Date: _____

Annexure – I
(See clause 14 of Section 2 of ITB)

Envelope – B, Technical Proposal

Technical Proposal shall comprise the following documents:

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

Note:

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

Annexure – I *(Format: I-1)*
(See clause 14 of Section 2 of ITB

FINANCIAL & PHYSICAL EXPERIENCE DETAILS

A. Financial Requirement

The bidder should have completed either of the below:

a) three similar works each costing not less than the amount equal to 20% of the probable amount of contract during the last 7 financial years; or
b) two similar works each costing not less than the amount equal to 30% of the probable amount of contract during the last 7 financial years; or
c) one similar work of aggregate cost not less than the amount equal to 50% of the probable amount of contract during the last 7 financial years;

To be filled in by the contractor:

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

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

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

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

B. Physical Requirement: (DELETED)

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

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

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

Annexure – I *(Format: I-2)*
(See clause 14 of Section 2 of ITB

ANNUAL TURN OVER

Requirement:

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

To be filled in by the contractor:

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

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

Bid Capacity (Deleted)

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

~~Bid Capacity = (2.0 A X B) - C~~

~~Where,~~

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

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

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

Annexure – I *(Format: I-3)*

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

LIST OF TECHNICAL PERSONNEL FOR THE KEY POSITIONS

Minimum Requirement							Available with the bidder						
S.No.	Key Position	Minimum requirement	Qualification	Age	Similar work experience	Total Work Experience	S.No.	Name of Personnel	Key Position	Qualification	Age	Similar work experience	Total Work Experience
1.	Site Engineer	2	Degree In Civil		3 years	5 years							
2	Material Engineer	1	Degree In Civil		5 years	10 years							
3.	Constriction Engineer	6	Diploma In Civil		3 years	5 years							
4.	Lab In-charge	1	Diploma In Civil		3 years	5 years							

Note: Designation mentioned above are only indicative performing different tasks and may be changed as per the contractor's organization.

Annexure – I *(Format: I-4)*
(See clause 14 of Section 2 of ITB)

List of Key Equipments/ Machines for Quality Control Labs

The Contractor shall be required to carry out all mandatory quality control tests as per specifications of various items of work under the project. The Contractor should demonstrate his capacity with respect to availability of key equipment/ machines required for carrying out mandatory tests under project. The pipes to be procured under this contract shall be as per relevant BIS/IS/ISO codes of practice and inspected by the representatives of PDMC. The request in this regard shall be made by the Contractor to PDMC.

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

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

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

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

Annexure – I *(Format: I-5)*
(See clause 14 of Section 2 of ITB)

LIST OF EQUIPMENTS / MACHINES FOR CONSTRUCTION WORK

The Contractor shall carryout the construction work in such a way that the requirements of the specifications of each item of work under the project are fully satisfied. For achieving the quality parameters as per the specifications, the contractor shall be required to deploy appropriate machinery and equipment for carrying out the work. In this section, the Bidder is required to demonstrate his capacity with respect to Key equipment and machinery that are required to carry out this work successfully.

Minimum requirement			**Available with the Bidder**	
S. No.	Name of Equipment/ Machinery	Quantity	Name of Equipment/ Machinery	Quantity

Annexure – J
(See clause 15 of Section 2 of ITB)

FINANCIAL BID
(TO BE CONTAINED IN ENVELOPE C)

TENDER FOR A LUMP SUM CONTRACT:

I/We do hereby TENDER to execute the whole of the work described in the drawing and according to the annexed specification for the sum of Rupees (in figures) ……..……..……..…… (in words)…….…….…… (To be quoted in lump sum online and to be expressed both in words and figures).I/We have visited the site of work and am/are fully aware of all the difficulties and conditions likely to affect carrying out the work. I/We have fully acquainted myself/ourselves about the conditions in regard to accessibility of site and quarries/kilns, nature and the extent of ground, working conditions including stacking of materials, installation of tools and plant conditions effecting accommodation and movement of labor etc. required for the satisfactory execution of contract.

Should this bid be accepted, I/We hereby agree to abide by and fulfill all the terms and provisions of the said conditions of contract annexed hereto so far as applicable, or in default thereof to forfeit and pay to the MUNICIPAL COMMISSIONER, UJJAIN MUNICIPAL CORPORATION, Madhya Pradesh or his successors in office the sums of money mentioned in the said conditions.

Note:

i. *Only Lump sum cost for the scope of work given therein shall be quoted.*

ii. *Lump sum offer shall be quoted in figures as well as in words. If any difference in figures and words found lower of the two shall be taken as valid and correct Price. If the bidder is not ready to accept such valid and correct Price and declines to furnish performance security and sign the agreement his earnest money deposit shall be forfeited.*

iii. *In case the price is not given by a bidder, his bid shall be treated as non-responsive.*

iv. *All duties, taxes, and other levies payable by the bidder shall be included in the lump sum offer given by the bidder. Only Exemption in Excise duty shall be available as per norms.*

Dated_____

Signature of Bidder_____

Name of Bidder

Address of Bidder_____

The above said Bid is hereby accepted by me on behalf of the (Ujjain Municipal Corporation)

Dated day of _____2017_____

SECURITIES

Name	Address	Occupation or Profession	Remarks

MUNICIPAL COMMISSIONER
UJJAIN MUNICIPAL CORPORATION
UJJAIN (M.P.)

Witnesses :_____

Address:_____

The lump-sum cost for the Bid to be quoted Online shall be calculated as under,

1.0 Cost of Works (A) =

2.0 Operation and Maintenance Cost next 10 years (B)

S.No.	Year	Cost in Rs	NPV taking Discount factor @ 11% (Cost in INR)
1.0	1st Year		
2.0	2nd Year		
3.0	3rd Year		
4.0	4th Year		
5.0	5th Year		
6.0	6th Year		
7.0	7th Year		
8.0	8th Year		
9.0	9th Year		
10.0	10th Year		
Total (B)			

3.0 Power Consumption (C)

S.No.	Year	Electricity Consumption (KwH) for entire system incl. SCADA-PLC, pumps and Sewage Treatment plant	Cost of Power to be calculated @ Rs 6.50 per KwH	NPV taking Discount factor @ 11% (Cost in INR)
1.0	1st Year			
2.0	2nd Year			
3.0	3rd Year			
4.0	4th Year			
5.0	5th Year			
6.0	6th Year			
7.0	7th Year			
8.0	8th Year			
9.0	9th Year			
10.0	10th Year			
Total (C)				

Note :

1 The charges for the power upto the electricity consumption as shown in table shall be borne by ULB. However, the payment for any additional consumption of electricity in a particular year shall be made by the Bidder on Prevailing rates of power at that time.

2 For arriving the NPV of the O&M and Electricity Charges the rate at Eleven(11) percent per annum will be used to discount the annual future costs. The discount factor to be used is calculated below,

S.No.	Year	Discount factor to be used @ 11% for arriving at NPV of O&M and Electricity charges
1.0	1st Year	0.659
2.0	2nd Year	0.593
3.0	3rd Year	0.535
4.0	4th Year	0.482
5.0	5th Year	0.434
6.0	6th Year	0.391
7.0	7th Year	0.352
8.0	8th Year	0.317
9.0	9th Year	0.286
10.0	10th Year	0.258

Lump-sum cost for the Bid = Lumpsum Cost (A) + NPV Cost of 10 Years O&M (B) + NPV Cost of Power for 10 years (C)

Annexure – K
(See clause 15 of Section 2 of ITB)

MATERIALS TO BE ISSUED BY THE DEPARTMENT

DWC/HDPE pipe will be issued by the Ujjain Municipal Corporation, Ujjain. Total Length of pipe available with the corporation is 68.059 km. Bidder will be supplied this material from the department and the amount of the material will be deducted from the monthly contractor bill.

Details of Available DWC Pipes at UMC store at Ambodiya Treatment Plant

Sr. No.	DWC Pipe	Quantity in meter	Issue Rate	Total Amount
1	170/200 mm dia	34841	308.00	10731028.00
2	250/295 mm dia	22423	748.00	16772404.00
3	400/480 mm dia	10795	1488.00	16062960.00
	Total	**68059**		**43566392.00**

Annexure – L
(See clause 21 of Section 2 of ITB)

LETTER OF ACCEPTANCE (LOA)

Dear Sir (s),

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

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

a. The performance security/ performance guarantee of Rs. _____ (in figures) (Rupees _____ in words) only being 5% of the capital cost of the project. The performance security shall be in the shape of Term Deposit Receipt/ Bank Guarantee of any nationalized / schedule commercial bank valid up to valid up to Valid Contract Period Plus three months.
(In prescribed Format as per Annexure – M)

b. The Additional Performance Security/ Additional Performance Guarantee of Rs. _____ (in figures) (Rupees _____ in words) only. The performance security shall be in the shape of Term Deposit Receipt/ Bank Guarantee of any nationalized / schedule commercial bank valid up Valid Contract Period Plus three months. (In prescribed Format as per Annexure – M)

c. Duly signed Contract Agreement in Agreement Form as prescribed in Section – 5

Please note that
(i) the time allowed for carrying out the work as entered in the bid is _____ months including/excluding rainy season, shall be reckoned from the date of signing the Contract Agreement and

(ii) the performance security/ performance guarantee of Rs. _____ (in figures) (Rupees _____ in words) only being 5% of O & M and electrical cost, to be submitted before the completion of design built component valid up to 3 months beyond the end of O&M period. The performance security shall be in the shape of Term Deposit Receipt/ Bank Guarantee of any nationalized / schedule commercial bank. (In prescribed Format as per Annexure – M)
Signing the contract agreement shall be reckoned as intimation to commencement of work and no separate letter for commencement of work is required.
Therefore, after signing of the agreement, you are directed to contact Engineer-in-charge within 14days for taking the possession of site and necessary instructions to start the work.

Yours faithfully,

MUNICIPAL COMMISSIONER
UJJAIN MUNICIPAL CORPORATION, UJJAIN

Annexure – M
(See clause 22 of Section 2 of ITB)

PERFORMANCE SECURITY/ADDITIONAL PERFORMANCE SECURITY

To

_____[Name of Employer]

_____

_____[Address of Employer]

_____

WHEREAS_____[name and Address of Contractor]

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

Dated _____to execute_____[Name of Contract and brief description of Works] (herein after called "the Contract").

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

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

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

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

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

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

Signature, Name and Seal of the Guarantor_____

Name of Bank_____

Address_____

Phone No., Fax No., E-mail Address, of Signing Authority_____

Date_____

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

SECTION 3

Conditions of Contract
Part – I General Conditions of Contract [GCC]

Table of Clauses of GCC

A. General

1. Definitions

1.1 **Bill of Quantities**: means the priced and completed Bill of Quantities forming part of the Bid.

1.2 **Chief Engineer**: means Chief Engineer of UADD.

1.3 **Completion**: means completion of the work as certified by the Engineer-in-Charge, in accordance with provisions of agreement.

1.4 **Contract:** means the Contract between the Employer and the Contractor to execute, complete and/or maintain the work. Agreement is synonym of Contract and carry the same meaning wherever used.

1.5 **Contract Data Sheet**: means the documents and other information which comprise of the Contract.

1.6 **Contractor**: means a person or legal entity whose bid to carry out the work has been accepted by the Employer.

1.7 **Contractor's bid** : means the completed bid document submitted by the Contractor to the Employer.

1.8 **Contract amount** : means the amount of contract worked out on the basis of accepted bid.

1.9 **Completion of work** : means completion of the entire contracted work. Exhaustion of quantity of any particular item mentioned in the bid document shall not imply completion of work or any component thereof.

1.10 **Day**: means the calendar day.

1.11 **Defect** : means any part of the work not completed in accordance with the specifications included in the contract.

1.12 **Department:** means department of Urban Administration and Development, Madhya Pradesh and UJJAIN MUNICIPAL CORPORATIONas the case may be.

1.13 **Drawings** : means drawings including calculations and other information provided or approved by the Engineer-in-Charge.

1.14 **Employer** : means the party as defined in the Contract Data, who employs the Contractor to carry out the work. The employer may delegate any or all functions to a person or body nominated by him for specified functions. The word Employer/Government/Department wherever used denote the Employer

1.15 **Engineer:** means Assistant Resident Engineer of PDMC AMRUT.

1.16 **Engineer in charge:** means Resident Engineer of PDMC AMRUT.

1.17 **Engineer In Chief :**Engineer In Chief of UADD

1.18 **Equipment** : means the Contractor's machinery and vehicles brought temporarily to the Site for execution of work.

1.19 **Government**: means Government of Madhya Pradesh.

1.20 **In Writing**: means communicated in written form and delivered against receipt.

1.21 **Material** : means all supplies, including consumables, used by the Contractor for incorporation in the work.

1.22 **Schedule of Rates** : means, Schedule of Rates (SOR) of Urban Administration and Development Department, Government of Madhya Pradesh w.e.f. 10th May 2012 with up to date amendments.

1.23 **PDMC** : Means WAPCOS LTD (A Mini-Ratna PSU under Ministry of Water Resources, River Development and Ganga Rejuvenation Govt. of India) have been appointed as Project Development and Management Consultant (PDMC) by UADD M.P. in April, 2016 for AMRUT Project in M.P. (Package – II).

1.24 **Superintending Engineer**: means Superintending Engineer of the Concerned Division of the MP, UADD as the case may be.

1.25 **Stipulated date of completion**: means the date on which the Contractor is required to complete the work. The stipulated date/ period is specified in the Contract Data.

1.26 **Specification**: means the specification of the work included in the Contract and any modification or addition made or approved by the Engineer-in-Charge.

1.27 **Start Date:**means the 14 days after the signing of agreement for the work.

1.28 **Sub-Contractor**: means a person or corporate body who has a Contract (duly authorized by the Employer) with the Contractor to carry out a part of the construction work under the Contract.

1.29 **Temporary Work**: means work designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the work.

1.30 **Tender / Bid, Tenderer /Bidder**: are the synonyms and carry the same meaning where ever used.

1.31 **UADD** : Urban Administration and Development Department

1.32 **Variation**: means any change in the work which is instructed or approved as variation under this contract.

1.33 **Work**: the expression "work" or "works" where used in these conditions shall unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean the work by virtue of contract, contracted to be executed, whether temporary or permanent and whether original, altered, substituted or additional.

2. Interpretations And Documents

2.1 Interpretations

In the contract, except where the context requires otherwise:

a. words indicating one gender include all genders;

b. words indicating the singular also include the plural and vice versa.

c. provisions including the word “agree”, “agreed” or “agreement” require the agreement to be recorded in writing;

d. written” or “in writing” means hand-written, type-written, printed or electronically made, and resulting in a permanent record;

2.2 Documents Forming Part of Contract:

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

2.2.1 Priority of bid document

1. Bid Data Sheet
2. Contractor Data Sheet
3. Special Condition of Contract
4. General Condition of Contract
5. Scope of Work
6. Specifications
7. Bill of Quantity
8. Drawings

3. Language and Law

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

4. Communications

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

5. Subcontracting

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

a. The Contractor may subcontract up to 25 percent of the contract price, only with and after the approval of the Employer in writing, but will not assign the Contract. Subcontracting shall not alter the Contractor's obligations.

b. The following shall not form part of the sub-contracting:
    i. hiring of labour through a labour contractor,
    ii. the purchase of Materials to be incorporated in the works,

iii. hiring of plant & machinery

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

6. Personnel

6.1 The Contractor shall employ for the construction work and routine maintenance the technical personnel as provided in the Annexure I-3 of Bid Data sheet, if applicable. If the Contractor fails to deploy required number of technical staff, recovery as specified in the Contract Data will be made from the Contractor.

6.2 If the Engineer asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within three days and has no further connection with the Works in the Contract.

7. Force Majeure

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

a) Which is beyond a party's control,

b) Which such party could not reasonably have provided against before entering into the contract,

c) Which, having arisen, such party could not reasonably have avoided or overcome, and

d) Which is not substantially attributed to the other Party

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

(i) War, hostilities (whether war be declared or not), invasion, act of foreign enemies),

(ii) Rebellion, terrorism, sabotage by persons other than he contractor's Personnel, revolution, insurrection, military or usurped power, or civil war,

(iii) Riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel,

(iv) Munitions of war, explosive materials, ionising radiation or contamination by radio activity, except ass may be attributed to the Contractor's use of such munitions, explosives, radiation or radio activity, and

(v) Natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity,

7.2 In the event of either party being rendered unable by force majeure to perform any duty or discharge any responsibility arising out of the contract, the relative obligation of the party affected by such force majeure shall upon notification to the other party be suspended for the period during which force majeure event lasts. The cost and loss sustained by either party shall be borne by respective parties.

7.3 For the period of extension granted to the Contractor due to Force Majeure the price adjustment clause shall apply but the penalty clause shall not apply. It is clarified that this sub clause shall not give eligibility for price adjustment to contracts which are otherwise not subject to the benefit of Price adjustment clause.

7.4 The time for performance of the relative obligation suspended by the force majeure shall stand extended by the period for which such cause lasts. Should the delay caused by force majeure exceed twelve months, the parties to the contract shall be at liberty to foreclose the contract after holding mutual discussions.

8. Contractor's Risks

8.1 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract are the responsibility of the Contractor.

8.2 All risks and consequences arising from the inaccuracies or falseness of the documents and/or information submitted by the contractor shall be the responsibility of the Contractor alone, notwithstanding the fact that designs/drawings or other documents have been approved by the department.

9. Liability for Accidents to Person

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

10. Contractor to Construct the Works

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

10.2 In the case of any class of work for which there is no such specification as is mentioned in contract Data, such work shall be carried as per best Engineering practice or as directed by Engineer In Charge. In the event of any disparity between the written specifications and BIS provisions, the provisions in BIS shall prevail.

10.3 The contractor shall supply and take upon himself the entire responsibility of the sufficiency of the scaffolding, timbering, Machinery, tools implements and generally of all means used for the fulfilment of this contract whether such means may or may not approved of or recommended by the Engineer.

11. Discoveries

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

12. Dispute Resolution System

12.1 No dispute can be raised except before the Competent Authority as defined in Contract data in writing giving full description and grounds of Dispute. It is clarified that merely recording protest while accepting measurement and/or payment shall not be taken as raising a dispute.

12.2 No issue of dispute can be raised after 45 days of its occurrence. Any dispute raised after expiry of 45 days of its first occurrence shall not be entertained and the Employer shall not be liable for claims arising out of such disputes.

12.3 The Competent Authority shall decide the matter within 45 days.

12.4 Appeal against the order of the Competent Authority can be preferred within 30 days to the Appellate Authority as defined in the Contract data. The Appellate Authority shall decide the dispute wiithin 45 days.

12.5 Appeal against the order of the Appellate Authority can be preferred before the Madhya Pradesh Arbitration Tribunal constituted under Madhya Pradesh MadhyasthamAdhikaranAdhiniyam, 1983.

12.6 The contractor shall have to continue execution of the works with due diligence notwithstanding pendency of a dispute before any authority or forum.

B. Time Control

13. Programme

13.1 Within the time stated in the Contract Data, the Contractor shall submit to the Engineer for approval a Programme showing the general methods, arrangements, order, and timing for all the activities in the Works for the construction of works.

13.2 The program shall be supported with all the details regardingkey personnel, equipment and machinery proposed to be deployed on the works for its execution. The contractor shall submit the list of equipment and machinery being brought to site, the list of key personnel being deployed, the list of machinery/equipment being placed in field laboratory and the location of field laboratory along with the Programme

13.3 An update of the Programme shall be a programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining Works, including any changes to the sequence of the activities.

13.4 The Contractor shall submit to the Engineer for approval an updated Programme at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Programme within this period, the Engineer may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Programme has been submitted.

13.5 The Engineer's approval of the Programme shall not alter the Contractor's obligations

14. Extension of Time

14.1 If the Contractor desires an extension of time for completion of the work on the ground of his having been unavoidably hindered in its execution or on any other grounds, he shall apply, in writing, to the Engineer-in-charge, on account of which he desires such extension. Engineer-in-charge shall forward the aforesaid application to the competent authority as prescribed.

14.2 The competent authority shall grant such extension at each such occasion within a period of 30 days of receipt of application from contractor and shall not wait for finality of work. Such extensions shall be granted in accordance with provisions under**clause -7** or **clause- 15** of this agreement.

14.3 In case of the work already in progress, the contractor shall proceed with the execution of their works, including maintenance thereof, pending receipt of the decision of the competent authority as aforesaid with all due diligence**.**

15. Compensation for delay

15.1 The time allowed for carrying out the work, as entered in the agreement, shall be strictly observed by the Contractor.

15.2 The time allowed for execution of the contract shall commence (14 days from the date of signing of the agreement). It is clarified that the need for issue of work order is dispensed with.

15.3 In the event milestones are laid down in the Contract Data for execution of the works, the contractor shall have to ensure strict adherence to the same.

15.4 Failure of the Contractor to adhere to the timelines and/or milestones shall attract such liquidated damages as is laid down in the Contract Data

15.5 In the event of delay in execution of the works as per the timelines mentioned in the contract data the Engineer-in- charge shall retain from the bills of the Contractor Amount equal to the liquidated damages liveable until the contractor makes such delays good. However, the Engineer-in-charge shall accept bankable security in lieu of retaining such amount.

15.6 If the contractor is given extension of time after liquidated damages have been paid, the engineer in charge shall correct any over payment of liquidated damages by the Contractor in the next payment certificate.

15.7 In the event the contractor fails to make good the delay until completion of the stipulated contract period (including extension of time) the sum so retained shall be adjusted against liquidated damages levied.

16. Contractor's quoted offer : NA

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

C. Quality Control

17. Tests

17.1 The Contractor shall be responsible for:

a. Carrying out the tests prescribed in specifications, and
b. For the correctness of the test results, whether preformed in his laboratory or elsewhere.

17.2 The contractor shall have to establish field laboratory within the time specified and having such equipment as are specified in the Contract Data.

17.3 Failure of the contractor to establish laboratory shall attract such penalty as is specified in the Contract Data.

17.4 Ten percent of the mandatory tests prescribed under the specifications shall be got carried out through Laboratories accredited by National Accreditation Board of Laboratories (NABL) by the Engineer-In – Charge at the cost of the Contractor or such testing charges will be borne by the employer and will be recovered/deducted from the payments due to the Contractor.

18. Correction of Defects noticed during the Defect Liability Period

18.1 Thedefect liability period of work in the contract shall be the Contract Data

18.2 The Contractor shall promptly rectify all defects pointed out by the Engineer well before the end of the Defect Liability Period. The Defect Liability Period shall automatically stand extended until the defect is rectified.

18.3 If the Contractor has not corrected a Defect pertaining to the Defect Liability Period to the satisfaction of the Engineer, within the time specified by the Engineer, the Engineer will assess the cost of having the Defect corrected, and the cost of correction of the Defect shall be recovered from the Performance Security or any amount due or that may become due to the contractor and other available securities.

D. Cost Control

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

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

19.2 The time for the completion of the work shall be extended in the proportion that the altered, additional or substituted work bears to the original contract work and the certificate of the Engineer in charge shall be conclusive as to such proportion.

20. Extra items

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

21. Payments for Variations and / or Extra Quantities

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

a. The contractor is bound to carry out the additional (Extra quantity), work at the same rates as are specified in the contract for the work.

b. If the item is not in the priced BOQ and is included in the SOR of the department, the rate shall be arrived at by applying the quoted tender percentage on the SOR rate.

c. If the rates of the altered or substituted work are not provided in applicable SOR-such rates will be derived from the rates for a similar class (type) of work as is provided in the contract (priced BOQ) for the work.

d. If the rates are for the altered, substituted work cannot be determined in the manner specified in the sub clause (c) above-then the rates for such composite work item shall be worked out on the basis of the concerned schedule of rates minus/plus the percentage quoted by the contractor.

e. If the rates of a particular part or parts of the item is not in the schedule of rates and the rates for the altered, or substituted work item cannot be determined in the manner specified in sub clause (b) to (d) above, the rate for such part or parts will be determined by the Competent Authority as defined in the Contract data on the basis of the rate analysis derived out of prevailing market rates when the work was done.

f. But under no circumstances, the contractor shall suspend the work on the plea of non acceptability of rates on items falling under sub clause (a) to (d). In case the contractor does not accept the rate approved by Engineer in charge for a particular item, the contractor shall continue to carry out the item at the rates determined by the Competent Authority. The decision on the final rates payable shall be arrived at through the dispute settlement procedure.

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

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

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

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

23. No Interest Payable

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

24. Recovery from Contractors

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

(a) Appropriating, in part or whole of the Performance Security and additional Performance Security , if any; and/or Security deposit and/or any sums payable under the contract to the contractor..

(b) If the amount recovered in accordance with (a) above is not sufficient, the balance sum may be recovered from any payment due to the contractor under any other contractor of the department, including the securities which become due for release.

(c) The department shall, further have an additional right to effect recoveries as arrears of land revenue under the M.P. Land revenue Code.

25. Tax

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

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

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

26. Check Measurements

26.1 The department reserves to itself the right to prescribe a scale of check measurement of work in general or specific scale for specific works or by other special orders.

26.2 Checking of measurement by superior officer shall supersede measurements by subordinate officer(s), and the former will become the basis of the payment.

26.3. Any over/excess payments detected, as a result of such check measurement or otherwise at any stage upto the date of completion of the defect liability period specified in this contract, shall be recoverable from the Contractor, as per clause 24 above.

27. Termination by Engineer in Charge

27.1 If the contractor fails to carry out any obligation under the Contract, the Engineer in charge may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time.

27.2 The Engineer in charge shall be entitled to terminate the contract if the Contractor

a) Abandons the works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the contract;
b) the Contractor is declared as bankrupt or goes into liquidation other than for approved reconstruction or amalgamation;
c) without reasonable excuse fails to comply with the notice to correct a particular defect within a reasonable period of time;
d) the Contractor does not maintain a valid instrument of financial Security, as prescribed;
e) the Contractor has delayed the completion of the Works by such duration for which the maximum amount of liquidated damages is recoverable;
f) If the Contractor fails to deploy machinery and equipment or personnel or set up a field laboratory as specified in the Contract Data.
g) if the Contractor, in judgemental of the engineer in charge has engaged in corrupt or fraudulent practices in competing for or in executing the contract;
h) Any other fundamental breaches as specified in the Contract Data.

27.3 In any of these events or circumstances, the engineer in charge may, upon giving 14 days' notice to the contractor, terminate the contract and expel the Contractor from the site. However, in the case of sub paragraph (b) or (g) of clause 27.2, the Engineer in charge may terminate the contract immediately.

27.4 Notwithstanding the above, the Engineer in charge may terminate the contract for convenience by giving notice to the contractor.

28. Payment upon Termination

28.1 If the contract is terminated under clause 27.3, the Engineer shall issue a certificate for value of the work accepted on final measurements, less advance payments and penalty as indicated in the Contract Data. The amount so arrived at shall be determined by the Engineer-in-charge and shall be final and binding on both the parties.

28.2 payment on termination under clause 27.4 above, the Engineer shall issue a certificate for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the contractor's personnel employed solely on the works, and the contractor's costs of protecting and securing the works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law.

28.3 If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be recovered as per clause 24 above.

29. Performance Security

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

30. Security Deposit

30.1 Security deposit shall be deducted from the each running bill at the rate as specified in the contract data. The total amount of security deposit so deducted shall not exceed the percentage of contract price specified in the Contract data.

30.2 The Security may be replaced by equivalent amount of bank guarantee or fixed deposit receipt assigned to the Employer, with validity up to 3(three) months beyond the completion of defect Liability PERIOD/ extended Defect Liability.

30.3 The Security deposit shall be refunded on completion of defect liability period.

31. Price Adjustment (Deleted)

32. Mobilization Advance

32.1 Payment of advances shall be applicable if provided in the Contract Data.

32.2 If applicable, the Engineer in charge shall make interest bearing advance payment to the contractorof the amounts started in the Contract Data, against provision by the contractor of an unconditional Bank Guarantee in a form and by nationalized/Scheduled banks, in the name as stated in the Contract data, in amounts equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by theamounts repaid by the contractor.

32.3 The rate of interest chargeable shall be as per Contract data**.**

32.4 The advance payment shall be recovered as stated in the Contract data by deducting proportionate amounts from payment otherwise due to the Contractor. No account shall be taken of the advance payment or its recovery in assessing valuations of work done, variations, price adjustments, compensation events, or liquidated damages.

33. Secured Advance (Deleted)

34. Payment Certificates

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

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

E. Finishing the Contract

35. Completion Certificate

35.1 A completion certificate in the prescribed format in Contract data shall be issued by the Engineer in charge after physical completion of the work.

35.2 After final payment to the contractor, a final completion certificate in the prescribed format in the contract data shall be issued by the Engineer in charge.

36. Final Account

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

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

F. Other Conditions of Contract

37. Currencies

All payments will be made in Indian Rupees.

38. Labour

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

38.2 The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several

classes of labour from time to time employed by the Contractor on the Site and such other information as the Engineer may require.

39. COMPLIANCE WITH LABOUR REGULATIONS

39.1 During continuance of the Contract, the Contractor and his sub Contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given in the Contract data. The Contractor shall k48

eep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/byelaws/Acts/Rules/ regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer. The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

39.2 Construction Safety

The contractor should be well conversant with technical as well as administrative and legal aspects of safety and judicial pronouncement. The contractor shall all times take all reasonable precautions and safety measures to maintain safety of personnel and property. The contractor shall, at his own expenses and throughout the period of the contract ensure appropriate and suitable arrangements for health, safety and hygiene requirements for the surroundings. The State and Central Government prevailing all Statues in this regard must be complied in letter and spirit throughout the period of contract.

40. Audit and Technical examination

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

41. Death or permanent invalidity of contractor

If the Contractor is an individual or a proprietary concern, partnership concern, dies during the currency of the contract or becomes permanently incapacitated, where the surviving partners are only minors, the contract shall be closed without levying any damages/ compensation as provided for in **clause 28.2** of the contract agreement. However, if the competent authority is satisfied about the competence of the survivors, then the competent authority shall enter into a fresh agreement for the remaining work strictly on the same terms and conditions under which the contract was awarded.

42. Jurisdiction

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

43. Monthly RA Bills

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

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

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

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

[End of GCC]

Contract Data

Clause reference	Particulars	Data
1.14	Employer	UJJAIN MUNICIPALCORPORATION, UJJAIN
1.15	Engineer	Assistant Resident Engineer of Project Development and Management Consultants (PDMC)
1.16	Engineer in charge	Resident Engineer of Project Development and Management Consultants (PDMC)
1.22	Stipulated period of completion	36 months
3	Language & Law of Contract	English & Indian Contract Act 1872
4	Address & contact details of the Contractor	As per Annexure H
	Address & contact details of the Employer/Engineer-phone, Fax, e-mail.	_____ _____
5	Subcontracting permitted for contract value	25% of the Contract value
6	Technical Personnel to be provided by the contractor – requirement &	As per Annexure I (Format I-3)
	Penalty, if required Technical personal not employed	Rs. 30,000/- per month per person for Degree Holder Rs. 18,000/- per month per person for Diploma Holder
10	Specifications	Annexure E
	Drawings	As per Annexure N
12	Competent authority for deciding dispute under Dispute resolution system	Superintending Engineer of UADD in charge of Concerned Division
	Appellate Authority for deciding dispute under Dispute resolution system	Engineer –In-Chief /Chief Engineer UADD
13	Period of submission of updated construction program	30 days upon signing the agreement
	Amount to be withheld or not submitting construction program in the prescribed period	0.20% of the Contract Amount
14	Competent Authority for granting Time Extension	Appropriate authority within the Urban Local Body
15	Milestones laid down for the contract	YES
	If Yes, details of milestones	As per Annexure O
	Liquidated damage	As per Annexure P
17	List of equipments for lab	As per Annexure Q
	Time to establish lab	2 months after signing the agreement
	Penalty for not establishing field Laboratory	0.20% of the Contract amount till the establishment of Lab
18	Defect Liability Period	5 (Five) years after physical completion of work
21	Competent authority for determining the rate	Chief Engineer/Engineer-in-Chief UADD
27	Any other conditions for breach of contract	NIL

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

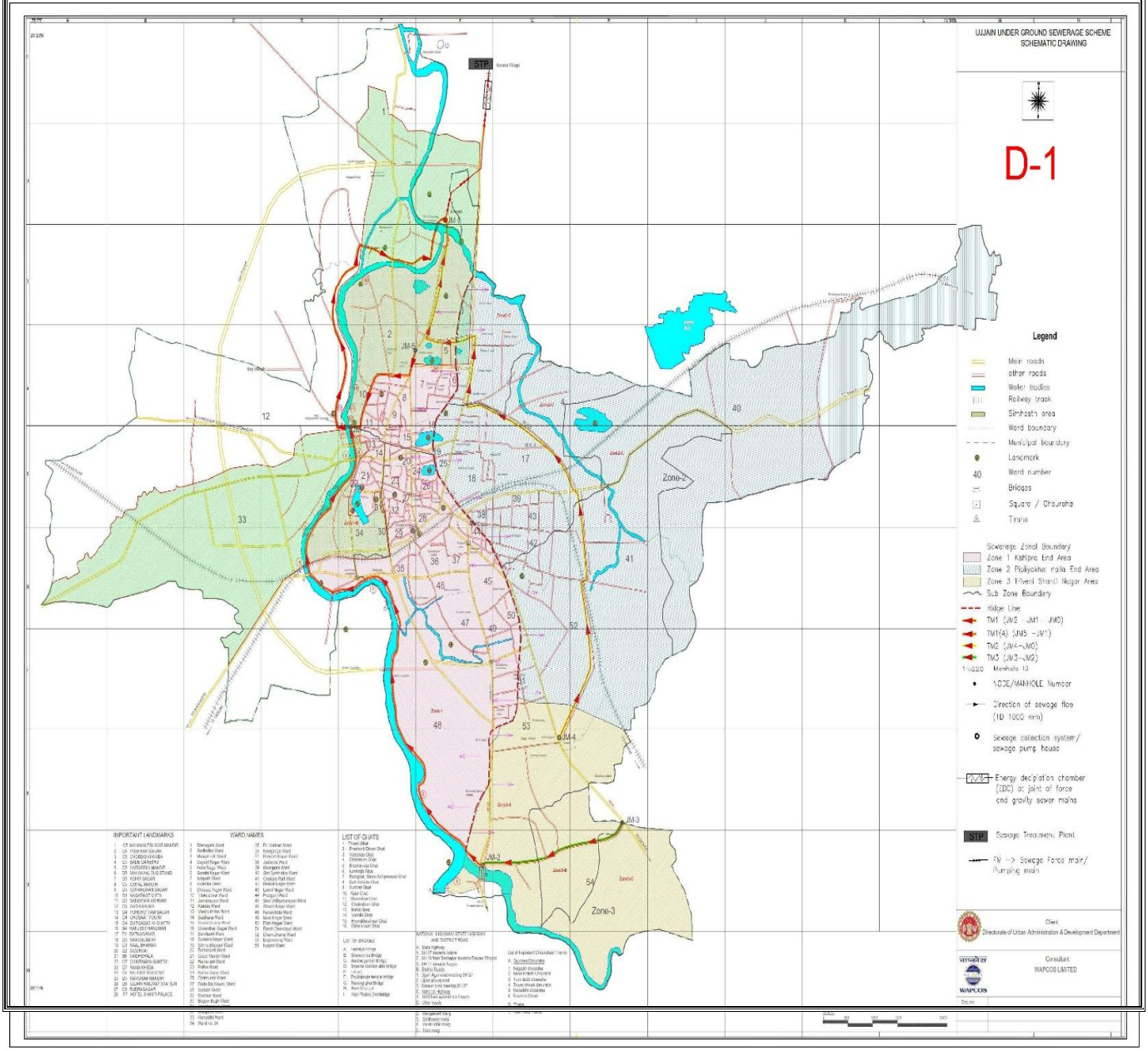
Clause reference	Particulars	Data
	33.3 If yes, Conditions for secured Advance	a) The materials are in accordance with the specification of works, b) Such materials have been delivered to site, and are properly stored and protected against damage or deterioration to the satisfaction of the engineer. The contractor shall store the bulk material in measurable stacks, c) The Contractor's records of the requirements, ordered, receipt and use of materials are kept in a form approved by the Engineer and such records shall be available for inspection by the Engineer; d) The contractor has submitted whit his monthly statement the estimated value off the materials on site together with such documents as may be required by the engineer for the purpose of valuation of the materials and providing evidence of ownership and payment thereof; f) The quantity of materials are not excessive and shall be used within a reasonable time as determined by the engineer.
	33.4 If yes, recovery of secured advance	The advance shall be repaid from each succeeding monthly payments to the extent materials [for which advance was previously paid] have been incorporated into the works.
35	Completion certificate- After physical completion of the work	As per Annexure – U
	Final Completion Certificate – after final payment on completion of the work	As per Annexure – V
36	Competent Authority	Chief Engineer/Engineer-in-Chief, UADD
39	39.1 Salient features of some of the major labour laws that are applicable	As per Annexure – W
	39.2 Salient features of some Construction Safety laws that are applicable	As per Annexure – W1
41	Competent Authority	Appropriate authority within the Urban Local Body (Authority Entering in the agreement in ULB)

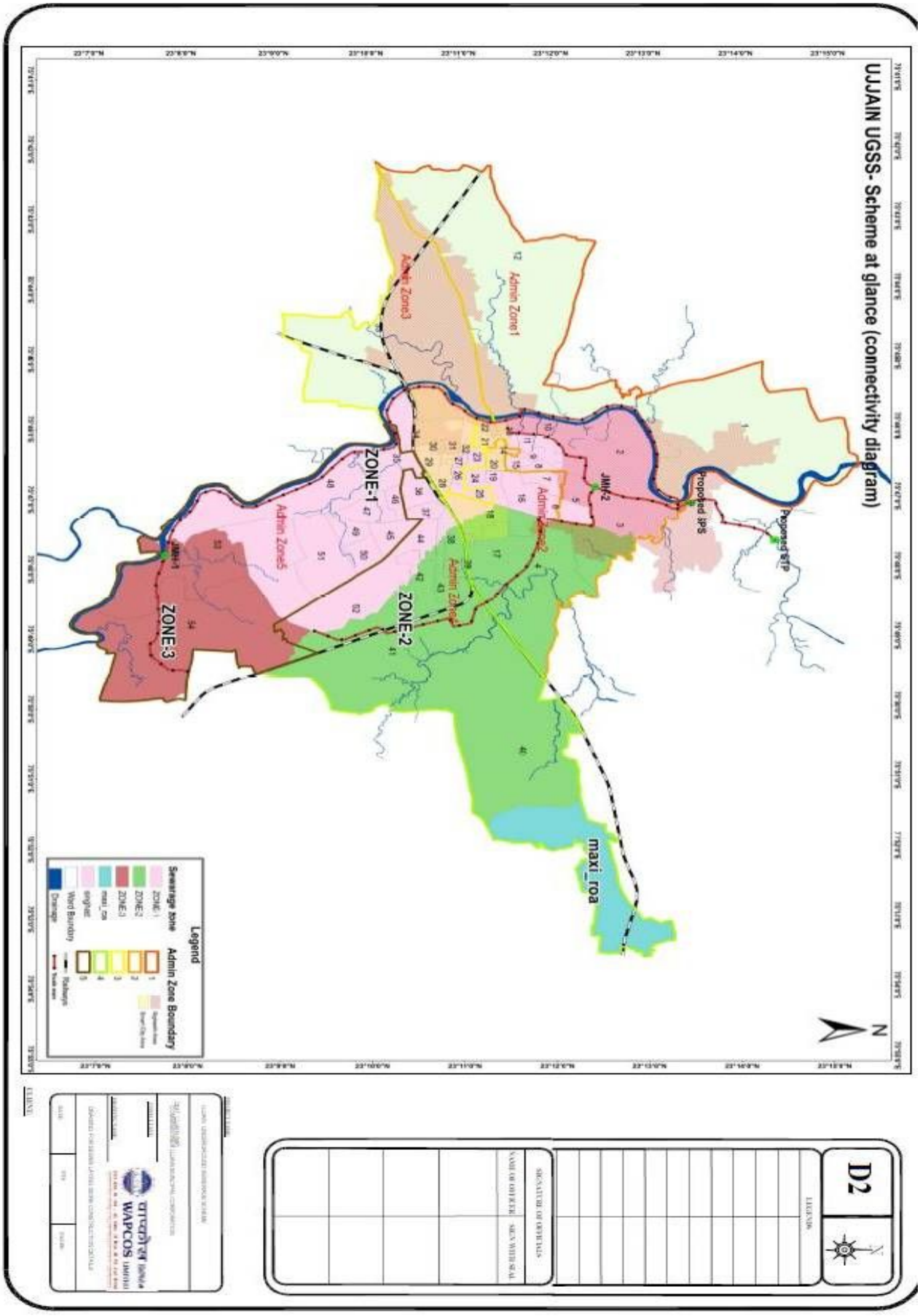
Annexure – N
(See clause 10 of Section 3 of GCC)

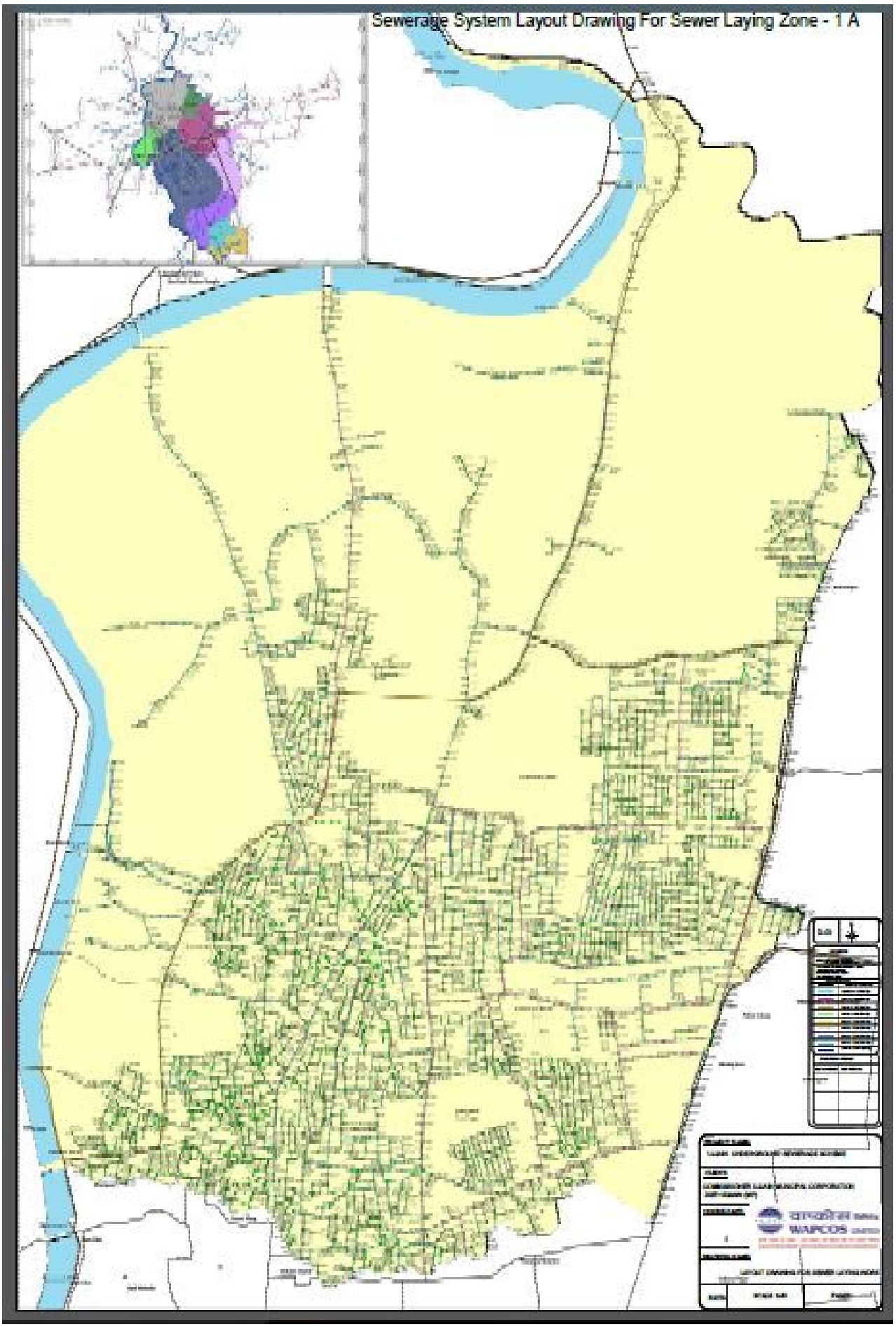
DRAWINGS

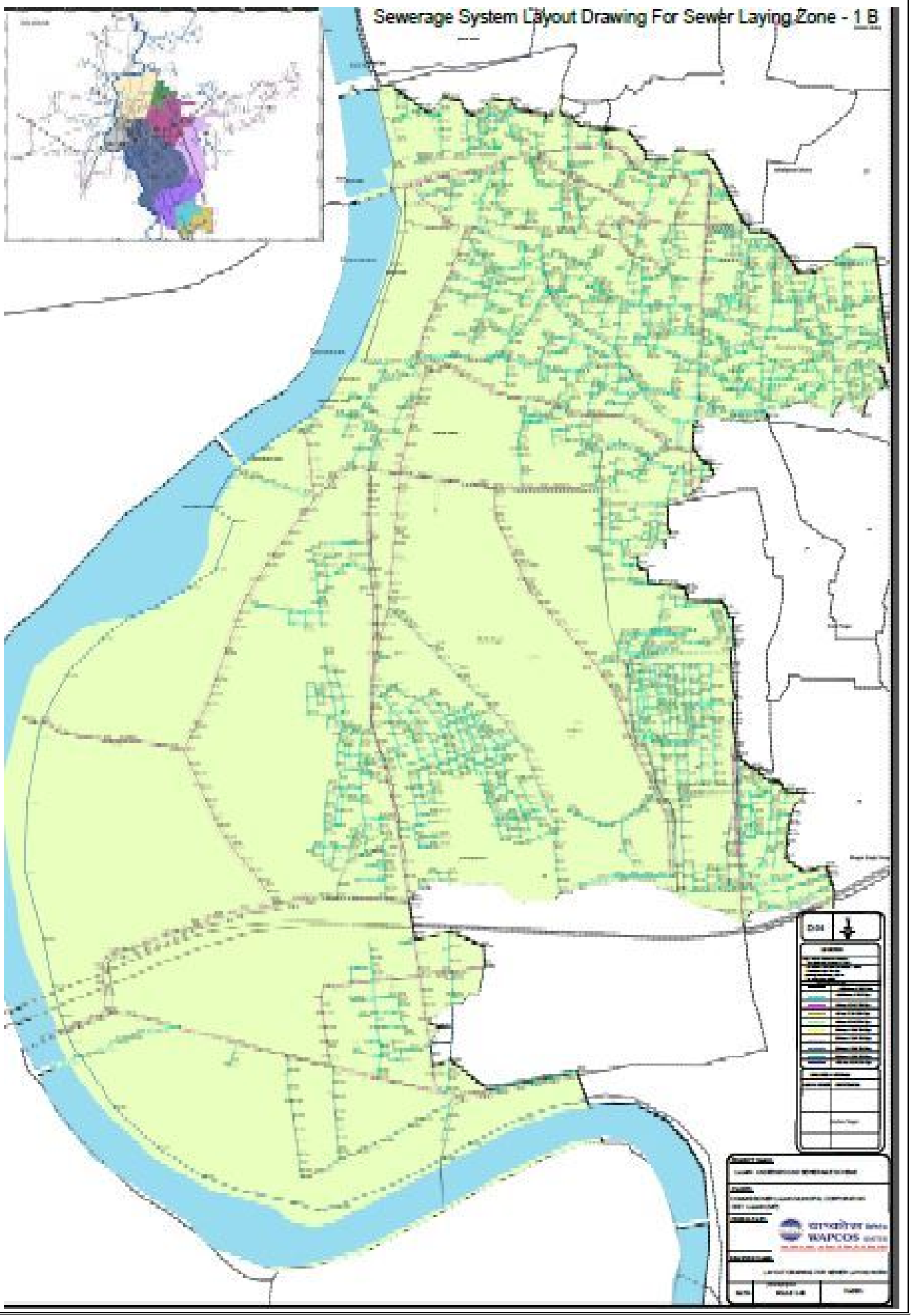
Sewer Network Zone – 1(Phase I Work)

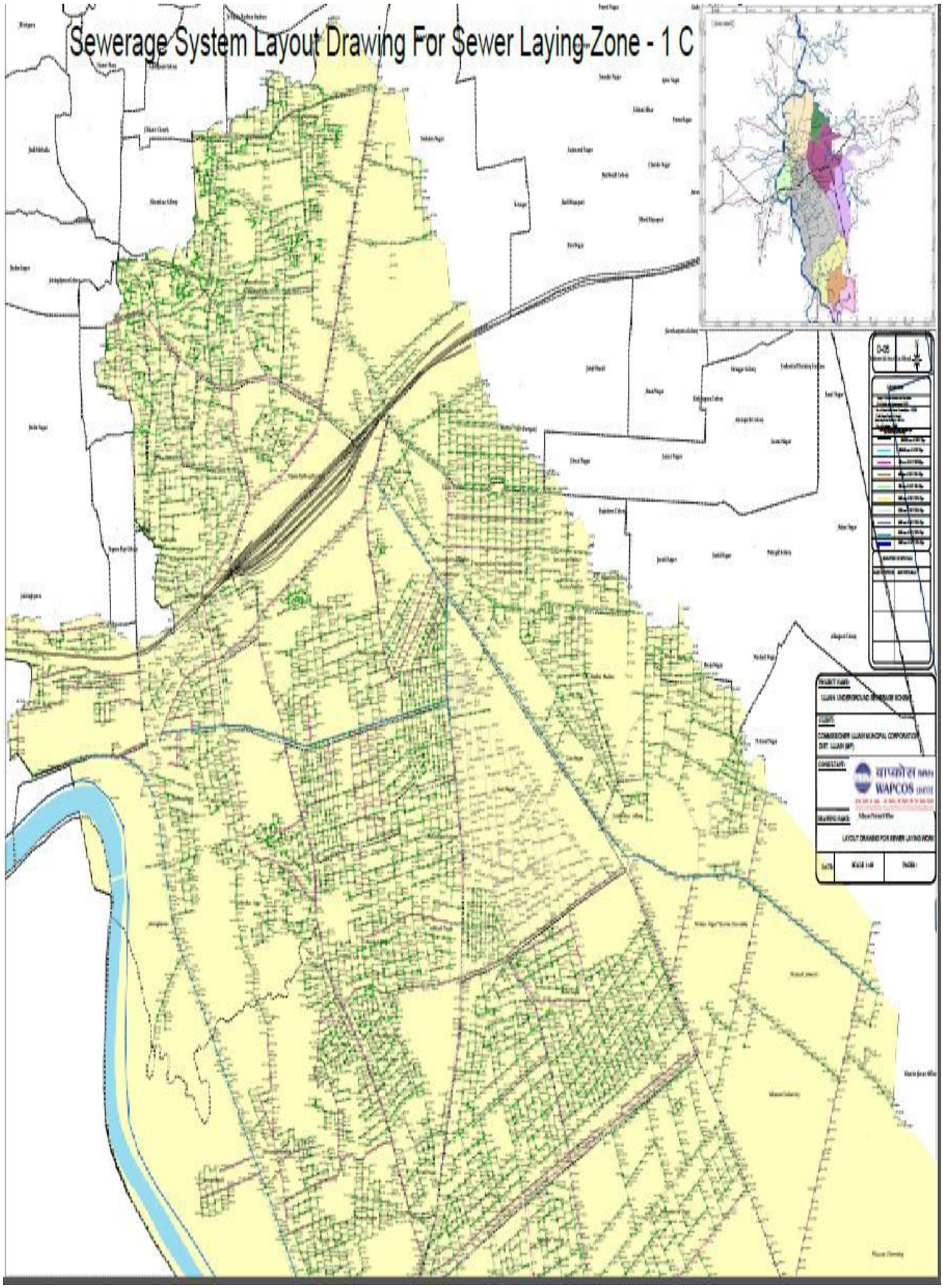
S NO.	Name of Drawing
1.	Schematic Drawing
2.	Scheme at a Glance Zonal Connectivity Diagram
3.	Sewerage System Layout Drawing for Sewer Laying Zone-1 A
4.	Sewerage System Layout Drawing for Sewer Laying Zone-1 B
5.	Sewerage System Layout Drawing for Sewer Laying Zone-1 C
6.	Drawing for RCC Special Type Manhole



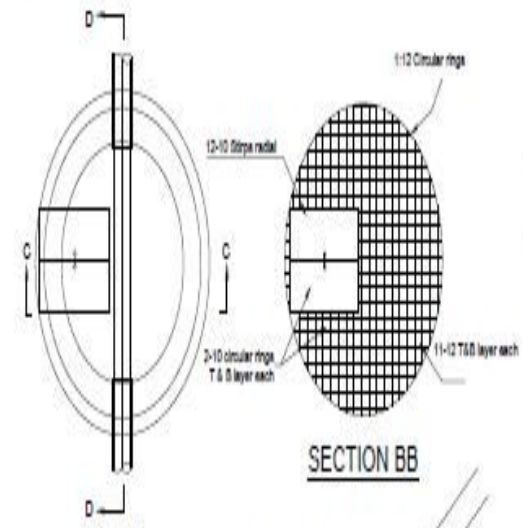

UJJAIN UGSS- Scheme at glance (connectivity diagram)
Admin Zone1
Admin Zone2
Admin Zone3
Admin Zone4
Admin Zone5
ZONE-1
ZONE-2
ZONE-3
JMH-1
JMH-2
Proposed STP
Proposed SPS
maxi_roa
N
Legend
Sewerage Zone
ZONE-1
ZONE-2
ZONE-3
maxi_roa
engnet
Ward Boundary
Drainage
Admin Zone Boundary
Railways
D2
LEGEND
SIGNATURE OF OFFICIALS
NAME OF OFFICIAL
DESIGNATION
WAPCOS LIMITED


Sewerage System Layout Drawing For Sewer Laying Zone - 1 A


Sewerage System Layout Drawing For Sewer Laying Zone - 1 B
WAPCOS

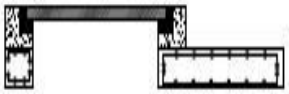

Sewerage System Layout Drawing For Sewer Laying Zone - 1 C
WAPCOS

DRAWING FOR RCC SPECIAL TYPE MANHOLE (WITH DROP CONNECTION AND HIGH FLOOD PROTECTION SYSTEM)

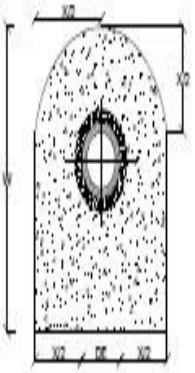


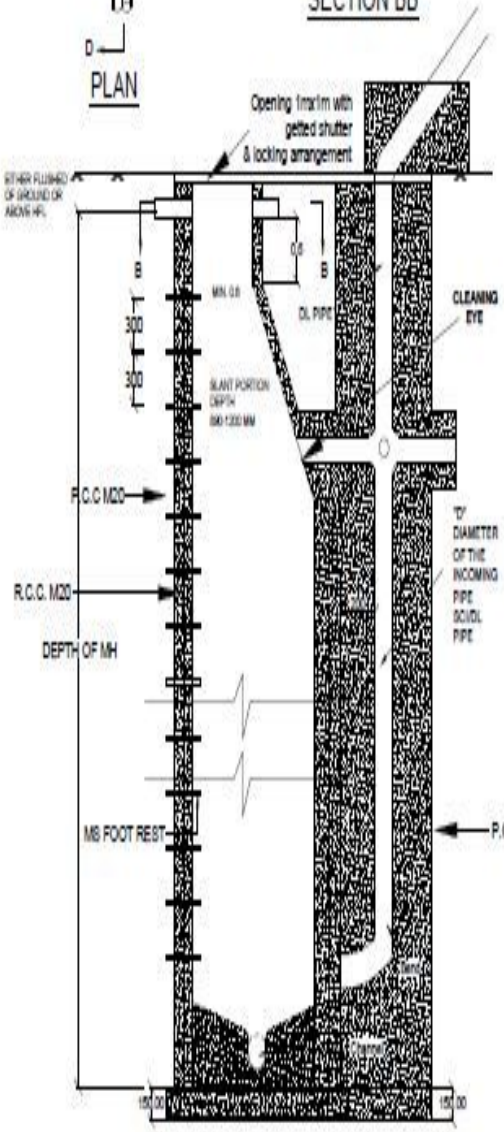
PLAN

SECTION BB



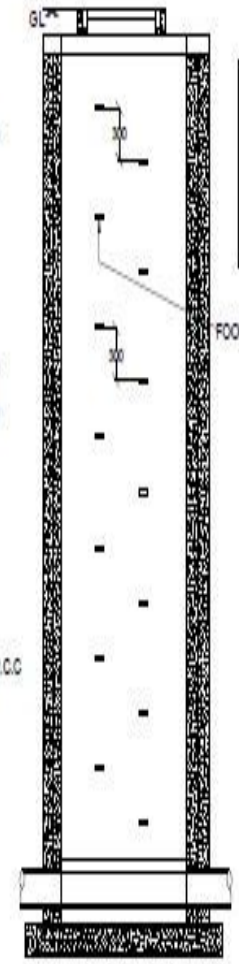
DETAIL 'C'





SECTION CC

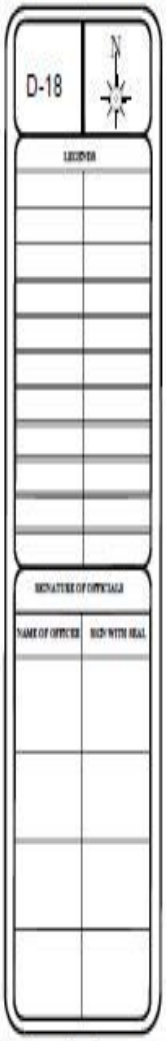
(For sewers of 900 to 2000 mm Dia.)



SECTION DD

NOTE
X= 30 FOR DEPTH UP 1.2 M
X= 40 CM FOR BEYOND 1.2 NO.

CONCRETE AROUND / HAUNCHES TO BE PROVIDE FOR LINES LIKELY TO BE EFFECTED DUE TO HIGH DUE TO HIGH FLOOD



TABLE

Outgoing sewer in manhole	Dia (d) mm	900	1000	1200	1400	1600	1800	2000
Manhole internal Dia (MH ID) in mm	MH ID (in mm)	1500	1500	1750	2000	2200	2300	2500
Circumferential reinforcement in wall	0-3.5m Depth	#10@250 c/c		#10 @ 250 c/c				
Vertical Reinforcement in wall	#8 @ 140 c/c							Base slab thickness
Base slab	0-3.5m Depth	Top layer	#12 @120 c/c both ways					350
		Bottom layer	#10 @200 c/c both ways					

PROJECT NAME:
UJJAIN UNDERGROUND SEWERAGE SCHEME

CLIENT:
COMMISSIONER UJJAIN MUNICIPAL CORPORATION DIST. UJJAIN (MP)

CONSULTANT:
वाप्कोस लिमिटेड
WAPCOS LIMITED

DRAWING NAME:
DRAWING FOR RCC MANHOLES WITH DROP CONNECTION AND HIGH FLOOD PROTECTION SYSTEM

DATE:	NTS	PAGES :

NTS - DRAWING NOT TO THE SCALE. FOLLOW WRITTEN DIMENSION

Annexure – O

(See clause 15 of Section 3 of GCC)

DETAILS OF MILESTONES

The time allowed for the carrying out the work, as entered in the tender form shall be strictly observed by the contractor and shall be deemed to be essence of the contract and shall be reckoned immediately 14 days after the signing of agreement.

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

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

Annexure – P
(See clause 15 of Section 3 of GCC)

COMPENSATION FOR DELAY

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

i. Slippage up to 25% in financial target during the milestone under consideration – 2.5% of the work remained unexecuted in the related time span.

ii. Slippage exceeding 25% but up to 50% in financial target during the milestone under consideration – 5% of the work remained unexecuted in the related time span.

iii. Slippage exceeding 50% but up to 75% in financial target during the milestone under construction – 7.5% of the work remained unexecuted in the related time span.

iv. Slippage exceeding 75% in financial target during the milestone under consideration – 10% of the work remained unexecuted in the related time span.

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

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

Annexure – Q
(See clause 17 of Section 3 of GCC)

LIST OF EQUIPMENT FOR QUALITY CONTROL LAB

(To be filled-in by the bidder)

The following Equipments/ Machines shall be required for quality control for the various civil works.

Minimum Requirement			**Available with the Bidder**	
S. No.	Name of Equipment/ Machinery	Quantity	Name of Equipment/ Machinery	Quantity
1	Digging tools like pick axe, shovel, etc.	One set		
2	IS Sieves Nos. with lid and pan (90 mm, 80 mm, 63 mm, 53 mm, 45 mm, 37.5 mm, 26.5 mm, 19 mm, 13.2 mm, 11.2 mm, 9.5 mm, 4.75 mm, 2.8 mm, 5.6 mm, 3.35 mm, 2.36 mm, 600 Micron, 425 Micron, 300 Micron, 150 Micron, 180 Micron, 90 Micron and 75 Micron)	ONE SET		
3	Sand Pouring Cylinder with tray complete for field Density test	One set		
4	Speedy moisture meter complete with chemicals	One set		
5	Straight Edges 3.00 metre width	Two set		
6	Liquid Limit and plastic limit testing apparatus complete with water bottle and glass wares	One set		
7	Electronic/digital balance 5 kg	One no.		
8	Pan balance with weight box, 5 kg.	One no.		
9	Slump cone	Two no.		
10	Concrete cube moulds (150 mm X 150mm)	Twelve no.		
11	Free swelling index test Apparatus	Six no.		
12	Flakiness and elongation testing gauges	Two no.		
13	Water absorption test apparatus	One no.		
14	Specific gravity test apparatus	One no.		
15	B.S. compaction apparatus	One no.		
16	Proving rings	One each		
17	Glass ware	One set		
18	Auto level and staff	Three nos.		
19	Rapid moisture meter	One no.		
20	Post Hole Auger with extensions	One set		
21	Measuring tape, spatula, glassware, porcelain dish, pestle mortar	One set		
22	Standard Proctor Density Test Apparatus with rammer	One set		
23	Electronic/digital balance 1 kg with the least count of 0.01 gm	One set		
24	Camber Board	Two no.		
25	Core Cutter (10 cm dia) 10cm/15cm height complete with dolly and	One set		

	hammer.			
26	CBR Testing machine	One no.		
27	Oven (ambient to 200°C)	One no.		
28	Digital Thermometers	Three no.		
	Aggregate Soundness test apparatus	One no.		
30	Concrete cube testing machine	One no.		
31	First aid box	One no.		
32	Sampling Pipette	One no.		
33	Balance	One no.		
34	Dial Gauges	Six No.		
35	Thickness gauge	One set		
36	Water still (4 ft.)	One no.		
37	A.I.V. testing equipment	One no.		

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

Annexure – R
(See clause 31 of Section 3 of GCC)

PRICE ADJUSTMENT (DELETED)

The formulas for adjustment f price are as follow:

R= Value of Work as DefinedInClause31.2(3)Of General Conditions Of Contract

Weightages*of component in the work

Sno	Component	Percentage of component in the work
1	Cement-P_c	
2	Steel-P_s	
3	Bitumen-P_b	
4	POL -P_f	

*Weight agesofvariouscomponentsofthe workshall be asdeterminedbythecompetenttechnicalsanctionauthority.

Adjustmentforcementcomponent

(II) Priceadjustmentforincreaseordecreasein thecost ofcementprocuredbythecontractorshallbepaidinaccordance withthefollowingformula:

VC= 0.85 x PC/100 x R x (C1-C0)/C0

Vc= increase or decrease in the cost of work during the month under consideration due to changes in rates for cement.

Co= The all India wholesale price index for Grey cement on the date of opening of Bids as published by the Ministry of Industrial Development, Government of India, New Delhi. (www.eaindustry.nic.in)

C1= The all India average wholesale price index for Grey cement for the month under consideration as published by Ministry of Industrial Development, Government of India, New Delhi.(www.eaindustry.nic.in)

Pc= Percentage of cement component of the work

Note : For the application of this clause, index of Grey Cement has been chosen to represent Cement group.

Adjustment of steel component

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

Vs= 0.85 x PS x /100 x R x (S1-S0)/S0

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

S0= The all India wholesale price index for steel (Bars and Rods) on the date of opening of Bids as published by the Ministry of Industrial Development, Government of India, New Delhi. (www.eaindustry.nic.in)

Si = The all India average wholesale price index for steel (Bars and Rods) for the month under consideration as published by Ministry of Industrial Development, New Delhi. (www.eaindustry.nic.in)

Ps= Percentage of steel component of the work.

Note : For the application of this clause, index of Bars and Rods has beenchosen to represent steel group.

Adjustment of POL (fuel and lubricant) component

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

Vf= 0.85 x Pf / 100 x R x (Fi – Fo) / Fo

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

Fo = The official retail price of High Speed Diesel (HSD) at the existing consumer pumps of IOC at nearest center on the date of opening of Bids.

Fi = The official retail price of HSD at the existing consumer pumps of IOC at nearest center for the 15th day of month of the under consideration.

Pf = Percentage of fuel and lubricants component of the work.

Note:Fortheapplicationofthisclause,thepriceofHighSpeedDieselhasbeen chosentorepresentfuelandlubricantsgroup.

Annexure - S
(See clause 32 of Section 3 -GCC)

BANK GUARANTEE FORM' FOR MOBILIZATION AND CONSTRUCTION MACHINERY ADVANCE

To,

_____ [name of Employer]
_____ [address of Employer]
_____ [name of Contractor]

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

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

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

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

Yours truly,

Signature and Seal :
Name of Bank/Financial Institution:
Address : '
Date :

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

Annexure –T
(See clause 33 of Section 3- GCC)

Bank Guarantee Form for Secured Advance

INDENTURE FOR SECURED ADVANCES

Thisindenturemadethe…….dayof……..…… 20_between
(hereinaftercalledthecontractorwhichexpressionshallwherethecontextsoadmitsorimpliesbedeemedtoincludehisexecutors ,administratorsandassigns)ortheonepartandtheemployeroftheotherpart.
Whereasbyanagreementdated..... (hereinaftercalledthe said agreement) the contractor has agreed.

ANDWHEREAS,thecontractorhasappliedtotheemployerthathemaybeallowedadvancedonthesecurityofmaterialsabsolutely belongingtohimandbroughtbyhimtothesiteoftheworksthesubjectofthesaidagreementforuseintheconstructionof suchoftheworksashehasundertakentoexecutiveatratesfixedforthefinishedwork(inclusiveof thecostofmaterialsandlabourandothercharges)
andwhereastheemployerhasagreedtoadvancetothecontractorthesumofrupees
onthesecurityofmaterialsthequantities
andotherparticularsofwhicharedetailedinaccountsofsecuredadvanceattachedtotherunningaccountbillforthesaidworkssignedbyt hecontractoron
andtheemployerhasreservedtohimselftheoptionofmakinganyfurtheradvanceoradvanceson thesecurityofothermaterialsbroughtbythecontractortothesiteofthesaidworks.
NowTHISINDENTUREWITNESSETHthatinpursuanceofthesaidagreementand inconsideration ofthesum ofrupees…….. onor
beforetheexecutionofthesepresentspaidtothecontractorbytheemployer(thereceiptwhereofthecontractordoth herebyacknowledge)andofsuchfurtheradvances(ifany)asmaybemadetohimasaforsaidthecontractordothherebycovenantandag reewiththepresidentanddeclareas follows:

That thesaidsumofrupees……..…….. soadvancedbytheemployerto

(1) Thecontractorasaforesaidandall oranyfurthersumofsumsadvancedas aforesaid shallbeemployedbythecontractorinortowardsexpendingtheexecutionofthesaid worksandfornootherpurposewhatsoever.

(2) Thatthematerialsdetailsinthesaidaccountofsecuredadvanceswhichhavebeen offeredtoandacceptedbytheemployerassecurityareabsolutelythecontractor's ownproprietyandfreefromencumbrancesofanykindandthecontractorwill not makeanyapplicationfororreceiveafurtheradvanceonthesecurity ofmaterials whicharenotabsolutelyhisownpropertyandfreefromencumbrancesofanykind andthecontractorindemnifiedtheemployeragainstallclaimstoanymaterialsin respectof whichan advancehasbemadetohimasaforesaid.

(3) That the materials detailed in the said account of Secured Advances and all other materials on the security of which any further advance or advances may hereafter be made as aforesaid (hereafter called the said materials) shall be used by the Contractor solely in the execution of the said works in accordance with the directions of the Engineer.

(4) That the Contractor shall make at his own cost all necessary and adequate arrangements for the proper watch, safe custody and protection against all risks of the said materials and that until used in construction as aforesaid the said materials shall remain at the site of the said works in the Contractor's custody and on his own responsibility and shall at all times be open to inspection by the Engineer or any officer authorized by him. In the event of the said materials or any part thereof being stolen, destroyed or damaged or becoming deteriorated in a greater degree than is due to reasonable use and wear thereof the Contractor will forthwith replace the same with other materials of like quality or repair and make good the same required by the Engineer.

(5) That the said materials shall not be removed from the site of the said works except with the written permission of the Engineer or an officer authorized by him on that behalf.

(6) That the advances shall be repayable in full when or before the Contract receives payment from the Employer of the price payable to him for the said works under the terms and provisions of the said agreement. Provided that if any intermediate payments are made to the Contractor on account of work done than on the occasion of each such payment the Employer will be at liberty to make a recovery from the Contractor's bill for such payment by deducting there from the value of the said materials than actually used in the construction and in respect of which recovery has not been made previously, the value for this purpose being determined in respect of each description of materials at the rates at which the amounts of the advances made under these presents were calculated.

(7) That if the Contractor shall at any time make any default in the performance or observance in any respect of any of the terms and provisions of the said agreement or of these presents the total amount of the advance or advances that may still be owing of the Employer shall immediately on the happening of such default be re- payable by the Contractor to be the Employer together with interest thereon at twelve percent per annum from the date or respective dates of such advance or advances to the date of repayment and with all costs, charges, damages and expenses incurred by the Employer in or for the recovery thereof or the enforcement of this security or otherwise by reason of the default of the Contractor and the Contractor hereby covenants and agrees with the Employer to reply and pay the same respectively to him accordingly.

(8) That the Contractor hereby charges all the said materials with the repayment to the Employer of the said sum of Rupees.....and any further sum of sums advanced as aforesaid and all costs, charges, damages and expenses payable under these presents PROVIDED ALWAYS and it is hereby agreed and declared that notwithstanding anything in the said agreement and without prejudice to the power contained therein if and whenever the covenant for payment and repayment here-in-before contained shall become enforceable and the money owing shall not be paid in accordance there with the Employer may at any time thereafter adopt all or any of the following courses as he may deem best.

DELETED

(a) Seize and utilize the said materials or any part thereof in the completion of the said works on behalf of the contractor in accordance with the provision in that behalf contained in the said agreement debiting the contractor with the actual cost of effecting such completion and the amount due to the contractor with the value of work done as if he had carried it out in accordance with the said agreement and at the rates thereby provided. If the balance is against the contractor, he is to pay same to the Employer on demand.

(b) Remove and sell by public auction the seized materials or any part thereof and out of the moneys arising from the sale retain all the sums aforesaid repayable or payable to the Employer under these presents and pay over the surplus (if any) to the Contractor.

(C) Deduct all or any par of the moneys owing out of the security deposit or any sum due to the Contractor under the said agreement.

(9) That except in the event of such default on the part of the contractor as aforesaidinterest on the said advance shall not be payable.

(10) That in the event of any conflict between the provisions of these presents and the said agreement the provisions of these presents shall prevail and in the event of any dispute or difference arising over the construction or effect of these presents the settlement of which has not been here-in-before expressly provided for the same shall be referred to the Employer whose decision shall be final and the provision of the Indian Arbitration Act for the time being in force shall apply to any such reference.

Annexure - U

(See clause 35 of section 3 -GCC)

Physical Completion Certificate

Name of Work:

_____

_____

_____

Agreement No. _____Date_____

Amount of Contract Rs _____

Name of Agency: _____

Used MB No.: _____

Last measurement recorded

a. Page No. & MB No.:_____

b. Date:_____

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

Date of issue

Engineer In Charge

_____

_____

Annexure-V
(See clause 35 of section 3 -GCC)

Final Completion Certificate

Name of Work:

_____
_____
_____

Agreement No._____ Date: _____

Name of Agency:_____

Used MB No._____

Last Measurement recorded

b. Page No. & MB No._____

c. Date_____

Certified that the above mentioned work was physically completed on_____(date)

And taken over on_____(date).

Agreement amount Rs._____

Final amount paid to contractor Rs._____

Incumbency of officers for the work

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

Date of Issue

Engineer In Charge

_____

_____

Annexure – W

(See clause 39 of Section 3 -GCC)

Salient Features of Some Major Labour Laws Applicable

(a) Workmen Compensation Act 1923: - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

(b) Payment of Gratuity Act 1972: - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed the prescribed minimum years (say, five years) of service or more or on death the rate of prescribed minimum days'(say, 15 days) wages for every completed year of service. The Act is applicable to all establishments employing the prescribed minimum number (say, 10) or more employees.

(c) Employees P.F. and Miscellaneous Provision Act 1952: The Act Provides for monthly contributions by the Employer plus workers at the rate prescribed (say, 10% or 8.33%). The benefits payable under the Act are:

i. Pension or family pension on retirement or death as the case may be. '

ii. Deposit linked insurance on the death in harness of the worker.

iii. Payment of P.F. accumulation on retirement/death etc.

(d) Maternity Benefit Act 1951: - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

(e) Contract Labour (Regulation & Abolition) Act 1970: - The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The principal Employer is required to take Certificate of Registration and the Contractor is, required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ prescribed minimum (say 20) or more contract labour.

(f) Minimum Wages Act 1948: - The Employer is to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads, runways is scheduled employment.

(g) Payment of Wages Act 1936: - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

(h) Equal Remuneration Act 1979: - The Act provides for payment of equal wages for work of equal nature to male and female workers and for not making discrimination against female employees in the matters of transfers, training and promotions etc.

(i) Payment of Bonus Act 1965: - The Act is applicable to all establishments employing prescribed minimum (say, 20) or more workmen. The Act provides for payments of annual bonus 'within the prescribed range of percentage of wages to employees drawing up to the prescribed amount of wages, calculated in the prescribed manner. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. States may have different number of employment size.

(j) Industrial Disputes Act 1947: - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

(k) Industrial Employment (Standing Orders) Act 1946: - It is applicable to all establishments employing prescribed minimum (say, 100, or 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and gets these certified by the designated Authority.

(l) Trade Unions Act 1926: - The Act lays down the procedure for registration of trade unions of workmen and Employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.

(m) Child Labour (Prohibition & Regulation) Act 1986: - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulations o employment of children in all

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

(n) Inter-State Migrant Workmen's (Regulation of Employment & Conditions of Service) Act 1979: - The Act is applicable to an establishment which employs prescribed minimum (say, five) or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as Housing, Medical-Aid, Travelling expenses from home up to the establishment and back etc.

(o) The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: - All the establishments who carry on any building or other construction work and employs the prescribed minimum (say, 10) or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as. may be modified by the Government., The Employer of the establishment- is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodations for workers near the-work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

(p) Factories Act 1948: - The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. it is applicable to premises employing the prescribed minimum (say, 10) persons or more with aid of power or another prescribed minimum (say, 20) or more persons without the aid of power engaged in manufacturing process.

Annexure – W1
(See clause 39 of Section 3 -GCC)

CONSTRUCTION SAFETY

1) IS: 3696(Part-1, 2) Safety code for scaffolds and ladder
2) IS: 3764 Safety code for excavation work
3) IS: 7205 Safety code for erecting of structural steel work
4) SP: 70-2001 Handbook on Construction Safety Practices

1. On all excavation work, safety precautions for the protection of life and property are essential: While measures to avoid inconveniences to the public are desirable. Such measures and precautions include the erection and maintenance signs (to forewarn public), barricades, bridges, and detours: placing and maintenance of lights both for illumination and also as danger signals, provision of watchmen to exclude unauthorised persons particularly children, from trespassing on the work: and such other precautions as local conditions may dictate.

2. Suitable scaffolds should be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from ladders. When a ladder is used, an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well suitable footholds and hand-hold shall be provided on the ladder and the ladder shall be given an inclination not steeper than ¼ to 1(¼ horizontal and 1 vertical.)

3. Scaffolding of staging more than 3.6 m (12ft.) above the ground or floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached or bolted, braced and otherwise secured at least 90 cm. (3ft.) high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends there of with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

4. Working platforms, gangways and stairways should be so constructed that they should not sag unduly or unequally, and if the height of the platform or the gangway or the stairway is more than 3.6 m (12ft.) above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened as described in (2) above.

5. Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of person or materials by providing suitable fencing or railing whose minimum height shall be 90 cm. (3ft.)

6. Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9m. (30ft.) in length while the width between side rails in rung ladder shall in no case be less than 29 cm. (11½") for ladder upto and including 3 m. (10 ft.) in length. For longer ladders, this width should be increased at least ¼" for each additional 30 cm. (1 foot) of length. Uniform step spacing of not more than 30 cm shall be kept. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites or work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defence of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit; action or proceedings to any such person or which may, with the consent of the contractor, be paid to compensate any claim by any such person.

7. (a) Excavation and Trenching - All trenches 1.2 m. (4ft.) or more in depth, shall at all times be supplied with at least one ladder for each 30 m. (100 ft.) in length or fraction thereof, Ladder shall extend from bottom of the trench to at least 90 cm. (3ft.) above the surface of the ground. The side of the trenches which are 1.5 m. (5ft.) or more in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides collapsing. The excavated materials shall not be placed within 1.5 m. (5ft.) of the edges of the trench or half of the depth of the trench whichever is more.

Cutting shall be done from top to bottom. Under no circumstances, undermining or undercutting shall be done.

(b) Safety Measures for digging bore holes:-

(i). If the bore well is successful, it should be safely capped to avoid caving and collapse of the bore well. The failed and the abandoned ones should be completely refilled to avoid caving and collapse;

(ii). During drilling, Sign boards should be erected near the site with the address of the drilling contractor and the Engineer in-charge of the work.

(iii). Suitable fencing should be erected around the well during the drilling and after the installation of the rig on the point of drilling, flags shall be put 50m alround the point of drilling to avoid entry of people;

(iv). After drilling the borewell, a cement platform (0.50m x 0.50m x 1.20m) 0.60m above ground level and 0.60m below ground level should be constructed around the well casing;

(v). After the completion of the bore well, the contractor should cap the bore well properly by welding steel plate, cover the bore well with the drilled wet soil and fix thorny shrubs over the soil. This should be done even while reparing the pump;

(vi). After the bore well is drilled the entire site should be brought to the ground level.

8. Demolition - before any demolition work is commenced and also during the progress of the work, (i) All roads and open areas adjacent to the work site shall either be closed or suitably protected.

(ii) No electric cable or apparatus which is liable to be a source of danger or a cable or apparatus used by the operator shall remain electrically charged.

(iii) All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

9. All necessary personal safety equipment as considered adequate by the Engineer-in-Charge should be kept available for the use of the person employed on the site and maintained in a condition suitable for immediate use, and the contractor should take adequate steps to ensure proper use of equipment by those concerned. The following safety equipment shall invariably be provided:--.

(i) Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective goggles.

(ii) Those engaged in white washing and mixing or stacking of cement bags or any material which is injurious to the eyes, shall be provided with protective goggles.

(iii) Those engaged in welding works shall be provided with welder's protective eyeshields.

(iv) Stone breaker shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

(v) When workers are employed in sewers and manholes, which are in active use, the contractors shall ensure that the manhole covers are opened and ventilated at least for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public. In addition, the contractor shall ensure that the following safety measure are adhered to :-

(a) Entry for workers into the line shall not be allowed except under supervision of the JE or any other higher officer.

(b) At least 5 to 6 manholes upstream and downstream should be kept open for at least 2 to 3 hours before any man is allowed to enter into the manhole for working inside.

(c) Before entry, presence of Toxic gases should be tested by inserting wet lead acetate paper which changes colour in the presence of such gases and gives indication of their presence.

(d) Presence of Oxygen should be verified by lowering a detector lamp into the manhole. In case, no Oxygen is found inside the sewer line, workers should be sent only with Oxygen kit.

(e) Safety belt with rope should be provided to the workers. While working inside the manholes, such rope should be handled by two men standing outside to enable him to be pulled out during emergency.

(f) The area should be barricaded or cordoned of by suitable means to avoid mishaps of any kind. Proper warning signs should be displayed for the safety of the public whenever cleaning works are undertaken during night or day.

(g) No smoking or open flames shall be allowed near the blocked manhole being cleaned. (h) The malba obtained on account of cleaning of blocked manholes and sewer lines should be immediately removed to avoid accidents on account of slippery nature of the malba.

(i) Workers should not be allowed to work inside the manhole continuously. He should be given rest intermittently. The Engineer-in-Charge may decide the time up to which a worker may be allowed to work continuously inside the manhole.

(j) Gas masks with Oxygen Cylinder should be kept at site for use in emergency.

(k) Air-blowers should be used for flow of fresh air through the manholes. Whenever called for, portable air blowers are recommended for ventilating the manholes. The Motors for these shall be vapour proof and of totally enclosed type. Non sparking gas engines also could be used but they should be placed at least 2 metres away from the opening and on the leeward side protected from wind so that they will not be a source of friction on any inflammable gas that might be present.

(l) The workers engaged for cleaning the manholes/sewers should be properly trained before allowing to work in the manhole.

(m) The workers shall be provided with Gumboots or non sparking shoes, bump helmets and gloves,non sparking tools, safety lights and gas masks and portable air blowers (when necessary). They must be supplied with barrier cream for anointing the limbs before working inside the sewer lines.

(n) Workmen descending a manhole shall try each ladder stop or rung carefully before putting his full weight on it to guard against insecure fastening due to corrosion of the rung fixed to manhole well.

(o) If a man has received a physical injury, he should be brought out of the sewer immediately and adequate medical aid should be provided to him.

(p) The extent to which these precautions are to be taken depend on individual situation but the decision of the Engineer-in-Charge regarding the steps to be taken in this regard in an individual case will be final.

(vi) The Contractor shall not employ men and women below the age of 18 years on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, the following precaution should be taken:

- (a) No paint containing lead or lead products shall be used except in the form of paste or readymade paint.

(b) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint is dry rubbed and scrapped.

(c) Overall shall be supplied by the contractors to the workmen and adequate facilities shall be provided to enable the working painters to wash during and on the cessation of work.

10. An additional clause (viii)(i) of Safety Code (iv) the Contractor shall not employ women and men below the age of 18 on the work of painting with product containing lead in any form, wherever men above the age of 18 are employed on the work of lead painting, the following principles must be observed for such use :

(i) White lead, sulphate of lead or product containing these pigment, shall not be used in painting operation except in the form of pastes or paint ready for use.

(ii) Measures shall be taken, wherever required in order to prevent danger arising from the application of a paint in the form of spray.

(iii) Measures shall be taken, wherever practicable, to prevent danger arising out of from dust caused by dry rubbing down and scraping.

(iv) Adequate facilities shall be provided to enable working painters to wash during and on cessation of work.

(v) Overall shall be worn by working painters during the whole of working period.

(vi) Suitable arrangement shall be made to prevent clothing put off during working hours being spoiled by painting materials.

(vii) Cases of lead poisoning and suspected lead poisoning shall be notified and shall be subsequently verified by medical man appointed by competent authority.

(viii)The employer may require, when necessary medical examination of workers. (ix) Instructions with regard to special hygienic precautions to be taken in the painting trade shall be distributed to working painters.

11. When the work is done near any place where there is risk of drowning, all necessary equipments should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision, should be made for prompt first aid treatment of all injuries likely to be obtained during the course of the work.

12. Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following standards or conditions:-

(i) (a) These shall be of good mechanical construction, sound materials and adequate strength and free from patent defects and shall be kept repaired and in good working order.

(b) Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from patent defects.

(ii) Every crane driver or hoisting appliance operator, shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding winch or give signals to operator.

(iii) In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load each safe working load and the condition under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

(iv) In case of departmental machines, the safe working load shall be notified by the Electrical Engineerin-Charge. As regards contractor's machines the contractors shall notify the safe working load of the machine to the Engineer-in-Charge whenever he brings any machinery to site of work and get it verified by the Electrical Engineer concerned.

13. Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce to the minimum the risk of accidental descent of the load. Adequate precautions should be taken to reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves and boots as may be necessary should be provided. The worker should not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

14. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.

15. To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the contractor shall be open to inspection by the Engineer-in-Charge or their representatives.

16. Notwithstanding the above clauses from (1) to (14), there is nothing in these to exempt the contractor from the operations of any other Act or Rule in force in the Republic of India.

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

1. GENERAL:

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

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

2.0 Accuracy of Lines, Levels and Grades

2.1 The various works shall be done true to line, level and grade. The periodical checking of these by the Engineer or Engineer's representative shall not absolve the Contractor of his responsibility regarding their accuracy. In case of any deviation or discrepancy in line, level or grade at the meeting faces, the contractor shall make good the discrepancy at his own cost and without any compensation for the additional work if any involved. Whenever such a discrepancy is found to arise at the junction of works being carried out by different Contractors the responsibility to set right their respective discrepancies shall be fixed by the Engineer whose decision shall be final and binding on the Contractors concerned. Engineer shall further have the unquestioned right if need be to rectify the discrepancies and recover the cost from the Contractor or Contractors according to proportions as he May consider reasonable.

2.2 The details of location and the nearest permanent bench marks. Reference Grid Marks shall be obtained by the Contractor in writing from the Engineer. Temporary bench mark for day to day use shall be fixed with reference to above permanent bench marks with double leveling. The Grid Co-ordinates and its references May be obtained from the Engineer.

3.0 Arrangements of Water and Electric Power

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

4.0 Measures for Prevention of Fire

4.1 The Contractor shall not set fire to any standing Jungle, trees, brush wood or grass without a written permission from the Engineer.

4.2 When such permission is given and also in all cases when destroying out of dug trees, brush wood, grass etc. by fire, the Contractor shall take necessary measures to prevent such fire spreading to or otherwise damaging surrounding property.

4.3 Any damage caused by the spreading of such fire, whether in or beyond limits of the Employer's property, the amount of the damage shall be recovered by the Engineer from the Contractor's Bills as damages or deducted by any other duly authorized officer from any sums that May be due or become due from the Employer to the Contractor under the contractor otherwise.

4.4 The Contractor shall bear the expenses of defending any action or law proceedings that May be brought by any person by injury sustained owing to neglect of precautions to prevent the spread of fire and shall pay any damage and cost that May be awarded in consequence.

5.0 Site Order Book

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

6.0 Foundations Depth/Levels.

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

7.0 Approach Road

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

8.0 Regulation and Bye-Laws----

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

9.0 Contractor to use Excavated Hard Rock

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

10.0 Income Tax

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

11.0 Supply and Arrangement of Materials

(1) The contractor shall make his own arrangement for supply of materials including cement and steel. The contractor shall be responsible for all transportation and storage of the materials at site and shall bear all the related costs. The Engineer shall be entitled at any time to inspect or examine all such materials. The contractor shall provide reasonable assistance for such inspection or examination as May be required.

(2) The contractor shall keep an accurate record of use of materials like cement and steel used in the works in a manner prescribed by the Engineers.

12.0 Cement

(a) The Contractor shall stock his requirement so as to ensure utilization of cement within 60 days but in no case later than 90 days Cement older than the period aforesaid shall not be used on any work except with the written permission of the Engineer, and after satisfactorily passing such lest as he May specify. The Contractor shall forthwith remove from the work such cement that Engineer has not allowed. The final disposal of such cement shall comply with the rules in force at the time and as the Engineer May approve

(b) Large stocks of cement shall not be kept at the works but only sufficient quantities shall be kept to assure continuity of the work. The Contractor shall provided and maintain efficient water proof storage sheds for cement on the site of work. It shall be stacked on the platform 30 cms. above the floor level and shall be covered with tarpaulin or any other impervious covering materials in order to protect the cement bags from moisture. The cement shall be neatly stacked in an orderly manner so as to allow an easy access and count. The arrangement of storage and utilization shall be such as to ensure the utilization of cement in the order of its arrival at the stores and the Contractor shall maintain satisfactory records which would at any time show the date of receipt and proposed utilization of cement laying in the stores at site.

(c) The Engineer shall at all time have access to the stores at sites of the Contractor. He shall have authority to check and examine the method of storage, record accounting and security provided by the Contractor. The Contractor shall comply with instructions that May be issued by the Engineer in this connection. The Contractor shall further at all times satisfy the Engineer on demand and by the production of records and books or submission of returns and proforma or by other proofs that May be demanded that the cement brought from the approved manufacturer with date of receipt & consumption etc. The Contractor shall at all

times keep his records up to date to enable the Engineer to apply such checks as he May desire to impose.

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

13.0 Special Condition Regarding Conditional TENDER

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

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

14.0 Design and Drawings

(1) The Detailed project report prepared by UJJAIN MUNICIPAL CORPORATION will be basic data for guidance of Contractor. The contractor will not claim whatsoever on account of deficiency in the data of Detailed Project Report.

(2) Bidder shall carryout detail survey and investigations (including soil test) as may be required for preparation of detail designs and drawings.

(3) The detailed design and drawing shall be prepared by Contractor and submitted to Government Engineering College and PDMC for examination through MUNICIPAL COMMISSIONER and the observations made by the examining institute shall be duly incorporated by Contractor without any claims what so ever in this regard. Thereafter the drawing duly vetted by engineering college shall be submitted to chief engineer for final approvals.

(4) The approved drawings shall remain in the sole custody of the Engineer. The Contractor shall obtain and make at his own expense any further copies required by him. At the completion of the contract the Contractor shall return to the Engineer all Drawings provided under the Contract.

(5) **One copy of the Drawings to be kept on Site.**

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

(6) **As- Built Drawings**

The contractor shall submit to the Engineer-in-Charge within 21 days of Physical completion, “Completion” Drawings as detailed below. These drawings shall be accurate and correct in all respects and shall be shown to and approved by the Engineer-in-charge.

Completion drawings as below on two prints and one polyester copy shall be supplied by the contractor along with a soft copy in CD. These drawings shall be developed in latest version of Auto-CAD. Drawings shall be of standard as stated below.

I. Site plan showing all features existing and as constructed under this contract with all external dimensions of clear spaces among those, diameter and materials of pipeline etc. complete.

II. Architectural, Civil and Structural details of all components of the plant including plans at different levels, elevations from all sides as well as sectional etc. complete with all dimensions including Structural Thickness, Concrete Grade, Reinforcement details, finishing details, schedules of doors and windows, details of associated fittings and features complete.

III. All piping, plumbing and electrical details with dimensions, diameters etc. complete at specific cases isometric views of piping may be necessary.

IV. Dimensioned details of all electrical, mechanical and instrumentation equipments including accessories along with arrangement inside the buildings or enclosures, connected piping and cabling layout etc. all complete.

V. Dimensioned details of all control and measuring device lined weirs, V-notches, probes, valves, gates, consoles, panels, switch diagrams/Circuit diagrams shall be used wherever applicable.

VI. L-sections for pipelines laid externally, showing pipe profile, ground profile, soil condition, bedding, location of specials, valves and other accessories complete.

VII. Dimensioned details of all site development works such as roads, drainage, cables pipelines, landscaping etc. complete with layout, cross – sections, levels etc. complete.

All drawings shall be prepared in appropriate scale and with adequate notes, legends, titles etc. for clarity.

(7) **Disruption of Progress**

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

(8)**Delay and Cost of delay of Drawings**

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

(9)**Further Drawings and Instructions**

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

15.0 Operation and Maintenance

Contractor shall operate and maintain the Sewerage project of MUNICIPALCORPORATION, UJJAINfor 10 years after successful completion of works, for which Contractor shall be paid separately as per Annexure 'J' Financial Bid. The details of the operation and maintenance charges payable along with the payment schedule are given in Annexure Y.

16.0 Sufficiency of TENDER

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

17.0 Planned Reconstruction of Roads Damaged By Project Elements Laying of Pipeline

17.1 In case the pipelines are to be laid under the existing roads / lanes/Bye-lanes, the dismantling of existing roads/lanes/bye-lanes shall be made in such a way that after laying of pipes or other such structures that are required to be constructed / placed under the road, the road /lanes/bye-lanes shall be restored to the original position. This mean that if prior to proposed construction, the road was Black topped with specific composition of the pavement than after construction, the road shall be constructed by the contractor with the same composition and specifications. This will also apply for concrete road or any other surface of roads.

17.2 The laying of pipes or other structures under the road is likely to involve public inconvenience such as interruption to traffic or interference in normal right of way. The Contractor shall ensure that because of the execution of work minimum possible public inconvenience is caused. For ensuring this, pipeline laying and road reconstruction work shall be carried out and completed in lengths specified by Employer (not more than 250 mtr. in one defined stretch of road).The further excavation, dismantling of road and laying of pipes in the same stretch of road shall not be started unless the earlier work of laying has been completed with full reconstruction of roads. The scheduling of work shall be got approved by the Engineer In Charge.

18.0 Guidelines for Supervision and Monitoring of Execution of Works Under AMRUT

Procedures to be adopted by the contractor/PDMC as per the following guidelines and format as mentioned below.

GUIDELINES FOR SUPERVISION AND MONITORING OF EXECUTION OF WORKS UNDER AMRUT

Following procedure will be adopted by Contractor / PDMC for the **"Supervision and Monitoring"** of the execution of works, using the **Forms (Request for Inspection)** attached with this note.

1. The enclosed forms will be used by the Contractor, and he shall get these Printed in **THREE Copies,** duly Bound in Book. These would bear the duly machined numbers.

    - **First Copy: -** Wil be given to PDMC, at least **THREE** days before the start of work.

    - Remaining **Two Copies** will be kept by Contractor, during the execution of that particular line, for the purpose of recording the signature of FE/ARE(PDMC) and ULB Officials, after checking of the activities by PDMC.

    - **Second Copy** (completed in All Aspect and duly signed) would be enclosed along with the **Bill for Payment** by Contractor, as a proof that the work is executed and monitored by PDMC.

    - **Third Copy** would be Copy for the Records of Contractor

2. Please, ensure the **Laying of Sewer Network** be done, starting from ***"Tail-End"*** and ***moving upward***, as per the gradient/ slope provided in Design / drawings/

संचालनालय नगरीय प्रशासन एंव विकास भोपाल
पी०ए०/07/2016/13513
प्र.पत्र ____ दिनांक 21/10/2016 द्वारा अनुमोदित

PROJECT :

PROJECT DE DEVELOPMENT AND MANAGEMENT CONSULTANT	WAPCOS LTD., B-23, Shahpura Near SBI, Bhopal (M.P.).
Contractor :	M/s

REQUEST FOR INSPECTION (SEWERAGE)

RFI NO : Date :

1	Line No./Location	
2	Type & Size :	
3	Lentgh :	
4	Time & Date of Insp.Desired :	
	Submitted By Contractor Representative	Received By Consultants Representative

DESPRITION	CHECKED - Sign and Date				REMARKS
	FE(PDMC)	ARE (PDMC)	NAGAR PALIKA	CONTRACTOR	
Material					
Aligment					
G.L. Checking					
Exacavation					
Bedding					
I.L.Checking					
Laying					
Man Hole					
Testing					
Back Filling					
Road Restoration					

Approved Not Approved

Remarks :

Mesurment Details

Descrption of item	NO	L	B	H	Qty.

Contractor Representative Resident Engineer

संचालनालय नगरीय प्रशासन एंव विकास भोपाल
क्र॰ 9८/07/2016/13513
पत्र दिनांक द्वारा अनुमोदित
21/10/2016

MUNICIPAL COMMISSIONER
UJJAIN MUNICIPAL CORPORATION

Section 4

Price Break-Up Schedule

<table>
<tr><th>S.No.</th><th colspan="5">Laying and jointing of DWC AND RCC sewer pipes of Different Diameters</th><th>Pro-rata Share %</th></tr>
<tr><td rowspan="11">1.</td><td colspan="5">Work of providing, laying and jointing including testing ,commissioning and trial run of 200mm to 400mm DWC HDPE pipes (conforming to IS 16098-2013-Part 2(with up-to-date amendments),and 500mm to 2000mm non-pressure (NP3&NP4) RCC socket & spigot pipes (conforming to IS 458-2003 having total length 454931.00mtr with suitable jointing material including testing of joints, cost of pipe, jointing material etc complete</td><td rowspan="11">19.20</td></tr>
<tr><td>Material</td><td>Dia</td><td>UNIT</td><td>Quantity</td><td>Cost/m</td></tr>
<tr><td>DWC</td><td>200/295 mm</td><td>M</td><td>287947</td><td>767.00</td></tr>
<tr><td>DWC</td><td>400/480 mm</td><td>M</td><td>107322</td><td>1524.00</td></tr>
<tr><td>RCC/NP3</td><td>500 mm</td><td>M</td><td>37862</td><td>2117.00</td></tr>
<tr><td>RCC/NP4</td><td>800 mm</td><td>M</td><td>4059</td><td>5440.00</td></tr>
<tr><td>RCC/NP4</td><td>1000 mm</td><td>M</td><td>7524</td><td>7075.00</td></tr>
<tr><td>RCC/NP4</td><td>1200 mm</td><td>M</td><td>1540</td><td>9608.00</td></tr>
<tr><td>RCC/NP4</td><td>1600 mm</td><td>M</td><td>2670</td><td>14625.00</td></tr>
<tr><td>RCC/NP4</td><td>1800 mm</td><td>M</td><td>3359</td><td>17126.00</td></tr>
<tr><td>RCC/NP4</td><td>2000 mm</td><td>M</td><td>2648</td><td>20500.00</td></tr>
<tr><td colspan="2">Total</td><td>Metre</td><td>454931.0</td><td></td><td></td></tr>
<tr><td rowspan="2">2</td><td colspan="5">Construction of 40784 NOS of Circular and Rectangular Manhole of Various Depth As Per Standard Specification</td><td>7.32</td></tr>
<tr><td colspan="2">Man hole for property connection (House connection) in narrow lanes.</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td colspan="2">For individual house</td><td></td><td></td><td></td><td></td></tr>
<tr><td>(a)</td><td colspan="2">Constricting of Man hole with S.O.R UADD specifications having inside size 600x450mm and 900mm deep including Pre Cast RCC Man hole Cover (Heavy Duty) 500mm dia having 100mm thickness conforming to IS : 12592 – 2002 Complete</td><td>No</td><td>26873</td><td>4818.00</td><td></td></tr>
<tr><td></td><td colspan="2">For cluster of houses</td><td></td><td></td><td></td><td></td></tr>
<tr><td>(b)</td><td colspan="2">Construction of Man hole with S.O.R UADD specifications having inside size 90x80 cm and 45 cm deep including C.I. cover with frame (light duty) 455x610 mm internal diameter, total weight of cover and frame to be not less than 38 kg (weight of cover 23 kg and weight of frame 15 kg):</td><td>No.</td><td>1318</td><td>7290.00</td><td></td></tr>
<tr><td>(c)</td><td colspan="2">Construction of Man hole with S.O.R UADD specifications having inside size 90x80 cm and 60 cm deep including C.I. cover with frame (light duty) 455x610 mm internal diameter, total weight of cover and frame to be not less than 38 kg (weight of cover 23 kg and weight of frame 15 kg):</td><td>No.</td><td>3953</td><td>8028</td><td></td></tr>
</table>

(d)	Construction of circular type manhole 900mm internal dia. at bottom, 560 mm dia at top total depth of manhole 900 mm in brick masonry with 1:5 cement mortar (1 cement : 5 fine sand), 12 mm thick Cement plaster 1:3 (1 cement : 3 coarse sand) finished with a floating coat of neat cement. 22.5 cm foundation in cement concrete grade M-10 (Nominal Mix) with stone aggregate 40mm nominal size, RCC top slab cement concrete M-20 (Nominal Mix) with stone aggregate 20mm nominal size and making channel in cement concrete grade M-15 (Nominal Mix) with stone aggregate 20mm nominal size neatly finished, curing fixing of ISI marked heavy duty SFRC cover etc. complete as per standard design.	No.	7937	6913.0	
(e)	Extra for increasing depth of manhole mentioned at item (d) above from depth of 900mm to 1650mm.	M	1557.00	3934.00	
(f)	Construction of circular type manhole 1200 mm internal dia at bottom, 560mm dia at top in brick masonry class designation 40 with 1:4 cement mortar 1:4 (1 cement : 4 Coarse sand) 1680 mm depth, 12mm thick cement plaster 1:3 cement plaster (1 cement : 3 Coarse sand) finished with a floating coat of neat cement. 30cm thick foundation in cement concrete grade M-10 (Nominal Mix) with stone aggregate 40mm nominal size, RCC grade M-20 (Nominal Mix) with stone aggregate M-20 nominal size on top slab and making channel in cement concrete grade M-15 (Nominal Mix) with stone aggregate 20 mm nominal size neatly finished, curing and fixing of SFRC cover and frame (heavy duty HD-20) 560mm internal dia conforming to IS 12592.	No.	160	13215.00	
(g)	Extra for increasing depth of Manhole mentioned at item no.14.10 from 1680 mm to 2290mm with modular brick class designation 40	M	49	5400.00	
(h)	Construction of circular type of manhole 1500 mm internal dia. at bottom, 560 mm dia at top, total depth of manhole 2650mm in brick masonry with 1:5 cement mortar (1 cement : 5 fine sand), 12 mm thick Cement plaster 1:3 (1 cement : 3 coarse sand) finished with a floating coat of neat cement. 30 cm thick foundation in Cement concrete grade M-7.5 (Nominal Mix) with stone aggregate 40 mm nominal size, RCC Cement Concrete grade M-20 (Nominal Mix) with 20mm Nominal size on top slab and	No.	501	19683.00	

	making channel in cement concrete grade M-15 (Nominal Mix) with stone aggregate 20 mm nominal size neatly finished, curing fixing of ISI marked reinforced concrete heavy duty cover (including transportation of cover) complete. as per standard design.				
(i)	Extra for increasing depth of manhole mentioned at above Item (f) from depth 2.65 m to 4.25m	M	382.40	8758.00	
(j)	Extra for increasing depth of manhole mentioned at above Item (f) from depth 4.25m to 9.75m	M	459.25	14979.00	
(k)	RCC Special Type manhole with drop manhole arrangement including high flood protection arrangement**as per enclosed drawing**	No.	42	145000.00	
(l)	Providing MS/CI/Plastic Encapsulated on 12mm dia. Steel bar (IS:10910) foot rests and fixing in manhole with CC blocks of Cement Concrete grade M-10 (Nominal Mix) with stone aggregate 20 mm nominal size of size 30x20x15cm With 20mm square bar/ casting one foot rest (average weight of 1 foot rest 2.35kg	Kg	126858.20	71.00	
3	**Work of House Sewer Connections (Pipes)** Providing, Laying, Jointing and suppy of DWC HDPE Pipes of renowned duly tested inclusive of all texes related to central, state and municipal, inclusive of excise duty, Inspection Charges, Transportation charges, transit insurences/ loading and unloading and stacking at site/store etc. complete.				**3.91**
(a)	Providing, Laying, Jointing and supply of DWC HDPE Pipes of renowned duly tested inclusive of all taxes related to central, state and municipal, inclusive of excise duty, Inspection Charges, Transportation charges, transit insurances/ loading and unloading and stacking at site/store etc. complete.				
	170/200 mm	M	482100.00	298.00	
4	**Excavation, filling and road restoration** For laying the pipe line existing surface/roads structure shall be dismantled in appropriate width. The dismantling of various layers of roads shall be carried out as per requirements but within the particular item given in Schedule of rates. The pipe shall be laid over the approved bedding and in true level as per specifications. After laying the pipe the back filling with appropriate material shall be carried out in such a way that the compaction is achieved to 100% OF MDD.for reconstruction of roads,the sub grade, the sub base, the base course and the surface layers shall be constructed as per specifications. The surface and composition of pavement of road being reconstructed over the laid pipe shall be the same as the road which was existing before the laying of pipe				**41.27**
4.1	Earth work Excavation for pipe trench in all kind of soil and WBM in areas including dressing, watering and ramming and disposal of excavated earth lead upto 50 met. and lift up to 1.5m disposal earth to be levelled , neatly dressed.				

4.1 (A)	Ordinary Soil including dressing,watering and ramming	Cum	855182.00	129.10	
4.1 (B)	Soft rock with or without blasting or bituminous pavement	Cum	898010.06	211.00	
4.2 (C)	Hard Soil/moorum, moorum mixed with boulders etc.	Cum	24744.00	230.00	
4.1 (D)	Extra for every additional lift of 1.5m or part there of over item A to C.	Cum	1146871.00	5.00	
4.2	Dismantling **C.C./R.C.C.** WORK BY MECHENICAL MEAN including staking of serviceable material and disposal of unserviceable material with in 50m lead (for CC road)	Cum	80127.70	703.0	
4.3	Filling available excavated earth in trenchs, plinth sides of foundation in layer not exceeding 20cm. In depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to1.5m in all kind of soil.	Cum	2572371.6	29.00	
4.4	Filling with moorum for pipe bedding or over the pipe including supply of moorum	Cum	36968.00	625.00	
4.5	Construction of dry lean cement concrete Sub- base over a prepared sub-grade with coarse and fine aggregate conforming to IS: 383, the size of coarse aggregate not exceeding 25 mm, aggregate cement ratio not to exceed 15:1, aggregate gradation after blending to be as per table of MORTH specification 600-1, cement content not to be less than 200 kg/ cum, optimum moisture content to be determined during trial length construction, concrete strength not to be less than 10 Mpa at 7 days, mixed in a batching plant, transported to site, laid with paver with electronic sensor/ mechanical paver, compacting with 8-10 tonnes vibratory roller, finishing and curing and as per relevant clauses of section-603	Cum	56630.60	2715.00	
4.6	Construction of dowel jointed, plain cement concrete pavement in M- 30 grade concrete over a prepared sub base with 43 or higher grade cement, maximum size of coarse aggregate not exceeding 25 mm, mixed in a batching and mixing plant as per approved mix design, transported to site, laid with a fixed form or slip form paver with spreading the concrete by shovels, rakes Compacted using needed, screed and plate vibratos and finished in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, sealant primer, joint sealant, debonding strip, placing of dowel bar and tie rod admixtures as approved, curing compound, finishing to lines and grades as per approved drawings as per IRC-15 2002 and as per relevant clauses of section-602 of specifications complete but including cost of	Cum	36592.08	4698.00	

	steel in dowel bar and tie rod etc.				
4.7	Providing & laying mechanically mixed cement concrete 20mm maximum size graded crushed stone including cost of centering & Shuttering				
	PCC M20	Cum	71532.79	4778.00	
4.8	Construction of granular sub-base by providing coarse graded material, spreading in uniform layers with on prepared surface, mixing by mix in place method at OMC, and compacting with vibratory roller to achieve the desired density, complete in all respect and as per relevant clauses of section-400.				
	Grading-II Material	Cum	36968	614.00	
4.9	Cutting of Water bound macadam road and making good the same including supply of extra quantities of materials i.e. aggregate, moorum screening and labour required	Cum	12300.00	693.00	
4.10	Construction of granular sub-base by providing coarse graded material, spreading in uniform layers with on prepared surface, mixing by mix in place method at OMC, and compacting with vibratory roller to achieve the desired density, complete in all respect and as per relevant clauses of section-400.				
	Grading-II Material	Cum	24000	614	
4.11	Providing and applying primer coat & Tack Coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.75 kg/sqm using mechanical/Manual means and as per relevant clauses of section-502.	Sqm	80000	26	
4.12	Providing and laying bituminous macadam with hot mix plant using crushed aggregates of specified grading premixed with bituminous binder, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction complete in all respects and as per relevant clauses of section-504. for Grading I (80-100mm thickness) bitumen content 3.25%	Cum	8000	5565	
4.13	Providing and laying semi dense bituminous concrete with hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction in all respects and as per relevant clauses of section-508. (Only cement will be used as filler).	Cum	5179.2	7822	

4.14	Transportation rate of different other material in comparison with 20mm metal.				
	Total Qty excavated stuff to be transported				
	For Lead up to 1KM	Cum	22890	91	
4.15	Installation of Product Pipe by Manual Jacking Method including making of entry and exits pits, all related civil works like excavation shoring/strutting etc., Manual shielding excavation lowering of pipe segments in the jacking pit, laying and jointing of product pipe line through jacking process from the jacking pit and restoration of site after project completion as per the instructions of the Engineer-in-charge all complete except the cost of the pipe. (upto 100 meter of installation length)				
	Above 1500mm and upto 1800mm				
	In hard Soil	M	15	68000	
	In stoney Soil	M	135	92000	
	Above 1800mm and upto 2200mm				
	In hard Soil	M	15	102000	
	In stoney Soil	M	135	130000	
4.16	Installation of Product Pipe by Pipe ramming method including making of entry and exits pits, all related civil works like excavation shoring/strutting etc. and restoration of site after completion (Up to 100m), Pipes above 450mm and up to 600mm				
	In Hard Soil	M	20	35438	
	In Hard Rock	M	180	51883	
4.17	Random rubble stone masonry with hard stone in foundation & Plinth including levelling up with cement concrete m-5 (Stone aggregate 20 mm) at plinth level with cm 1:6	Cum	466	2671	
5	**Construction of sewage Collection System and Pumping Machinary and Force main (sewage pumping Station)**				
A-	Designing (aesthetically), and constructing RCC Dry cum wet well/RCC sumps in mix of M-30 required capacity including excavation in all types of strata, foundation concrete, container walls, bottom slabtop RCC roof slab, 20 mm thick cement plaster with water proofing compound in CM 1:3 proportion to inside face of the container, including chlorinated reburised paint from inside and acrylic paint on the external surfaces including refilling and disposing of surplus stuff with in lead of 50M, all labour and Material Charges, for laying and jointing of pipe assembly for inlet, outlet washout connections with Sluice valves,				**1.61**

	overflow and bypass arrangement consisting of C.I. M.S. D/F. pipes upto 10m outside the structure, special and valves for valves of suitable diameters, providing stair case(RCC) & accessories such as M.S. ladder inside and outside, C.I. Manhole frame and cover, water top slab, B.B. Masonry chamber for all valves, ventilating shaft, including giving satisfactory hydraulic test and water tightness test as per IS Code and Providing three coats of cement paints to all exposed surface of structure including roof surface etc. complete as per design data, criteria obligatory requirements and detailed specifications. Anti-termite treatment shall be given for underground portion of the structure. Protection arrangement for sump well approach slab for access in well. Providing Grit chamber with coarse and fine screen, Bypass channel Gate Valve, Dewatering Pumps, and area sufficient to accommodate 5 Pumping Sets and suction delivery System, Manifolds, Suitable Exhaust fans, Super Structure, Gate, Window, approaches, Suitable, Control Panel all complete.				
		Cum	**2298**	**Rate Analysis**	
	Pro Rata Percentage for Item No. 5(B), 5(C), & 5(D)				
B	Supplying spirally welded/ERW/SAW/fabricated M.S. pipes (commercial Quality) including procurements of plates, gas cutting to required size rolling, tack welding assembling in suitable lengths to form pipes, welding on automatic welding machine and forming 'V' edge on both ends of pipes including all taxes (central and locl), railway freight, insurance unloading from railway wagon, loading in to truck, transport to stores/site, unloading, stacking, etc, complete as per IS-3589 and IS-5504 as applicable as per specification (NO negative tolerance in thickness is permissible).				**1.22**
	1200 mm dia and 10mm Thick MS Pipes	**M**	**2500**	**17960**	
C	Providing and making inner cement mortar lining to M.S. pipes with mechanical devices in cement mortar 1:1 proportion, including cost of all material,labour,special sand required, machinery, power generation, all equipment and taking necessary access opening and manholes, cut at suitable intervals as directed by Engineer-In-Charge and rewilding the same after done with double plates pipes including necessary excavation, refilling concrete braking and remaking if any, braking guniting and remaking the same, repainting where even required with epoxy paint in three coats, all dewatering including emptying the				**0.03**

	pipe line and refilling the same after done with (water to be supplied by department free of cost within 5Km lead at fixed point and all other arrangement to be done by agency), including carrying out" C" value performance test of pipe line , complete job as per the direction of Engineer-In-Charge.				
	12mm thick for pipe up to 1200mm diameter	**Sqm**	**2826**	**377**	
D	Providing and applying with mechanical arrangement 1:3 proportion cement sand gunite, 40 to 50 mm thick to M. S. pipe surface under 2.1 kg per sqcm to 2.80 kg per sqcm Pressure including removing the loose materials as directed by Engineer-in-charge and including scrapping the surface with wire brushes, degreasing cleaning by compressed air and providing fixing wire febric as per Annexure – A of IS 3589-2001 as reinforced curing for 21 days disposing off the rebound materials within a lead of 50 M, etc Complete as directed by Engineer-in-charge.				**0.11**
	1200 mm dia and 10mm Thick MS Pipes	**Sqm**	**9577**	**416**	
E	Lowering laying in position to correct line and level M.S. Pipes including M.S. Specials with/without any out coating such as distance pieces straps band stapersetc, on pedestal or chairs upon formation the rate to include loading unloading hoisting marginal cutting wherever required, assembling and tack welding, and transportation up to 500m etc complete				**0.04**
	1200 mm dia and 10mm Thick MS Pipes	**M**	**2500**	**640**	
F	Providing, erecting,testing and commissioning at site of Horizontal Centrifugal Pumps suitable for 92 MLD plant as per CPHEEO manual with complete in all respects i.e discharge valves spread manifold Pressure Gauges, Level switch, MOC of pump as CI Casing, Impeller and other wetted parts in SS-316, Shaft SS-410 with suitable rating motor class F insulation and IP55 Protection, 3Hp, 440 V, 50 HZ				**1.59**
	(As per Quotations collected from Market)				
	Two Pumps each suitable to pump sewage peak flow/4 i.e 625 LPS 32m Head 360HP	**No.**	**2**	**7200000**	
	Three Pumps each suitable to pump sewage peak flow/4 i.e 1250 LPS 32m Head 700HP	**No.**	**3**	**14000000**	
	Providing and fabrication of common pipes manifold, valves and special complete in all respect as per the direction of engineer in-charge	**M**	**32**	**3102**	
	Providing and erection of suitable control panel for above pumps	**No.**	**2**	**550000**	
	Provide pump for dewatering, 3 Pumps (Required for dewater from dry well)				
	2HP	**No.**	**1**	**30000**	
	3HP	**No.**	**1**	**45000**	
	5HP	**No.**	**1**	**750000**	

				Total	
6	**Construction of Effulent Disposal Recycling, Reuse and Recharging of Near By Water Bodies After Package Treatment**				**0.86**
	Providing, Laying and Jointing non-Pressure (NP-2) RCC socket & Spigot pipes with rubber gasket joints including testing of joints (Conforming to IS: 458-1988, ISI marked (Laying as per IS: 783: 1985)	M	500	598	
	Providing pumping main of 200 mm dia for length of 500 mt for pumping recycled/treated water from effleunt collection sump well to nearby Water Bodyincluding valves and everything (DI K7 Pipe)	M	500	1876	
	Provision of mini package treatment plant to be installed for treatment and recharging of RudraSagar(Block Cost)	**Mld**	**2**	**2500000**	
	Renovation and Lining of Rudrasagar area with Cement Concrete as per Engineer-in-Charge	**LS**		**9600000**	
7	**CONSTRUCTION OF THE SEWAGE TREATMENT PLANT WITH OTHER ALIED WORKS**				**21.28**
	Construction of 1 number STP based on SBR or suitable technology for achieving desire quality of sewage 1 having capacity 92 MLD. The plant shall have SCADA-PLC for controlling and quality monitoring at inlet and outlet point of process treatment including sewage laboratory and administrative building all complete	MLD	92	**8500000**	
8	**Construction of Electrical substation, Installation, Erection, Testing commissioning and of power line as per MPSEB Specification (approval, sanction and release to be obtained from MPSEB)**				**1.56**
A	Cost per Km L T Line including Substation	KM	3.0	1500000.0	
	Total Cost of 3.0 Km HT/LT Line for SPS & STP				
B	Provision for DG Set	KVA	890	9000	
C	Transformer for STP and SPS	KVA	3750	9000	
				Total (Percentage)	**100%**

Note:

1.0 Under this agreement, it is clarified that any payment for the work of feeder/ distribution/ road reconstruction/ house service connection/ HT feeder for any executed quantity shall only be made on the item rates given against each item of the work, after these given rates are adjusted by a factor explained in point no. 2 below. Accordingly the total lumpsum accepted tender cost shall be adjusted as per actual work done under these items.
Thus, any increase or decrease in the work described above (pipe line, road reconstruction and house connection work) shall be paid or deducted from the total agreement cost of the work on the basis of the unit rates of actual quantities of these items executed.

2.0 The final rates of above items shall be the rates plus or minus the overall percentage of the approved lumpsum tender cost. If the accepted cost of this tender is "x" than all the above mentioned rates shall be adjusted by a factor of "x" / (__) and the increase/reduction shall be done on the basis of such adjusted rates.

3.0 As per clause 21 of GCC if any order for change of scope is issued the contractor shall be liable to execute quantities more than the above quantities, if required as per site conditions and payment for such excess work shall also be made on the adjusted rates mentioned in point no. 2 above. Such excess quantities shall however remain within the 10% of the agreement cost of the total work.

4.0 Bidder shall be responsible for road reconstruction of pipe trenches till one rainy season. In case of any repair to be made because of bad quality of construction the same shall be made good without any extra cost.

5.0 Bidder shall carry out fencing along the boundary of Sumpwell and STP.

6.0 The scope of work includes shifting of electric poles, crossing of Railway/Highway as may be required for laying of pipeline. No extra payments shall be made to the contractor for doing the same.

7.0 For Manhole Item contractor can use Precast Manholes if feasible with prior approval from Engineer-In-Charge. However, payment for such item will be restricted to rates provided in BOQ for similar items.

SECTION 5

AGREEMENT FORM
AGREEMENT

(On Non Judicial Stamp Paper of Rs. 1000.00)

This agreement, made on the day of _____between (name and address of Employer) (hereinafter called “the Employer) and _____(name and address of contractor) hereinafter called "the Contractor" of the other part.

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

NOW THIS AGREEMENT WITNESSED as follows:

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

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

The Common Seal of affixed in the presence of:

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

Binding Signature of Employer _____

Binding Signature of Contractor_____

Section-6

ANNEXURE :X

BILLING BREAK-UP

Sewerage Network &Misc work including Transportation, Laying, Jointing and Testing (19.20% of the total sanctioned cost)

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

For House Sewer chambers and Manholes (7.32 % of the total sanctioned cost)

1. 5% shall be payable to the Contractor after approval of Designs and drawings.
2. 85% shall be payable to the Contractor on civil construction.
3. 10% shall be payable to the Contractor after completion & Successful Testing of the connection.

For Sewage Treatment plant,Pumping Machinery and Force Main (25.88 % of the total sanctioned cost)

1. 5% shall be payable to the Contractor after approval of designs and drawings.
2. 10% shall be payable to the Contractor after completion of excavation and foundation works.
3. 15% shall be payable to the Contractor after completion of works upto ground level.
4. 10% shall be payable to the Contractor after supply of all electrical and mechanical equipments.
5. 30% shall be payable to the Contractor on super structure work on pro-rata basis
6. 10% shall be payable to the Contractor after erection, installation of all electrical and mechanical equipments.
7. 10% shall be payable on Successful Testing.
8. 10% shall be payable after completion of the whole work and trial run for a period of 1 month.

For Electrical Substation, Installation, Erection, Testing Commissioning and Power Line(1.56 % of the total sanctioned cost)

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

For House Sewer Connection(3.91 % of the total sanctioned cost)

1 5% shall be payable to the Contractor after approval of designs and drawings.
2 50% shall be payable to the Contractor on supply of material including pipe, specials etc.
3 30% shall be payable to the Contractor after completion of laying of 50% length of pipeline in all respect incl. road restoration on pro-rata basis.
4 10% shall be payable on Successful Testing of the connections.
5 5% shall be payable after completion of the whole work and trial run for a period of 1 month.

Excavation, pipe bedding, refilling, Road restoration work for Distribution Network (41.27% of the total sanctioned cost)

Payment for Excavation, pipe bedding, refilling, road restoration work shall be made as per actual work done on unit rate basis.

For Effluent Disposal Recycling, Reuse and Recharging of near by water body after Package Treatment(0.86 % of the total sanctioned cost)

1. 5% shall be payable to the Contractor after approval of designs and drawings.
2. 50% shall be payable to the Contractor on supply of material including pipe, specials etc.
3. 30% shall be payable to the Contractor after completion of laying of 50% length of pipeline in all respect incl. road restoration on pro-rata basis.
4. 10% shall be payable on Successful Testing of the connections.
5. 5% shall be payable after completion of the whole work and trial run for a period of 1 month.

ANNEXURE:Y

Operation and Maintenance:

The Bidder shall be responsible for the operation and maintenance of the project for a period of 10 years from the date of successful completion of the work. During O&M all the expenses for repairs, replacements & consumables except electricity (to be borne by ULB upto the limit as given below) shall be on the part of Bidder. It shall be the responsibility of Bidder that the system runs at desired capacity and efficiency during the O&M period. ULB shall extend all the necessary support to the Bidder for fulfilling the Obligations for operating and maintaining the system successfully. During O&M the scope of Contractor shall be to operate and maintain the sewerage system and Sewage Treatment plant. A brief detail is given in Service level agreement.

Details of minimum Staff to be deployed by Bidder for Operation and maintenance of the project,

S.No.	Particulars	Minimum Qualification	Experience	No.	Minimum monthly salary at the start of O&M in Rupees
1.0	Project Manager	B.E.(Civil)	5 years	01	30,000
2.0	Mechanical Engineer	Dip (Mech)	3 years	01	18,000
3.0	Chemist	BSc.(Che)	3 years	01	12,000
4.0	Electrician	ITI (Elect.)	3 years	01	7,200
5.0	Skilled labours	-	-	12	7,200
6.0	Un skilled labours	-	-	12	6,000
7.0	Sweeper	-	-	30	7,200

The payment against the O&M shall be made in 4 equal installments after completion of each quarter.Period of Operation and Maintenance can be extended upto 15 years on the same terms and conditions as mentioned in this Bid. If bidder does not employ the no. of staffs shown, proportionate deduction shall be made accordingly.

Service Level Agreement

The variations allowed in treated effluent quality during Operation & Maintenance (O&M) period of 10 years and during Defect Liability Period, and penalty for not maintaining the standards are as below:

The treated water quality and other key deliverable standards shall be demonstrated by the Contractor at,

The nominal design flow

(1) 25% of nominal design flow*

(2) 10% above the nominal design flow*

(3) The pollutant concentration of all incoming pollutants as freight (i.e. kg/day in terms of flow received) in a range of 75% to 110% of the pollutant freight calculated at the design pollutant concentration and nominal design flow.

**On some occasions during the year like festivals, excessive rain, extreme weather conditions etc.*

Parameter	***Maximum Allowed Concentration (MAC)***
BOD	*10 mg/l*
TSS	*10 mg/l*
Faecal Coliforms(FC)	*230 MPN/100 ml*
Total Nitrogen as N	*10 mg/l*
Ammonia Nitrogen as N	*2 mg/l*
Total Phosphorus as P	*2 mg/l*

** An event is defined as online reporting duration, not exceeding 3 minutes i.e. a maximum of total 30 minutes a day i.e. 98% system reliability.*

Non-compliance to demonstrate the plant performance during the completion tests with respect to treated water quality and sludge quality for a continuous period of 72 hours, is not acceptable and the Contractor shall rectify the facility to demonstrate the performance. Not being able to demonstrate the plant performance shall render the plant as “Non-Acceptable” leading to a Liquidity Damages of 10% of contract Price and shall forfeit the Performance Securities.

Contractor to maintain guarantee parameters for treated effluent quality during O & M period and during Defect Liability Period. These quality parameters are subject to presumptions that actual Pollutants like BOD, TSS, Nitrogen) load will not exceed design pollutant load for every parameter. However, on some occasions during the year (i.e festivals, excessive rain, extreme weather conditions), individual pollutant concentration (mg/l) can exceed up to 10% of design parameters, and total sewage flow can exceed up to 10% design flow.

The treated effluent parameters shall be demonstrated with 24 hour composite samples with 95% compliance on monthly basis.

The Maximum Allowed Concentration (MAC) on individual grab samples shall not be more than 2 times of the above specified 95 percentile value.

If any parameter of any grab sample exceeds the MAC values, the sample shall be considered as “Non-Compliant”.

Guarantee for Faecal Coliform shall be based on 30 days geometric mean value. However, if pollutants load (kg/day) exceeds the design pollutant load per day basis, or total flow exceeds the design capacity (24 hr basis), no penalty shall be applicable.

During trial run and commissioning, no penalties will be applied and Contractor will rectify the plant to ensure successful commissioning.

However, during DLP of 60 months and O & M period of 10 yrs, MUNICIPALCORPORATION, UJJAIN will impose following penalties/liquidated damages for not maintaining the guaranteed parameters, as described below:

Condition A:-

Liquidated Damages for non-compliance of treated effluent standards

Event Triggering the recovery of Liquidity Damages	Liquidated Damages	Frequency
Non-conformance with MAC forBOD Standard	Rs. 2000/-	For every event of non- conformance*
Non-conformance with MAC for TSS Standard	Rs. 2000/-	For every event of non-conformance*
Non-conformance with MAC For Total Nitrogen	Rs. 2000/-	For every event of non-conformance*
Non-conformance with MAC for Ammonia Nitrogen	Rs. 2000/-	For every event of non-conformance*
Non-conformance with MAC for Faecal Coliform Standard	Rs. 2000/-	For every event of non-conformance**

** An event is defined as online reporting duration, not exceeding 3 minutes i.e. a maximum of total 30 minutes a day i.e. 98% system reliability.*

*** An event is defined as daily composite sample, not exceeding one non-conforming sample in 30 days i.e. 97% system reliability.*

The cumulative of above liquidated damages shall not exceed the monthly O&M cost (Maximum liquidated Damages).

Condition-B: Breakdown of Equipment:
In case of breakdown of equipment for more than the stipulated time period as below, on discretion of Engineer-in-Charge, the Contractor shall be penalized as mentioned below:

Equipment	Breakdown Time Period	Penalty Imposed
Critical Equipment/ Instrumentation (Critical equipment shall mean those equipment's / systems which are essential to ensure the plants performance and it shall include all flow and treated water quality measuring instruments and systems including submersible mixers , blowers, sludge and MLSS recirculation pumps, disinfection (chlorination system), filters electrical systems such as critical electrical system such transformers, electrical panels	beyond 72 hours i.e. 72 hours	3% of Monthly O&M Cost per day of default beyond permitted breakdown time period

etc.)			
Equipment/ Systems	**Breakdown Time Period**	**Penalty to be Imposed**	**Penalty to be Imposed**
(B) Semi-Critical Equipment			
Semi Critical equipment shall Mean those equipments / systems which are normally necessary to ensure the plants performance and they shall include all screens, grit removal systems, primary clarifiers, bio reactors (aeration system), secondary clarifiers, sludge thickening, and digestion systems etc.	More than 7 days	2% of Monthly O&M Cost per day of default beyond permitted breakdown time Period.	
(C) Non Critical Equipment Non Critical equipment shall mean those equipments/ systems which have been provided at the plant but not critical towards operation of the plant/ for delivering the plants performance, such as area lighting, air conditioners, instruments etc.	More than 10 days	1% of Monthly O&M Cost per day of default beyond permitted breakdown time Period.	

The cumulative of above liquidated damages shall not exceed the monthly O&M cost (Maximum Liquidated Damages).

NOTE: In case the non-conformance, on a continuous basis, due to Condition A and Condition B becomesequal to or more than 50% of the monthly O&M value for a period more than 3 months in a year i.e. 90 days in a year, then the Employer reserves the right to terminate the Contract after en-cashing all the Security Deposits, Retention Money and Performance Guarantees.

Condition- C:

Grid Power Failure:

In any case, if the Grid Power failure is more than 8 hrs in a single occasion in a day orcumulative Grid Power failure is more than 8 hrs in a day

a) No treatment standards will be compulsory. However, contractors are encouraged to maintain standards as far as possible. No penalties will be imposed on contractor for the above contingencies. Above relaxation shall be applicable only for a period of 24 hours after resuming regular Grid Power.

Condition-D:

Cost of Electrical Energy:

Contractor shall give complete details of Total Power Consumption, Guarantee Power Generation and Net Grid Power (if any) consumed in the STP/ WWTP.

During Operation and Maintenance, damages payable by Contractor to Employer on excess consumption of Net Electrical Energy shall be equal to the actual cost of the excess energy used for Operation and Maintenance of the Works for STP/WWTP under the Contract, based on the Guaranteed Consumption Provided by the Contractor and the current rates charged to the Employer for Electricity Consumed. Such payable amount will be assessed for each month during the O&M. Period in which the Actual Power Consumption exceeds the Guaranteed Power Consumption calculated on a **"Kilowatt-Hour Consumed per litre of Sewage" basis.**

During Operation and Maintenance (O&M), damages payable by Contractor to Employer on reduction in Power Generation from STP/WWTP shall be equal to the value of the Power Generation Deficiency, based on the Guaranteed Power Generation provided by the Contractor for STP/WWTP and the current rates charged to the Employer for electricity consumed. Such

payable by Contractor will be assessed for each month during the O&M Period in which the actual power generation is less than the guaranteed power generation calculated on a "Kilowatt-Hour generated per litre of sewage treated" basis.

After the Completion Test, the guarantees would come into effect for power generation, consumption and generation.

Condition-E:
Residual Handling & Disposal

The Plant Residuals shall conform to the following specifications:

Screenings

The screenings shall comprise of all particles of an effective size in excess of 5 mm and be "free of dripping water "i.e. the screenings on collection does not contain any dripping water when disposed from the plant

Grit

The grit removed shall contain less than 3% organic matter on dry basis of an average particle size between of more than 100 microns but less than 1000 microns and be free of dripping water

Excess Bio Solids (Sludge)

The excess Bio Solids (Sludge) produced shall contain approximately 20-22% of Solid Content Concentration with VSS/TSS ratio of not less than 48%, for "spadeable" or "open body truck able" consistency for easy transportation and disposal.
The Waste Water Treatment Residuals i.e. Screenings / Grit and Dewatered Bio Solids shall be handled and transported by the Bidder in a nuisance free manner following environmental guidelines. If the performance of the Bidder is not found satisfactory in respect of processing, handling and transportation of the sludge, the Employer shall have the liberty to recover from Bidder two (2) times the cost incurred for handling and transportation of the residuals. The residuals shall be disposed by the bidders as per the guidelines provided by the Employer

Screenings & Grit: Disposal to the Sanitary Land fill (the tipping charges shall be borne by the Contractor)

Dewatered Sludge: Ultimate Disposal of dewatered sludge shall be the responsibility of the Contractor. Sludge shall be disposed within the battery limit of plant area.

Annexure 'E'
Specifications for Sewage Related Jobs

Table of Contents

Chapter 1

General:

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

1.0 The specifications for various material to be used for the project shall confirm to BIS/IS/ISO standards with uptodate amendments as given below:

S. No.	BIS/BS/ISO CODE No. (YEAR)	Title
1	IS 5 (2007)	Colour for Ready Mixed Paints and Enamels
2	IS 210 (2009)	Grey Iron Castings
3	IS 269 (1989)	Specification for Ordinary Portland Cement (33 Grade)
4	IS 383 (1970)	Specification for Coarse and Fine Aggregates From Natural Sources For Concrete
5	IS 432-1 (1982)	Mild Steel and Medium Tensile steel bars and hard steel wire for concrete Reinforcement part-01 Mild Steel And Medium Tensile Steel Bars
6	IS 432-2 (1982)	Mild Steel and Medium Tanium Tensile Steel Bars and Hard Drawn Steel Wire for Concrete Reinforcement part-02 Hard Drawn Steel Wire
7	IS 438 (2006)	Aluminium power for explosive and pyrotechnic compositions
8	IS 455 (1989)	Portland Slag Cement
9	IS 456 (2000)	Plain and Reinforced Concrete
10	IS 457 (1957)	Code Of Practice For General Construction Of Plain And Reinforced Concrete For Dams and Other Massive Structure
11	IS 458 (2003)	Precast Concrete Pipes (With And Without Rein For Cement
12	IS 516 (1959)	Method Of Tests For Strength OF Concrete
13	IS 779 (1994)	Water Meters
14	IS 783 (1985)	Code of Practice for Laying of Concrete Pipes
15	IS 875-1 (1987)	Code of Practice for Design loads for Buildings and Structures
16	IS 875-2 (1987)	Code of Practice for Design loads for Buildings and Structures Imposed Loads
17	IS 875-3 (1987)	Code of Practise for Design Loads for building and Structures Wind Loads
18	IS 875-4 (1987)	Code of Practice for Design Loads
19	IS 875-5 (1987)	Code of Practice for Design Loads
20	IS 1199 (1959)	Methods of sampling and analysis of concrete
21	IS 1239 Part 1 (2004)	Steel Tubes, Tubulars And other Wrought Steel Fitting
22	IS 1239 Part 2 (2011)	Steel Tubes, Tubulars And other Steel Fittings
23	IS 1343 (1980)	Code of practice for Pre-stressed Concrete
24	IS 1489-1 (1991)	specification for Portland -Pozzolana Cement
25	IS 1489-2 (1991)	specification for Portland Pozzolana Cement, Part 2 (Calcined Clay Based)
26	IS 1538 (1993)	Cast iron fittings for pressure pipes for water, Gas and sewage
27	IS 1786 (2008)	High strength deformed steel bars and wires for concrete
28	IS 1834 (1984)	Hot applied sealing compounds for joints in Concrete specification
29	IS 1834 (1984)	Hot applied sealing compounds for joints in Concrete specification
30	IS 1865 (1991)	Iron Castings with Spheroidal or nodular Graphite
31	IS 1893-1 (2002)	Criteria for Earthquake Resistant Design of Structures
32	IS 1893-4 (2005)	Criteria for Earthquake Resistant Design of Structures
33	IS 2386-1 (1963)	Methods of test for aggregates for concrete
34	IS 2386-2 (1963)	Methods of test for aggregates for concrete
35	IS 2386-3 (1963)	Methods of test for aggregates for concrete
36	IS 2386-4 (1963)	Methods of test for aggregates for concrete Part 4 (Mechanical properties)

37	IS 2530 (1963)	Method Of Tests For Polyethylene moulding materials and polyethylene compounds
38	IS 2720-1 (1983)	Method Of Tests For Soils, Part 1(Preparation of Dry soil samples for various test)
39	IS 2720-7 (1980)	Method Of Tests For Soils, Part 7 (Determination of Water Content-Dry density relation using light compaction)
40	IS 2720-8 (1983)	Method Of Tests For Soils, Part 8 (Determination of Water Content-Dry density relation using heavy compaction)
41	IS 2720-15 (1965)	Method Of Tests For Soils, Part XV (Determination of Consolidation Properties)
42	IS 3370-1 (2009)	Code Of Practice Concrete Structure For The Storage of Liquids, Part 1 (General Requirements)
43	IS 3370-2 (2009)	Code Of Practice Concrete Structure For The Storage of Liquids, Part 2 (Reinforced Concrete Structures)
44	IS 3370-3 (1967)	Code Of Practice Concrete Structure For The Storage of Liquids, Part 3 (Pre stressed Concrete Structures)
45	IS 3370-4 (1967)	Code Of Practice Concrete Structure For The Storage of Liquids, Part 4 (design tables)
46	IS 3389 (2001)	Steel pipe for water and sewerage
47	IS 3597 (1998)	Concrete pipe (methods of test)
48	IS 3812-1 (2003)	Specification for polarized fuel Ash, part 1 for use as pozzolana in cement (Cement Mortar and Concrete)
49	IS 3812-2 (2033)	specification for pulverized Fuel Ash Part 2 For use as Admixture in Cement Mortar and Concrete)
50	IS 3913 (2005)	Suspended sediment load samplers
51	IS 3917 (2003)	Scoop Type Bed Material Samplers
52	ISO 4064 -1 (2014) Fourth Edition	Water meters for cold potable water and hot water Part -1: Matrological and technical requirements
53	ISO 4064 -2 (2014) Fourth Edition	Water meters for cold potable water and hot water Part -2:Test methods
54	ISO 4064 -3 (2014) Fourth Edition	Water meters for cold potable water and hot water Part -3:Test Report format
55	ISO 4064 -1 (2005) Third Edition	Measurement of water flow in fully charged closed conduits - Meters for cod potable water and hot water Part :1 Specifications
56	ISO 4064 -2 (2014) Third Edition	Measurement of water flow in fully charged closed conduits - Meters for cod potable water and hot water Part 2 : Installation requirements
57	ISO 4064 -3 (2014) Third Edition	Measurement of water flow in fully charged closed conduits - Meters for cod potable water and hot water Part 3: Test methods and equipment
58	ISO 4422-4	Pipes and fittings made of un plasticized polyvinyl chloride (PVC-U) for Water Supply Part -4 Valves and ancillary equipment
59	BS ISO 4427- Part 1 (2007)	General – Plastic Piping Systems for Polyethylene (PE) Pipes and Fittings for Water Supply
60	ISO 4427- Part 2 (2007)	Pipes - Plastic Piping Systems for Polyethylene (PE) Pipes and Fittings for Water Supply
61	ISO 4427- Part 3 (2007)	Fittings - Plastic Piping Systems for Polyethylene (PE) Pipes and Fittings for Water Supply
62	ISO 4427- Part 5 (2007)	Fitness for the purpose of the system - Plastic Piping Systems for Polyethylene (PE) Pipes and Fittings for Water Supply
63	IS 4890 (1968)	Methods for Measurement of Suspended Sediment in open channels
64	IS 4905 (1968)	Methods for random sampling
65	IS 4926 (2003)	Code of Practise Ready Mixed Concrete
66	IS 4984 (1995)	High Density Polyethylene Pipe For Water Supply
67	IS 5120 (1977)	Technical Requirements for roto dynamic Special Purpose
68	IS 5330 (1984)	Criteria for design of Anchor Block for penstock with joints (First Revision)
69	IS 5382 (1985)	Rubber Sealing Rings for Gas Mains, Water Mains and Sewers

70	IS 5477-1 (1999)	Fixing the capacities of Reservoirs methods ,part 1
71	IS 5477-2 (1994)	Fixing the capacities of Reservoirs methods ,part 2
72	IS 5477-3 (2002)	Methods for fixing the capacities of Reservoirs methods ,part 3
73	IS 5477-4 (1971)	Methods for fixing the capacities of Reservoirs methods ,part 4
74	IS 5600 (2002)	Sewage and Drainage
75	IS 6295 (1986)	code of Practice for water supply and drainage in high altitudes and /or sub –zero temperature regions
76	IS 6518 (1992)	Code of practice for control of Sediment in reservoirs
77	IS 7328 (1992)	High Density Polyethylene Materials for Moulding and Extrusion
78	IS 7357 (1974)	Code of Practice for Structural design of surge tanks
79	IS 7634-1 (1975)	Code of Practise for plastic pipes work for potable water supplies
80	IS 7634-2 (2012)	Plastics Pipe Selection Handling Storage and Installation for Potable Water supplied
81	IS 7634-3 (2003)	Plastics Pipe Selection Handling Storage and Installation for Potable Water supplies
82	IS 8008-1 (2003)	Code of practice for control of sediment in reservoirs
83	IS 8062-1 (1976)	Code of Practice for Cathodic protection of steel Structure :General principles
84	IS 8062-2 (1976)	Code of Practice for Cathodic protection of steel Structure : Underground pipelines
85	IS 8062-3 (1977)	Code of Practice for Cathodic protection of steel Structure
86	IS 8062-4 (1979)	Code of Practice for Cathodic protection of steel Structure
87	IS 8112 (1989)	Specification for 43 grade ordinary Portland cement
88	IS 8329 (2000)	Centrifugally cast ductile iron Pressure Pipes for water, Gas and Sewage
89	IS 9137 (1978)	Code for Acceptance test for centrifugal, maxed flow and axial pumps class c
90	IS 9523 (2000)	Ductile Iron Fittings for Pressure Pipes for water, Gas and Sewage
91	IS 9668 (1990)	Code of practice for Provision and Maintenance of water supplies and fire fighting
92	IS 9845 (1998)	Determination of overall Migration of Constituents of Plastics Materials and articles intended to come in contract with foodstuffs
93	IS 10141 (2001)	Positive List of constituents of polyethylene in Contact with Foodstuffs, Pharmaceuticals and Drinking Water
94	IS 10146 (1982)	Polyethylene for its safe use in Contact with Foodstuffs Pharmaceuticals and Drinking Water
95	IS 10221 (2008)	Casting and wrapping of underground mild steel pipelines
96	IS 11433-1 (1985)	Specification for one part gun- grade polysulphide based joints sealants
97	IS 11433-2 (1986)	Speciation for one part gun- grade polysulphide based joints sealants
98	IS 11682 (1985)	Criteria for Design for Overhead Water Tanks
99	IS 11906 (1986)	Recommendations for cement mortar lining for cast iron mild steel and ductile iron pipes and fittings for Transportation of water
100	EN 12201-2 (2011)	Plastics piping systems for Water Supply and for Drainage and Sewerage under pressure- Polyethylene (PE)-Part 2 : Pipes
101	BS EN 12201 -3:2003	Plastics piping systems for Water Supply Polyethylene (PE) Part 3: Fittings
102	IS 12330 (1988)	Specification for sulphate resisting Portland
103	IS 12235-1 TO 19 (2004)	Thermoplastics Pipes and Fittings
104	IS 12269 (1987)	53 Grade Ordinary Portland cement
105	IS 12288 (1987)	Code of Practise for use and Laying of Ductile iron Pipes
106	IS 12592 (2002)	Precast Concrete Manhole Cover And Frame
107	IS 13920:1993	Ductile detailing of reinforcement concrete structures subjected to seismic forces
108	IS 14333 (1996)	High Density Polyethylene Pipe For Sewerage
109	IS 14846 (2000)	Sluice Valve For Works Purposes
110	IS 15388 (2003)	Specifications for Silica Fume

111	IS 16098-1 (2013)	Structured -Wall Plastics Pipe Systems For pressure drainage and sewerage
112	IS 16098-2 (2013)	Structured -Wall Plastics Pipe Systems For Non-Drainage And sewerage
113	IS 16098 PART 2 (2013)	Structured -Wall Plastics Pipe Systems For Non-Drainage And sewerage

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

2.0 The other part of the specifications for various components of the project shall be as per provisions of clauses and sub clauses of chapters of Manual on Sewerage and Sewage Treatment (Second Edition), CPHEEO Ministry of Urban Development Govt. of India

Design of Sewer	Chapter 3
Sewer Appurtenances	Chapter 4
Construction of Sewers	Chapter 7
Maintenance of Sewerage System	Chapter 8
Sewage and storm water pumping stations	Chapter 9
Basic Design Considerations	Chapter 10
Pre-treatment Screening and Grit Removal	Chapter 11
Sedimentation	Chapter 12
Aerobic Suspended Growth system	Chapter 13
Aerobic attached growth system	Chapter 14
Sludge Thickening, Dewatering, Digestion and Disposal	Chapter 17
Sludge Pumping	Chapter 18
Tertiary treatment of sewage for reuse	Chapter 19
Effluent disposal and utilisation	Chapter 20
Treatment plant operation and maintenance	Chapter 23
Plant Control Laboratory	Chapter 24

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

The item wise specifications to be followed by the Contractor are given in the subsequent Chapters.

Chapter 2
Providing, Laying and Jointing of Pipelines

1.0 Laying of Pipe Line

1.1. Excavation for Pipe Line Trenches/ Horizontal drilling

The pipe shall be laid by horizontal drilling. However where it is not possible open excavation will have to be carried out. Tendered rate is supposed to cover cost of all such means i.e, either drilling or excavation (soil, rock) by manual, mechanical or blasting.

1.2. Site Clearance

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

1.3. Alignment marking

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

1.4. Working survey

Working survey of the pipeline alignment shall be carried out by the contractor before start of the excavation work. The contractor shall provide all the instruments such as levelling instruments, steel tape, ranging rods, strings, pegs etc. for carrying out the survey. Based on the working survey, the alignments, L-section (depth of laying), grade, and location of manholes and inspection chambers shall be finalized and got approved from the Engineer-in-charge.

1.5. Use of Machinery:

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

1.6 Trench Width and Depth:

All buried pipelines shall be minimum 1 metre +/- 0.2 metre below ground level to maintain proper grade unless other depths are approved by the engineer in charge. The trench width for respective pipe diameters permissible as required under respective IS code for Pipeline laying and installation.

The trench width shall be constant throughout the trench depth, which will provide a clearance of about 0.30 m on either side of the pipe line.

The contractor may, for the facility of work or similar other reasons, excavate and also backfill later, if so approved by the Engineer-in-Charges, at his own cost, outside the allowable trench width specified above. Should any excavation be taken below the specified trench bottom, contractor shall fill it up to required level, at his own cost, with the same material available at the trench bottom including watering and compaction.

The excavation shall be taken down to such depths as shown in drawings. Excavation for extra depth equal to the thickness of proposed pipe bedding shall be done below pipe soffit level for providing bedding below pipe line wherever bedding is required. The trench bottom shall be excavated to proper grade as shown on drawings. The contractor shall provide site rails and levelling instruments required for checking the grade during excavation, bottom bedding and pipe laying Projections in rock excavation shall be removed by chipping.

The contractor shall carryout extra excavation at the pipeline joints to be welded in the trench, as required (minimum 0.6 m deep and 0.9 m lengthwise, all around the pipe), for facilitating proper welding of the bottom joint from outside. The work of trench excavation should be commensurate with laying and jointing of the pipe line. It should not be dug in advance for a length greater than 500 m ahead of work of laying and jointing of pipeline unless otherwise permitted by the Engineer-in-Charge.

The minimum cover on pipe is to be maintained 1 metre+/- 0.2 metre. However the cover on pipe may be modified to suitgradients and site conditions as per direction of Engineer-in-Charge.

1.7 Barricading and Guarding:

To protect persons from injury and to avoid damage to property, adequate barricades, construction signs, red lanterns and guards as required shall be placed and maintained

During the progress of work, till filling of the trenches after pipes are laid and jointed. The lighting, barricading, guarding of the trenches and the maintenance of watchman shall be done by the contractor at his cost.

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

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

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

1.8. Re-use of Surface Material

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

1.9. Stacking of Excavated Material

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

1.10. Maintenance of Traffic

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

1.11. Structure Protection

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

1.12. Protection of Property

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

1.13. Avoidance of Existing Services

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

1.14. Bailing out of Water/Open and Close Timbering

1.14.1 Bailing out of Water

During the excavation if subsoil water is met with, contractor shall provide necessary equipment and labour for dewatering the trenches. If pumping out subsoil water is found necessary, contractor shall provide sufficient number of pumps for the same. The tendered rate shall cover all costs for bailing out of

water including hire charges of pumps, cost of diesel and labour etc. and hence, no extra payment shall be allowed.

1.14.2 Open and Close Timbering

Contractor shall provide necessary materials labour& equipment's for open timbering/close timbering/ steel or any other protection work required to be done during excavation. In case of open areas, shafts, wells, cesspits, manhole including strutting, shoring and packing cavities(wherever required). The tender rate shall cover all cost of materials, labour and equipments required and hence no extra payment shall be allowed even timbering material is left permanent at site.

1.15. Disposal of loose boulders etc.

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

1.16. Disposal of Excavated Material

All the excavated surplus material shall be disposed of on low lying Government land or as directed by the Engineer-in-charge.

1.17. Moorum / Sand Bedding below Pipeline

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

2.0 Refilling the trenches

2.1. Use of selected excavated material

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

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

2.2. Filling zones

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

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

2.3. All excavations shall be backfilled to the level of the original ground surfaces unless otherwise shown on the drawings or ordered by the Engineer-in-Charge, and in accordance with the requirements of the specification. The material used for backfill, the amount thereof, and the manner of depositing and compacting shall be subject to the approval of the Engineer-in-Charge, but the Contractor will be held responsible for any displacement of pipe or other structures, any damage to their surfaces, or any instability of pipes and structures caused by improper depositing of backfill materials.

The back filled layers shall be wetted and compacted to a density of not less than 90 percent of the maximum dry density at optimum moisture content of the surrounding material. Any deficiency in the quantity of material for backfilling the trenches shall be supplied by the Contractor at his expense.

The Contractor shall at his own expense make good any settlement of the trench backfill occurring after backfilling and until the expiry of the defects liability period.

On completion of pressure and leakage tests exposed joints shall be covered with approved selected backfill placed above the top of the pipe and joints in accordance with the requirements of the above specifications. The Contractor shall not use backfilling for disposal as refuse or unsuitable soil.

2.4. Fillings of the trench excavated in rock

In case of excavation of trenches in rock, the filling up to a level of 300 mm above the top of the pipe shall be done with fine materials, such as soft soil, moorum etc. The filling up of the level of the centre line of the pipe shall be done by hand compaction in layers not exceeding 150 mm, whereas the filing above the centre line of the pipe shall be done by hand compaction or mechanical means in layers not exceeding 150 mm. The filling from a level of 300 mm above the top of the pipe to the top of the trench shall be done by mechanical methods with broken rock filing of size not exceeding 150 mm mixed with fine material as available to fill up the voids.

2.5. Consolidation

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

3.0 Ductile Iron PIPES (Pipes shall be procured only from the Manufacturers.)

3.1Supply, laying and jointing of DI Pipesand fittings.

The ductile iron pipe to be supplied and laid shall be DI K-7/K-9 as per IS 8329-2000, fittings for the pipe shall conform to the provisions of IS 5382-1985, DI fittings confirming to IS 9523:1980 complete.

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

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

3.4 The DI pipe manufacturer should have valid BIS license from last 5 years (or valid BIS license from last 2 years with an experience of manufacturing and supplying at least 500 kms of various diameters of DI pipe to any State/Central Govt. / board/organization of repute in last 3 years) and the pipes should be manufactured conforming to IS 8329-2000 specification and further amendment to the code as on date and duty ISI marked.

3.5 The DI pipe manufacturer should have in-house facility for carry out the following test for size DN 80-DN1000:-

a) C -value determination arrangement

b) Type test for leak tightness as per ISO 2531:2009/BS EN 545/IS 8329:200.

3.6 DI pipe manufacturer should have the ISO 9001:2008 & ISO 2531:2009 certification for manufacture of DI pipe.

3.7 A certificate for having supplied DI pipe of size proposed in the project for quantity 1/3 of the TENDER requirement during last 3 years to any state/central Govt. department /board to be submitted by pipe manufacturer.

The manufacturer should be able to demonstrate the conformity of the product to the requirement by controlling the manufacturing process and by carrying out the various tests as specified in IS wherever possible, statistical sampling techniques should be used to control the process so that the product is produced within the specified limit. The successful bidder is required to submit the **Quality Assurance Program (QAP) of the manufacturer along with the documentary evidence of the production capacity, BIS & ISO Certification as mentioned above for obtaining the approval of Employer & Engineer-in-charge before production of pipes.**

3.8 **Each pipe or Fittings shall be marked with the standard mark, Lot/ Batch No., Period of Manufacturing and as per the employer/purchasers requirement.**

4.0 Supply, laying and jointing of Double Wall (Non-Smooth External Surface) Corrugated (DWC) wall & Smooth Internal wall) Polyethylene Class SN 8 /High Density Poly Ethylene (HDPE) Pipe PN 2.5 PE 100 for Piping System for Non-Pressure underground Sewerage & Drainage Applications.

4.1 Scope

The specification for manufacturing, supplying, transportation, handling, stacking, installation, jointing, and testing of Piping System for non-pressure underground Sewerage & Drainage Applications shall be as below,

4.2 Applicable Codes

The manufacturing, testing at factory, supplying, transportation, handling, stacking, installation, jointing, and testing at sites shall comply with all currently applicable National statutes, standards & codes. If requirements of these specifications are at variance with any other standards, this particular document shall be governed by the proceedings of:

IS16098 (Part-1) : 2013	Structured Wall Plastics piping Systems for non-pressure drainage and sewerage- Specification Part 1: Pipes and fittings with smooth external surface, Type A
IS16098(Part-2) : 2013	Structured Wall Plastics piping Systems for non-pressure drainage and sewerage- Specification Part 2: Pipes and fittings with non-smooth external surface, Type B
ISO 9001: 2008	Quality Management Systems

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

Code No.	Title/Specification
IS 14333	High Density Polyethylene Pipes for sewerage
IS 2530	Methods of test for polyethylene moulding materials and polyethylene compounds DI K7 Pipes, Joints and Fittings for use for Potable Water Supply
IS 5382	Rubber sealing rings for gas mains, water mains and sewers.
IS 4905	Methods for random sampling
IS 7328	High density polyethylene materials for moulding and extrusion
IS 7634	Laying & Jointing of Polyethylene (PE) Pipes

Other Indian standards which are integral part of above standard as normative references form a significant portion of this specification document.

4.3 Inspection

The Contractor shall be responsible for the performance tests at the Manufacturer's place in presence of the Engineer-in-charge or the authorized representative(s) of the client and/or by the authorized representative of PDMC, AMRUT.

The Pipe Manufacturer shall produce all necessary test certificates related to relevant Material Characteristics of PE Material in Granular Form for each lot of Pipes as specified in the IS code. At the time of inspection, before supply of the designated lot to the contractor, such certificates from the manufacturer, duly supported by the purchaser's invoices shall be made available to the employer with proper endorsement from the inspecting agency.

The employer reserves the right to inspect the Pipe Manufacturer's unit if required to evaluate the capacity/ capability/ Quality Assurance before extending their clearance to the contractor towards procurement of pipes.

The Employer reserves the right to test Pipe samples of Pipe & Fittings picked up at random from project site stack yard/storage for performance test at any Govt. authorized National Testing Laboratories or NABL Accredited laboratory.

4.4 Transportation

While loading the pipes onto the truck, care should be taken that the coupler- end should be arranged alternatively in the corresponding layers so as to avoid the damage to the coupler/ socket ends.

4.5 Handling

Following Recommendations shall be followed while handling the pipes:

- Adherence to National Safety requirements
- Pipes to be smoothly lowered to the ground
- Pipes should not be dragged against the ground to avoid the damages to the Coupler/pipes.
- 900mm and larger diameter pipes are carried with Slings at two points spaced approximately at 3 Meters apart.
- For smaller diameters (450 mm to 900 mm, both exclusive) one lift point shall besufficient& can be handled either manually or mechanically.
- For diameters smaller than or equal to450 mm, manual labour can be used.
- **Do not use a loading Boom or Fork Lift directly on or inside pipe.**

4.6 Pipe Storage at Site

- Stockpiling shall be done temporarily on a Flat Clear Area as per IS 16098 (Part- 2).
- For avoiding collapse of Stacks, use Wooden Posts or Blocks
- Stacking shall not be higher than 2.5 Meters
- While stacking, alternate the socket/coupler ends at each row of stacked pipes.

5.0 Lowering, Laying & jointing of Pipes

The width of a Sewer Trench depends on the soil condition, type of side protection needed and the working space required at the bottom of Trench for smooth installations. The Minimum Trench Width is specified as per Table below:

Indicative Trench Widths**	
Pipe Diameter (mm)	Trench Width (M)
75-200	0.6
250	0.7
300	0.8
400	0.9
600	1.2
800	1.3
1000	1.8

The pipe segment between two manholes shall be laid approximately in straight line without any vertical undulations (at prescribed Gradient) only in case of curve if found necessary. The piping system shall rest on the carefully prepared bedding portion of the Backfill Envelope as per IS-16098 (Part- 2) (Annexure – A) and at appropriate jointing locations the trenches shall be excavated deeper to accommodate the bulges of coupler-spigot joints. However, special care shall be ensured as mentioned below:-

- Excavation of trenches shall be carried out in accordance with the approved drawing & specifications and as directed by the engineer-in-charge as well.
- The piping system shall be laid and jointed in true to gradient with the help of sight rails and boning rods as detailed in Manual on Sewerage and sewerage treatment CPHEEO, MoUD, GoI, New Delhi. The levels need be checked with calibrated modern Levelling Instrument. Specific care shall be taken to prevent entry of sand / mud /slush/ any other foreign material etc into the system during the installation operation.

A minimum cover of 600 mm should be maintained or as directed by the Engineer-in-Charge.

The bedding area (ref. Annexure A) is an essential portion of Back fill Envelope and shall be constructed with proper bedding material as computed in accordance with appropriate national code of practice for structural bedding design mentioned in the list of normative references under IS 16098-2.The bedding shall be laid to specified thickness and gradient with proper manual compaction of the aggregate.Indicative installation details with suggestive ‘Backfill Envelop’ have been shown in Annexure Aas per IS-16098 (Part- 2).

The moulded on-line coupler (or separate coupler integrated to the pipe in case of lower sizes) will have a suitable internal surface to push-fit the said end over the spigot end of the next pipe. On first valley of the corrugation of said spigot end (destined to receive the pushed coupler), the sealing rubber ring of standard quality shall be placed so that the coupler end of the pipe smoothly but tightly slides over the sealing ring for making an absolute watertight joint. Similar system is also used for fabricated accessories or moulded fittings requiredReducer end caps for the purpose of installation of the system related to drainage/sewerage.

For quality connections following steps are to be ensured, failing which the performance aspects are to be severely compromised:-

- The non-coupler (socket) end needs to be thoroughly cleared and shall be free from any foreign material
- Clean and lubricate the coupler end of the pipe, if required.
- Lubricate the exposed Gasket in the same manner, if required.
- Keep the non-coupler end free from dirt, backfill material, and foreign matter so that the joint integrity is not compromised.
- Push the coupler onto the non-coupler end and align properly. Always push coupler end onto non-coupler end.

For smaller diameter pipes simple manual insertion shall be sufficient. It should be ensured that the coupler end is adequately 'homed' on non-coupler end to ensure installation and tight joining seal. Therefore prior to insertion always place a 'Homing Mark' on appropriate corrugation of the 'Non-Coupler End'.

6.0 Construction of backfill envelope and final backfilling of the trenches

DWC Piping System with well compacted Backfill Envelope along with the bottom and sides of trench (native soil) work together to support soil overburden and superimposed (traffic) loads. The carefully constructed Backfill Envelop has three distinct but non-isolated stages (ref. Annexure A of IS-16098 Part-2).The construction need to be done stage by stage as per the sequence stated below:

- Bedding portion
- Up to Haunch level
- Remaining portion

The material for backfill envelop shall be in accordance with the structural design of flexible buried conduit as per relevant National code in meticulous consultation with ISO 21138-1 &3 :2007 and all other referred International Codes such as BS EN 1295-1 that forms an integral part of the said ISO Specifications. It can be the same material that were removed in the course of excavation or it can be fine sand/course sand/gravel / moorum /other form of course / fine aggregates depending on the effected Design Load [Overburden + Superimposed (Live) load]. However, in no circumstances, the flexible pipe should be embedded in cement concrete (un- reinforced or reinforced) which invariably induces undesired rigidity in the system.The Manufacturer may also be consulted to provide for the necessary module for the Structural Design of the 'Backfill Envelope'.

- The remaining portion of backfilling which do not contribute to the structural integrity of the system may be the materials that were removed in the course of excavation or any other foreign material as may be required to suit the particular site condition. These materials shall consist of at least clean earth and shall be free from large clod or stone above 75 mm, ashes, refuse and other injurious materials.
- After completion of bedding portion of the Backfill envelop and subsequent lying of pipes, etc, first the haunch portion & then upper portion of Backfill Envelope shall be constructed as per design around the pipe. Voids must be eliminated by knifing under and around pipe or by some other indigenous tools.
- The compaction, by hand rammers or compactors with necessary watering to a possible maximum level of proctor density shall be ensured.
- Remaining portion of the Construction of 'Backfill Envelope' (above the Bedding Portion) & subsequent final Backfilling of the Trench shall start only after ensuring the water tightness test of joints for the concerned sewer segments. However, partial filling may be done keeping the joints open.

- Precautions shall be taken against floatation (if at all necessary) as per the specified methodology and the minimum required cover.

7.0 Continuity Test /Hydraulic Testing

Since the entire application pertains to Non-pressure (gravity flow) domain, on-field pressure testing of the installed system is not necessary. As per the relevant IS Code, each of the supplied pipe assembly need to be pressure tested at manufacturer's end for ensuring its leakage proof status as per the IS 16098 (Part 2):2013. However, for on-field acceptability, a segment wise continuity test shall be performed by the contractor in the same methodology as depicted in the CPHEEO, MoUD, GoI Manual on Sewerage and Sewage Treatment to the fullest satisfaction of the Employer/Department/PDMC, AMRUT. The contractor shall arrange the water at his own cost for testing and other requirements.

Notwithstanding the satisfactory completion of the continuity test, if there is any discernible leakage of water from any pipe or joint, the Contractor shall, at his own cost, replace/repair the pipe or re-make the joint and repeat the hydraulic test again.

8.0 Flow measuring devices:

Electromagnetic Flow Meter as per ISO 6817-1992 of appropriate size shall be provided along with 8 hour Battery back-up, at inlet and outlet of the Raw water and Clear water pipeline and Feeder pipeline outlet at RCC Sumpwells; to check losses and measure the quantity of water. Reading display of all the Flow meters, alongwith data logging instruments should be made available at single point, wherever decided by the Engineer-in-charge.

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

Coil housing of the Electromagnetic flow meters of fully welded SS-316 and Flow-tube lining of PTFE / EPDM / Neoprene.

Recommended make:Krohne-Marshall / Yokogawa / Emerson- Rosemount.

9.0 Technical Qualifications of Manufacturer of DWC pipes:

9.1 The Pipe manufacturer should have an annual installed production capacity of quantity equal to this TENDER. The manufacturer should have manufactured and suppliedpipesto any state/central Govt. department /board having minimum DN/ID 150mm or above, a minimum length of 500 Km.; out of which atleast 10% length (50Km.) should be of minimum DN/ID 250mm or above.

9.2 The manufacture should have valid BIS License as per IS 16098:2013 Part-2 / IS 14333:1996 and accreditation of ISO 9001: 2008/2015 for Manufacture and supply of DWC / Structured wall PE Pipe and fittings.

9.3 The manufacturer should be able to demonstrate the conformity of the product to the requirement by controlling the manufacturing process and by carrying out the various tests as specified in IS wherever possible, statistical sampling techniques should be used to control the process so that the product is produced within the specified limit. The successful bidder is required to submit the **Quality Assurance Program (QAP) of the manufacturer along with the documentary evidence of the production capacity, Valid BIS & ISO Certification as mentioned above for obtaining the approval of Employer & Engineer-in-charge before production of pipes.**

10.0 DWC Pipe Manufacturer In-House Facility for Testing:

10.1 The manufacturer should have required Plant, machinery and equipment for size DN/ID 150mm or above for the following vital test:

- Ring Flexibility Test,
- Ring Stiffness Test,
- Creep Ratio Test,
- Water Tightness Test,
- Tensile Strength Test,
- Melt Flow Index Test,
- Impact Test,
- Environmental Stress Cracking Resistance Test,
- Oxidation Induction Time Test Etc.

10.2If the manufacturer does not have required Plant, machinery and equipment for size DN/ID 150mm or above for the above vital test, the required tests to be carried out in any National Test House or NABL accredited Test Laboratory. The cost of such tests shall be borne by the manufacturer.

10.3 Each pipe or Fittings shall be marked with the standard mark, Lot/ Batch No., Period of Manufacturing and as per the employer/purchasers requirement.

11.0 Supply, Laying, Jointing, Installation, Testing and Commissioning of pipes

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

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

c. The HDPE/DWC/DI/RCC Pipes shall be laid in accordance with the latest BIS/EN/ISO specifications.

12.0 Field Hydraulic Test

a. The Sectional Hydraulic Test shall be carried out after the pipeline section to be tested has been laid jointed and backfilled to a depth sufficient to prevent floatation

b. Each length of the pipeline to be tested shall be capped or blanked off at each end and securely strutted or restrained to withstand the forces which will be exerted when the test pressure is applied.

c. The proper method of filling the pipeline with water shall be used. The length under test shall be filled making certain that all air is displaced through an air valve or any other appropriate mechanism. The test length shall then remain under constant moderate pressure as per testing method given in the IS 7634.

d. As per IS code water required to built-up allowable drop in pressure during test will be treated as a make-up water.

e. The maximum allowable test pressure shall be as per CPHEEO manual and or IS codes specified.

f. Notwithstanding the satisfactory completion of the hydraulic test, if there is any discernible leakage of water from any pipe or joint, the Contractor shall, at his own cost, replace the pipe, repair the pipe or re-make the joint and repeat the hydraulic test at his risk and cost including the cost of water.

g. Test pressures are to be measured in kg/cm^2 at the centre of the blank flange situated at the lowest end of the pipeline under test. Unless otherwise specified the test pressure shall be as stated in Clause 12(f).

13. Supply, Laying & Jointing of RCC Pipes

13.1 The Pipe manufacturer should have an annual installed production capacity of quantity equal to this TENDER. The manufacturer should have manufactured and supplied pipes to any state/central Govt. department /board quantity equal to this TENDER in last 3 years.

13.2 The manufacture should have valid BIS License as per IS 458:2003 and accreditation of ISO 9001: 2008/2015 for Manufacture and supply of RCC Pipes.

13.3 The manufacturer should have manufactured and supplied pipes quantity equal to this TENDER.

13.4 The manufacturer should have required Plant, machinery and equipment for the following vital test:

- Hydraulic Test,
- Three-edge Bearing Test,
- Permeability Test,

13.5 If the manufacturer does not have required Plant, machinery and equipment for the above vital test, the required tests to be carried out in any National Test House or NABL accredited Test Laboratory. The cost of such tests shall be borne by the manufacturer.

13.6 Each pipe or Fittings shall be marked with the standard mark, Lot/ Batch No., Period of Manufacturing,Source of Manufacture and as per the employer/purchasers requirement.

14. Precast Concrete Manhole Cover and Frame

14.1 The manufacturer should have an annual installed production capacity of quantity equal to this TENDER. The manufacturer should have manufactured and supplied different grades of to any state/central Govt. department /board quantity equal to this TENDER in last 3 years.

14.2 The manufacture should have valid BIS License as per IS 12592:2002 and accreditation of ISO 9001: 2008/2015 for Manufacture and supply of SFRC, Manhole Frame and Cover.

14.3 All the covers and frames shall be sound and free from cracks and other defects which interferes with the proper placing of the unit. The underside of the cover and protective mild steel sheet of minimum 2 mm thick around the periphery of cover and frame especially 25mm x 3mm mild steel flat used to protect the frame shall be given suitable treatment with anti-corrosive paint or coating. Lifting hooks of dia 12mm mild steel for light and medium duty and 16mm dia. mild steel for heavy and extra heavy duty covers shall be protected from corrosion by hot dip galvanizing or any other suitable means as approved by the Employer. The top surface of the cover shall given a chequered finish.

The manufacturer should have required Plant, machinery and equipment for the following vital test:

- Load Test,

14.4 If the manufacturer does not have required Plant, machinery and equipment for the above vital test, the required tests to be carried out in any Government, National Test House or NABL accredited Test Laboratory. The cos of such tests shall be borne by the manufacturer.

14.5 Each cover & frame shall be marked with the standard mark, Lot/ Batch No., Grade Designation LD2.5, MD10, HD20, EHD35, Period of Manufacturing, Source of Manufacture and as per the employer/purchasers requirement.

15 SAFETY FOOT REST

Orange/ Black colour safety foot rest of minimum 6mm thick plastic and capsulated on 12 mm dia. Steel bars having minimum cross-section as 23mm x 25mm and overall minimum length 263mm and width as 165mm with minimum 112mm space between protruded legs having 2mm tread on top surface by ribbing or chequering besides necessary adequate anchoring projection on tail length on 138mm suitable to withstand the bend test and as per specification and manufacturers' permanent identification mark to be visible even after fixing, including fixing in manholes with 30x20x15 cm cement concrete blocks 1:3:6 complete as per the direction of Engineer-in-Charge.

16 THRUST BLOCKS

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

Chapter 3

SPECIFICATION FOR CONSTRUCTION OF R.C.C. SUMP AND SEWAGE TRAETMENT PLANT(STP)

1.0 PREAMBLE:

The work comprises of construction of Sump well at various locations and at Sewage treatment plant

2.0 Scope of work:

Three RCC sump well as mentioned in Description of work is to be designed and tested on Lump sum contract.

The work includes the following sub work:

i. Investigation and testing for foundation.

ii. Design and drawing of the structure.

iii. Construction as per approved design and drawing.

iv. Providing and fixing of pipes, valves and other appurtenances wherever required.

v. Testing of the structure for the water tightness and stability.

All materials required for satisfactory completion of the work such as cement, steel, pipes, specials and valves shall be procured by the contractor himself. The water required for construction shall be arranged by the contractor but that required for testing and handed over to the department within the time period specified in the Notice inviting TENDER.

3.0 LOCATION OF WORK:

Sump well site: One number of sump well of required capacity at the land identified by UJJAIN municipal corporation.

4.0 GENERAL REQUIREMENT:

4.1 The foundation of the structure should be taken down sufficiently below the average ground level for safe transfer of load to undisturbed formation. Suitable Soil test should be carried out by the contractor through Govt. Engineering college or any other recognized laboratory to ascertain safe bearing capacity of the soil for design purpose.

4.2 The specification laid down in the letter TC No. 236 dated 21.05.97 issued by Engineer-in-Chief PHED M.P. Ujjain be strictly followed. Applicable for Over Head Tanks.

4.3 The type of foundation should be suiting to the determined safe bearing capacity of the soil and shall be designed accordingly. The excavation shall be done in all sort of strata and if blasting is required, the contractor shall obtain permission from the competent authority and all rules regarding safety shall be followed.

4.4 The tanks can either be rectangular or circular is shaped supported over column staging but the location plan of the columns should permit utilization of spacing underneath fully for construction of office/staff building.

4.5 The capacity of the tanks specified in para 2.0 above shall be between the outlet level and the full tank level. The maximum depth of water in the tanks should not be more than 4.0 m. The outlet level should be kept minimum 0.15m above the tank floor level. A free board of 0,5m should be provided below the lowest surface of the roof slab or beam. The inlet level should be 0.10m above the full tank level. The scour level should be kept flush with the floor slab.

4.6 A RCC doglegged staircase 1.2m wide shall be provided from ground level to upto the top of the tank. The staircase should have straight flights with intermediate landing at bracing levels. The rise of the stairs shall not be more than 25cm. The staircase should have railing on both sides comprising of 1.2m high GI medium class pipe of 80 mm dia posts, 1.5 to 1.6m apart and medium class 20mm dia I pipes in three rows. The GI pipes posts and the railing pipes (class medium) should be secured adequately.

4.7 A RCC gallery 1.2m wide all around the tank at vertical wall ring beam level should be provided to facilitate inspection, cleaning and painting of the tank. A railing comprising of medium class 80m dia GI pipes posts 1.2m high rigidly fixed in the gallery slab at 1.5m maximum spacing with 3 rows of 20mm GI pipes (Class medium) should be provided. The

gallery should have access from the staircase, A steel door shall be provided at the entrance to the gallery or at the far end of the RCC staircase to prevent unauthorized entry.

4.8 RCC ladder properly supported from tank wall with hand rails 0.45m in width should be provided outside of the tank from gallery of top of roof slab. The RCC ladder shall have at least one landing in between gallery and roof top and. Mild steel ladder, from the manhole in the roof slab to floor slab, inside of the tank to facilitate inspection and cleaning. These ladders should be of MS plates 65mmx10mm size with 20mm dia round bars fixed at 0.25 centers by holding and welding to MS plates. The insides ladder should be properly supported in the mid span for rigidity.

4.9 An apron of cement concrete 1:2:4 i.e. M-15 mix should be provided for an area which is 1.5 metre more the dimension of the tank of all sides having 100x100 mm drain in cement concrete 1:2:4 all around shall be constructed and water will be led to the proper disposal point through the drain to be constructed for the purpose. The top of the drain around the apron shall be 100mm above the ground level. Outer edge will be covered with sloping earth the apron will have a slope of 1.60 from centre towards the drawl. The edge of the drain will be flush with the top surface of the apron. The apron will be 100mm thick in cement concrete 1:2:4 laid on sub base of 100mm thick 1:4:8 cement concrete in case of black cotton/cohesive soil the soil will be removed up to 500mm below the ground level and refilled with rammed moorum up to 400mm in case of hard strata like moorum, kopra etc. moorum filling will not be required.

5.0 PIPES AND FITTINGS:

The inlet, outlet, over flow and scour pipes for the tanks shall be cast iron double flanged class A as per IS : 7181-186 all these pipes shall be independent of each other and shall be fixed in vertical position rigidly by bolting and clamping properly.

The size of these pipes in SUMPWELL shall be as given below

Inletdia of pipe	250 mm
Outlet dia of pipe	300 mm
Overflow dia of pipe	350 mm
Scour dia of pipe	200 mm

Cast iron bell mouths as per Appendix 10.2 of CPHEEO manual conforming to IS 1538-1976 shall be provide on the top end of all pipes. These pipes shall have CI puddle collars properly embedded in the floor slab at the time of concerting to provide monolithic joint. Cast iron strainer shall be provided don the top of outlet and scour pipes,. Cast iron duck foot bends shall be fixed over cement concrete bed block, to support vertical pipes. The bed blocks shall be designed to take the load of pipes and the water column indecently. The double flanged Duck foot shall be provided. 1.2m below average ground level at site.

Cast Iron Double flanged sluice valves with spur gear and hand wheel class PN 1.0 confirming to IS : 14846 with all revision up to date issued of NIT shall be provided and fixed minimum 3.0 m away from the ground level bracing, along with necessary C.I.D.F. pipes. The size of the valves shall be as given below:

Inlet valve Dia (150 mm)

Outlet valve Dia (150 mm)

Scour valve Dia (80 mm)

The overflow pipe shall be left open at minimum 3.00 m distance from bracing CIDF pipes shall be provided between Duck foot bends and D.F. sluice. The contract will limit up to fixing of DF values.

6.0 APPURTENANCES:

6.1 Water level indicator:

A float operated level indicator comprising of stainless steel float pulleys, steel wire rope and enameled indicator plate calibrated to read depth of water in metre, shall be provided.

The pulleys should provide free movement of rope and they should be easily accessible for repair and maintenance. The indicate plate should be fixed at about 5m. Above ground level on the front side of tank.

Additionally the following arrangement may be provided as optional

(a) Water level indicator, working on physical characteristics.

(b) Pressure gauge, calibrated, to read water depth directly.

6.2 Ventilators :

Mosquito proof ventilators, of suitable design shall be provide on the roof slab of tank to facilitate discharge of dissolved gases of water and to keep the inside of tank odour free.

6.3 Manhole:

An opening of 0.75x0.75m or 0.9m dia. size shall be provided in the roof slab fo tank for access inside the tank for inspection and cleaning. The opening shall have CI/MS cover with locking arrangement.

Lightening Arrestor:

Aluminum lightening arrester as per relevant B.I.S. shall be above highest point and 30 mmx4mm size strip connected to earth electrode shall be provided. The earth strip shall be secured rigidly to concrete surface.

7.0 FINISHING AND PAINTING

7.1 Form finish:

All external surfaces on the structure shall have form finish. However all uneven surface and small defects shall be made even immediately after removal of forms with 1:1 cement mortar. The inside surface of the tank shall be rendered even and water proof by cement plaster in 1:2 portion.

7.2 Painting of Concrete:

The outside surface of the Sump shall be painting with 2 coats of IS marked cement colour of approved make. The colour shade shall be decided by the Engineer-in-Charge.

7.3 Painting of pipes etc.

Cast iron pipes, valves and fittings, shall be painted with 2 coats of black bituminous paint.

7.4 Painting of MS Ladders and MH Cover:

As the MS ladder inside of the tank and manhole cover shall be subjected to corrosive action of chlorinates water they shall be coated with epoxy paint

8.0 TESTING OF SUMPWELL:-

In addition to the structural test as given in IS 456-1978 revised and amended up to date the Sumpwell shall also be tested for water tightness at maximum water level in accordance with clause 10.1.1 of IS 3370 (part-I) 1965. The tanks shall be filled more than 0.25m per day and the settlement of foundation of foundation shall be measured accurately before each filling. Any defect of any sort affecting the strength, durability, appearance of usefulness of the structure noticed during testing shall be completely removed to the satisfaction of Engineer-in-charge with in the specified time for completion of work.

9.0 COMMISSOINING & HANDING OVER:-

On completion of all works and the successful of the Sumpwell, it shall be handed over to the department for commissioning as required on completion of work and testing. The contractor shall submit completion drawing in six sets along with foundation investigation, concrete strength water tightness test reports at the time of handing over of work.

Chapter 4

SPECIFICATIONS FOR SEWAGE TREATMENT PLANT

All the work shall be carried out as per relevant provisions of clauses and sub clauses of chapters of Manual on Sewerage and Sewage Treatment (Second Edition), CPHEEO Ministry of Urban Development Govt. of India

(1) Construction of Sewage Treatment Plant. The Job includes the construction of one number of STP of capacity 92.5 MLD in SurasaVillage .

(2) TREATMENT:

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

The Sewage treatment plants shall be for Primary and Secondary treatment of MUNICIPAL SEWAGE. Typical composition of untreated domestic waste water, is as follows:

Parameters		**Concentration**		
Contaminants	**unit**	**Weak**	**Medium**	**Strong**
Suspended Solids	mg/l	100	220	350
BOD_5	mg/l	110	220	400
COD	mg/l	250	500	1000
Total Nitrogen	mg/l	20	40	85
Free Ammonia	mg/l	12	25	50
Nitrates	mg/l	0	0	0
Total Phosphorous	mg/l	4	8	15
Chlorides	mg/l	30	50	100
Sulfate	mg/l	20	30	50
Grease	mg/l	50	100	150

The Effluent Characteristics should meet the MP Pollution Control Board norms and MOEF Norms for discharging water in inland water ways or to be used for community purpose as per Pollution Control Authorities with up to date amendments. The effluent discharge limits are described below.

Contaminants	unit	Inland surface water discharge limits
Ph		5.5-9
Temperature	^{0}C	Shall not exceed 5^{0}C above receiving water bodies
Oil and grease	mg/l	10
Total residual chlorine	mg/l	1
Suspended Solids	mg/l	100
Ammonical Nitrogen	mg/l	50
Total Kjeldal Nitrogen	mg/l	100
Free ammonia	mg/l	5
BOD_5	mg/l	30
Fluoride	mg/l	2
COD	mg/l	250
Dissolved phosphate	mg/l	5
Sulphide	mg/l	2
Phenolic compounds	mg/l	1
Bio-assay test	-	90% survival of fish after 96 hours in 1005 effluent
Manganese	mg/l	2
Nitrate Nitrogen	mg/l	10

All the treatment units shall be as per CPHEEO Manual and relevant IS standards. Bidder shall require to submit a brief write up on the Sewage treatment plant along with the TENDER. On acceptance of TENDER the successful Bidder shall submit a detailed design and drawings of the Sewage treatment plant for the approval of competent authority. The general specifications and guidelines for STP are as below,

1.0 General Guidelines for level of STP and proposed Trunk Main Sewer.

The contractor is advised to have a site visit and verify the site levels.The STP should be designed, such that the complete process is completed with least of power consumption, also STP should be at sufficient height to avoid flooding during monsoon. It is the responsibility of contractor to match the outfall chamber level with proposed by pass channel meant for excess flow and discharge of treated sewage.

2.0 Raw Sewage Intake System & Raw Sewage Sump & Pump

The raw sewage shall be intercepted from the last manhole and shall be taken to the raw sewage intake and pump sump via gravity. A minimum self-cleaning velocity shall be maintained throughout the sewer line in order to avoid the settling of the particles. The raw water sewage pumping station shall comprise of the following system:-(i) Inlet chamber, (ii)mechanically cleaned coarse bar screen,(iii) pump sump and (iv) raw sewage pumps.

A bypass line to the Pumping station shall be provided which shall discharge Sewage to the drain, in case of overflow or raw sewage pump failure. This Pipe line shall be designed to maximum hydraulic capacity.

3.0 Sewage Treatment Plant

3.1 Inlet chamber cum distribution chamber

The raw sewage shall be pumped to the inlet chamber before the fine screens.

3.2 Fine Screen Chamber.

One no. mechanical and one no. manually operated fine screen of 6 mm openings shall be installed in a reinforced concrete chambers for fine screens. These two chambers shall be in parallel with common wall construction. Manual bar screen shall be standby in case the mechanical fine screen is out of service. The screen channels shall be designed for peak flow. The bar screens shall be of Stainless Steel (SS-304) flats. Conveyor Belt and chute arrangement shall be provided to take the screenings to the screenings dropped from chute will be collected in a trolley positioned below of approx. 0.5 m3 capacity. Manually operated gates are provided at the upstream and downstream ends to regulate the flow and for isolation. The Sluice gates shall be thimble mounted and confirm to IS: 13349. RCC Platforms shall be provided at the upper level to enable operation. Railings shall be provided around the entire periphery of the Chamber as well as for the platform. The entire structure is as per relevant IS code including the platform for the gates. RCC staircase 900 mm wide shall be provided for access from the ground level to the top of the unit & to the operating platforms.

All other accessories, whether specified or not, but required for completeness of the contract shall be in contractor's scope.

A level switch shall be provided in the channel upstream of screen chambers to start/stop the screen drive mechanism. Signal for Tripping of mechanical screen due to heavy blockage shall be announced through alarm for corrective action. ON-OFF and trip indication shall also be sensed and indicated in the panel room. Level increase in the channel from the upstream of screens due to clogging of screens including manual screen shall be sensed and alarm annunciation shall be initiated in the panel room for corrective action. ON-OFF trip indication of conveyor belt due to fault of overload shall be sensed in panel room for corrective action.

The screened sewage shall flow by gravity to the grit chambers, through suitably branched and sized channels.

3.3Grit Separator Units

Grit Separators are to be provided after the screening and before the biological treatment. There shall be one number mechanically operated detritor type grit separator designed for Peak flow. Another parallel manually cleaned grit channel shall also be designed and provided for peak flow and will work as a standby unit. The grit chamber should have a low head loss. All equipment and components (including but not limited to scrapper, classifier, and organic return pump) necessary for a fully functional system shall be provided regardless of whether or not such items are specifically listed or described in the Tender Document. Washed grit shall be collected in a trolley positioned at ground level below the Grit Classifier discharge. De-gritted sewage shall exit the Grit Basins over the outlet weir. Liquid streams from grit classifier shall be returned to the de-gritted sewage stream.

The bidders are to note that the silt & grit removed from grit chamber, does not form a part of the TSS in the incoming wastewater quality indicated in the tender document. Accordingly sludge calculations shall be done by bidders.

The grit separator should preferably have a scrapper and suitable grit lifting screw/rake transferring the settled grit to a grit classifier with an integral grit washer.

3.4 Flow Measurement

Flow measurement in the common outlet channel after screening and grit removal shall be in the form of a Parshall flume housed in the RCC channel. There shall be a straight length of at

least 10 times the throat width of the channel housing the flume in both upstream and downstream of the flume. The flume shall be constructed in RCC and finished in cement mortar. An ultrasonic level measurement device shall measure sewage depth in the flume and the flow computation shall be through the dedicated digital display with integrator near the flume. The readings of this meter shall be transmitted to the control room. Parshall flume channel shall lead to the distribution chamber of Biological treatment.

3.5Distribution chamber

Sewerage from the Parshall flume shall be fed to the distribution chamber which will distribute the Sewerage into separate streams for the Biological treatment.

3.6 Biological treatment of sewage

Process Design

Sewerage from the distribution chamber shall enter process basins as per relevant IS code. Screened and De-gritted sewage shall be fed for biological treatment to remove BOD, COD, Suspended Solids, Nitrogen and Phosphorous.

It shall perform biological organic removal, Nitrification, De-nitrification and Biological Phosphorous removal. It shall be capable of simultaneous sludge stabilization. Complete operation including decanting rate, sludge recirculation and wasting of excess sludge shall be controlled by PLC. Treated Sewage shall be disposed in the adjacent drain through Sewerage Pipe after chlorination.

The Biological and Tertiary Treatment shall be based on technology based on which at least one Municipal Sewage Treatment Plant running successfully at present in India having capacity 30% or more of the capacity of Sewage Treatment plant proposed in the project on the same technology. The effluent characteristics should meet the CPCB and MoEF norms for disposal on land or water resource. Also the sludge should be digested ad stabilized before disposal by the Contractor.

The basic continuous signal instrumentation system

It shall include flow measurement and the necessary water level readings from a pressure transducer device installed in each reactor. The measuring elements for all instruments including floats shall be located together on the side of the reactor in a well-mixed area easily accessible for maintenance.

- **Level transducers**

  One level transducer shall be used in each reactor and in any other basin where water level is to be monitored to assure the automation of the operation. One spare pressure transducer shall be supplied to enable a quick replacement of a faulty part. The pressure transducers shall be maintenance-free with a maximum deviation of less than 2% over a period of 6-month operation.

- **Dissolved oxygen (DO) transducer**

  One DO transducer shall be supplied for each reactor. This instrument is meant to control the aerobic environment in the reactor by controlling the blower operation (start/stop). Proper logic control is to be established by the bidder. One spare sensor shall be supplied to enable a quick replacement of a faulty part.

- **Sequence control strategy**

  The TECHNOLOGY PROVIDER shall be responsible of providing all the logic control programming and related hardware into an enclosure panel described further complete with all the equipment specified herein.

  The contractor shall be responsible to install the Logic Control Panel and to provide and install separate MCC and power distribution panels as specified in the electrical section of this specification. The contractor shall also be responsible to interconnect electrically all the

instrumentation and float signals specified herein with the logic control and the MCC panels as needed for a Complete Automated Operation.

- **Logic Control Hardware and Panel**

  The program controller shall be provided with key pad and display to enable the operator to easily re-adjust all cycle time and sequence. The programmable logic controller (PLC) shall have sufficient memory to perform automatic control of the process described herein and shall be sized to provide an additional number of input/output capacity of 10%.

  All control equipment installed in the control panel shall be accessible for operation of mounted on the front face of the panel. This panel shall control the operation of the various process equipment including:

  - influent valves or gate weirs
  - air blowers
  - decant equipment
  - waste sludge pumps (or valves)
  - any additional process equipment specified herein

  The PLC shall receive all input signals or described and take the necessary decisional action in regards to the operation of the above process equipment.

  The panel for the logic control shall be NEMA (National Electrical Manufacturers Association) enclosure and shall be provided with necessary Control Breaker, Transformers and Supplementary Contacts as noted herein.

  The panel wiring shall be sized per applicable codes using SWG 16 gauge minimum wire size. Wiring terminal blocks shall be rail mount control terminal type thermoplastic rated at 600 Volts. Not more than two wires shall be allowed to terminate in anyone terminal.

  The panel face shall be provided with an individual 3-position selector switch (HOR) for each automated valve, blower (4-position selector if dual-speed blower), pump, decanter or auxiliary equipment and instrumentation specified herein. It shall be equipped with one pilot light dedicated to each equipment.

  The pilot light shall be wired in parallel with the related motor starter auxiliary contact or relay other limit Switch contact to indicate that the equipment is activated or deactivated. Pilot lights shall be 415V AC direct types or led type.

  All internal devices shall be clearly marked and identified as to its application, including selector switches, pilot lights, pushbuttons and other devices exposed in front of the panel. Identification nameplates shall be with black letters or numbers in white, carved in plastic.

  For all automated valves and decanter operation, feedback signal shall be also provided and connected to the logic controls to acknowledge and confirm the good operation. In the event of one equipment failure, the reactor shall be temporarily bypassed and an alarm shall be activated to notify the operator. In the meantime, the flow shall be managed by the other reactor(s) in accordance with the programming.

  The control panel shall be equipped with circuitry to shutdown automatically the pump motor when required, to protect this equipment from damages caused by excessive humidity, temperature, or current overload. The contractor shall be responsible for connecting these pumps and motor sensors to the appropriate circuit in the control panel to protect the pumps in accordance with the pump manufacturer instructions. One pilot light shall be mounted on the control panel surface to indicate an alarm condition; all alarms shall appear on the operator interface. In both cases, these alarm conditions shall open the circuit of the pump starter to prevent it from starting.

  The control panel shall be shipped completely factory wired, assembled and factory tested.

- **Programmable Logic Controller (PLC)**

  The Programmable Logic Controller (PLC) shall be from the suggested makes.

- **Operator Interface Unit**

  The Operator Interface Unit shall be from the suggested makes ABB Panel View or approved equivalent.

3.7 Disinfection System

Chlorine Contact Tank

For Chlorination of final treated sewage a provision shall be made so that no harm is caused to the receiving water body. Decanted treated water from Biological treatment Process shall be taken to chlorine contact tank by RCC channel/pipe.

Tank shall be provided for dosing of chlorine from the chlorination system to the sewage from Biological Process. The tank shall be constructed as per the relevant IS code. RCC platform 1000 mm wide as per specifications shall be provided. RCC staircase 900 mm wide shall be provided for access from the ground level to the top of the unit and to the operating platforms. Baffle walls shall be provided to achieve proper disinfection. The baffle walls shall be constructed in concrete and 20 cm thick plaster in CM 1:3 on either side.

The inlet and outlet pipe shall be designed for peak flow.

No. of Units	: 1 no.
Detention Time	: 30 minutes of average flow (minimum)
Freeboard	: 0.5 m

Chlorination System:

Number of Units	: 2 nos. (1W + 1S)
Type	: Vacuum Chlorination system
Chlorine Dosing	: 5 mg/l
Residual chlorine	: 0.2 mg/l
Capacity of system	: Rounded to the upper Kg/hr.

Chlorine house of adequate plinth area shall be provided. It shall have sufficient ventilation as per the latest norms for safety purpose with necessary lifting arrangement and EOT etc. complete. All other accessories, whether specified or not, but required for Chlorination shall form part of contractors scope.

3.8 Outlet Pipe

Treated sewage after chlorine contact tank shall be taken to disposal to the discharge point. The length of the Pipe shall be as per site condition. Capacity of the pipe should be such that it can carry peak flow.

3.9 By-Pass Arrangements

Adequate by-pass arrangement shall be provided from Raw Sewage pump sump & inlet chamber at the entry of STP, to the outfall of the drain in case of necessity.

4.0 Solids and sludge handling

4.1 Sludge Holding tank

A tank shall be provided to store sludge from the WAS (Waste Activated Sludge) pumps and to act as a sump for sludge transfer to centrifuge.

Sludge sump will have mixing using coarse bubble aeration through PVC piping with openings. Separate dedicated air blowers will be provided for sludge mixing.

All other accessories, whether specified or not, but required for completeness shall form part of contractors scope.

4.2 Sludge Pump House

Screw pumps for sludge transfer from sludge holding tank to centrifuges, polyelectrolyte dosing system and air blowers for mixing of sludge in sludge holding tank will be housed in the sludge pump house. It shall be RCC framed structure with sufficient openings in the form of doors, windows, ventilators etc. and 1 MT capacity chain pulley block will be provided in it, for material handling purposes. Minimum carpet area of this building will be 20 square metre.

4.3 Polyelectrolyte Dosing

The polyelectrolyte will be dosed and blended with the sludge in the sludge sump. Minimum dose of polyelectrolyte shall be 1.5 kg/T of dry solids in sludge. There shall be one poly-dosing tank. Minimum volume of each dosing tank shall be suitable for 8 hours requirement of dosing. Each tank shall be equipped with slow speed mixer (100 RPM) to prepare polyelectrolyte solution, to feed the solution into sludge sump by dosing pumps.

4.4 Centrifuge Feed Pump

The sludge pumps will be positive progressive cavity displacement types. There shall be two pumps (One Working + One Standby) for pumping this sludge to the centrifuge. The minimum capacity of the pump shall be 1 m3/hr. Pumps will have solid handling capacity of not less than 40 mm sphere. M.O.C.(Materials of Construction) of pump shall generally be C.I.

Pump and motor will be mounted on a common MS fabricated base frame. The coupling will be flexible coupling. The motor will be Totally Enclosed Fan-Cooled (TEFC) and driven through belt drive.

4.5 Centrifuge

Thickened sludge shall be pumped to the centrifuge unit for dewatering. It shall be provided at suitable elevation for the dried sludge from centrifuge to be collected in a trailer/container situated below it.

Centrifuge shall be operated for 16 hours in a day and floor mounted. It shall be suitable to handle thickened sludge from thickener. The minimum solid contents in the sludge at centrifuge inlet shall be 3 %.

The material of construction of all parts coming in contact with the liquid shall be in CS.

Number of Units	: 2 (1Working+ 1Standby)
Operation	: 16 hours running per day
Dry solids in dried sludge	: 15 – 18 percent

All other accessories, whether specified or not, but required for completeness shall form part of contractors scope.

4.6 Centrifuge Shed

Sludge dewatering system shall comprise of centrifuge shed of appropriate size, which includes thickened sludge pumps, poly dosing tank with mixers, centrifuge unit.

Filtrate from the sludge shall be taken to plant drainage system by gravity.

4.7 Disposal of Solid Waste

Disposal of all solid wastes except wet cake as generated from the STP during construction, commissioning, and O & M shall be responsibility of the contractor. The solid wastes shall be disposed of in accordance with and as per instructions of the Employer/ Engineer or the representative of the employer. The Sludge Land Fill (SLF) identified for disposal may be assumed maximum at a distance of 10 kms from the proposed new STP site for bidding purposes. Loading, transportation, unloading shall be to Contractor's account.

Grit & Screenings

The evacuated grit and screenings are to be disposed off from the site by the Contractor at landfill site identified by the Employer's representative from time to time

Wet cake

The contractor can sell wet cake generated from STP during O & M period at his own level. If it is not possible to sale then wet cake shall be disposed off at land fill site identified by the Employer's representative from time to time considering at least 10 KM from STP site (for bidding purpose)

5.0 Ancillary Structures

5.1 D.G. Room (area as per DG manufacturer's requirements)

5.2 Outdoor Transformer Yard

5.3Admin Bldg, MCC Room, Blower Room, Operator Room, SCADA Room, Laboratory

Sub-station/Transformer yard (outdoor), Master Control Rooms, Operator Room, D.G. Room/Yard, SCADA Room and Laboratory shall be constructed at suitable location. The buildings shall be designed as per requirement.

The building shall have RCC frame work of minimum not less than M25 consisting of RCC columns, RCC roof and beams with brick panels and foundation, suitably designed to take the load of the walls. Rolling shutters of adequate size shall be provided for the above rooms on the external walls. At the entrance of the transformer yard, M.S. gate shall be provided of adequate size.

The floor of the MCC rooms and D.G. room shall consist of 40 mm thick cement concrete laid over 1:2:4 including 15 mm thick ironed finish 150 mm thick 1:3:6 cement concrete. The floor of other rooms shall bewith 20mm thick mosaic laid over 150mm thick 1:4:8 cement concrete. The above floors shall be laid over well consolidate sand with rammed earth filling below floor. The walls shall be provided with 150 mm high skirting with 20 mm thick mosaic finish as per direction of the Engineer.

The brick walls of the buildings shall be plastered internally and externally with cement mortar 1:2:4 (1 cement : 2 coarse sand : 4 fine sand) and provided with oil bound distemper inside and water proof cement paint outside as approved by the Engineer. Ceiling shall be plastered with 1:4 cement mortar (1 cement and 4 fine sand) and three coats of white wash. All steel work in the doors/windows/ventilators, rolling shutters etc. shall be provided with a superior class paint/primer etc. approved by the Engineer to give a smooth finish.

The buildings shall be provided with plinth protection all around, 750 mm wide as specified. Necessary slopes shall be given in the plinth protection so as to drain away the rain water from the building. The roof shall be provided with water proofing as per DEPARTMENT specifications. A RCC stair case of required width shall be provided to access different floor levels.

The plinth level of the buildings shall be 600 mm above formation level. Suitable ramps shall also be provided wherever required as desired by the Engineer.

The offer shall include for internal electric wiring of the buildings with light/fan, Switch and regulator fittings.

The buildings shall be of sufficient size to accommodate all machineries / equipments and controls and an office for operation, toilet, store etc. The tenderer shall verify and provide the required size from the practical point of view and ease of operation.

5.4 Interconnecting Piping and Valves

All piping including valves, specials and other appurtenances, auxiliaries and accessories required as per process design and scope of work. All the piping, valves, specials shall be designed for peak flow.

In case of pumping mains thrust blocks with PCC/RCC shall be provided whenever required. In case of buried pipes warning tapes shall be provided of the appropriate colors.

5.5 Security Room

The security room at entry of road shall be provided. This shall be a ground floor construction with3m x 5m carpet area and be of RCC frame structure building with in filled rock faced stone masonry and shall be provided with glass panels on three sides and an air cooler. Necessary fans and lights shall be provided as directed by the Employer's representative. Toilet and bathroom shall be attached with security room. There shall be a working platform made of Granite stone.

5.6 Landscaping

Landscaping involves beautification of Sewage Treatment Plant site by cultivating plants, shrubs and trees of environmental value and suitably modifying the appearance of STP site. It shall add scenic value to the STP site to obtain maximum visual impact. Contractor has to develop proper landscaping in the STP site as per guidance from the Engineer in charge. Area for future expansion shall also be considered for landscaping.

5.7 Compound Wall and Retaining wall of STP site and its Main Gates

R.R Masonry Compound wall of not less than 2.4 m above the finished ground level, 34 cm thickness with suitable foundation, for covering the entire plot boundary around the proposed site.

5.8 Earth Filling Cutting and Dressing

Area shall have to be filled up, consolidated, levelled and nearly dressed upto required formation levels. In case earth is required over and above the surplus excavated for the same, the tenderer shall have to arrange good sheet earth from its own resources and provide for same in their offer. Filling of such earth in layers with proper consolidation as per specifications shall be done.

5.9 Walkway and Pathway/Footpath

All Elevated RCC walkway 1.2 m wide shall be of RCC with M-20 grade concrete. The floor of the walkway shall be finished smooth with 40 mm thick cement concrete. It shall be provided with one meter high GI pipe railing on both sides of the walkway with connecting platforms.

All pathway and footpath over ground connecting individual units to bituminous road shall be 1.2 m wide and be 100 mm thick cement concrete (1:3:6) finished with 40 m thick (including base mortar 1:4) checkered cement concrete tiles. The base concrete to be laid on 150 mm thick hard core with 40 mm down stone ballast and morrum rammed and consolidated properly as per direction of Engineer.

5.10 Roadway

Roads as per lay out shall be provided around all units as directed.

5.11 Parking Space

Adequate parking space should be provided .The area shall be paved as per WBM specification.

5.12 D. G. Set

D. G. Set shall be provided to cater for the power failures. Capacity of D.G. set shall be minimum 50% total connected electrical load (STP + RSPS)). D.G. Set will be placed in DG Room, to be provided in the STP premises.

6.0

Chapter 5

PART – 1.0 PUMPS FOR SEWAGE PUMPING

1.1-GENERAL DESIGN CONDITION SUBMERSIBLE NONCLOG PUMPS FOR SEWAGE PUMPING

The pumps shall be of non-clogging equipped to operate satisfactorily in UJJAIN for pumping sewage from sump well to STP. Lean Flow, Mean Flow to be managed. Accordingly, pump configuration with 100% standby should be provided.
MPS: For pumping of 92.5 MLD sewage from sump well to STP

The configuration of Pumps are as per BOQ.

The pump shall be submersible with the suction and delivery branches cast inline on the bottom half of the casing, the top half should be constructed to allow easy dismantling there by providing the facility of inspection and repair to the equipment without any difficulty. The rotating elements of pumps will be dynamically balanced and over stressing should not occur due to sudden failure of power & reverse rotation should not damage the pump.
The pump shall be so designed as to have a maximum flow capacity of not less than 110%

1.2 CODES AND STANDARDS

The designed performance requirement, material requirements, manufacturer, inspection and testing of the pumps shall generally comply with the requirements of all applicable Indian/British/American/DIN/ISO standard, in particular the following:

IS 5120 : Technical requirements – Ro to dynamic special purpose pumps
IS 5600 : Sewage and drainage pumps
IS 9137 : Code for acceptance for centrifugal, mixed flow and axial flow pumps

1.3 DESIGN AND CONSTRUCTION

a) Each pump shall be a mono unit, equipped with a motor on single shaft, with rating so selected as to have at least 15% margin over the maximum power required by the pump throughout its range of operation.
b) Motor shall be of submersible squirrel cage induction motor type, F class, Oil filled, suitable for 415 volts (+6%-15%) & 50Hzs (+/-3%).

1.4 PUMP CASING

a) Casing shall be so designed to allow free passage of specified maximum size of solid.
b) Casing shall be designed to withstand the maximum shut off pressure developed by the pump
c) The casings shall be cast, free from blow hole, sand holes, other detrimental defects. The casing shall be complete with suction and discharge connections.
d) For pumps adequate seal arrangement shall be made to keep leakage of liquid from casing to column assembly to minimum and adequate drain shall be provided in column assembly to permit escape of the leakage flow. The casing shall also include the bearing housing of the bottom pump shaft bearing.

1.5IMPELLER

a) The impeller shall be non-clog type, cast in one piece and specially designed to pass large solids or unscreened liquids. The clearance between stationary and moving parts should be such as to allow sustained performance without excessive maintenance.

1.6 PUMP SHAFT

a) Shaft size selected shall be such that critical speed is at least 20% away from the operating speed and the runway speed.
b) The shaft shall be ground and polished to final dimension and of ample size to withstand all stresses resulting from rotor weight, hydraulic loads and across the line starting.

1.7 BEARINGS

a) Adequate nos. of properly designed bearings shall be furnished. Bearing for fixed type sump pumps shall be oil lubricated and bearings shall be antifriction type.
b) Thrust bearing of adequate design shall be furnished for taking the entire pump thrust arising from all probable condition of continues operation throughout its "Range of operation" and also the shut off condition life of thrust bearing shall be 20,000 working hour minimum for the load corresponding to the duty point.

1.8 WEARING RING/ PLATE (As required)

a) Renewable wearing rings/ plates shall be provided either on impeller or on the casing or on both impeller and casing.

1.9 BOLTS NUTS AND WASHERS

All bolts, nuts and washers shall be of SS-304.

1.10 PRESSURE INDICATION DEVICE

Each installation shall be equipped with pressure gauges of good quality make to give indication of delivery pressure. The pump pressure gauges should be designed in such a way that the readings shall not be affected due to mechanical vibration. The connections sizes shall be 12mm and diameter size 150mm in addition to above each pump shall be fitted with electronic pressure transducer with electronic digital display type indicator in control panel to indicate the delivery pressure of the pump.

1.11 MATERIAL AND CONSTRUCTION

MATERIAL OF CONSTRUCTION OF PUMP SHALL BE SUCH AS TO RESIST EROSION & CORROSION. MATERIAL OF CONSTRUCTION OF VARIOUS COMPONENTS SHALL BE AS UNDER

Pump casing	:	CI
Impellers	:	CI
Pump shaft	:	AISI -410
Nuts, Bolts & Washers	:	SS-304

1.12 INSPECTION AND TESTING

All the inspection, examination and testing shall be carried out in accordance with relevant IS/BIS/ISO and standard specification.

1.13LABORATORY TEST

Laboratory pump test shall be carried out as per IS: 9137, with latest amendment each pump to assess the pump discharge Vs head, Horse Power (hp) and efficiency figure. The pump casing shall be subjected to a pressure test of 1.5 times the working pressure at duty point

1.14 FIELD TEST

If need be the field test be carried out as per IS: 9137, with latest amendment these test may be witnessed by the Engineer-In-Charge or his authorized representative. If they desire the tolerance as specified in relevant IS code of practice shall not be quoted efficiency of pump during the testing.

1.15 GUARANTEES PERFORMANCE & TECHNICAL PARTICULARS

The contractor shall submit the details of guaranteed performance and technical particulars as required and the preliminary out line drawing indicating principal dimension and weight of pumping equipment and cross section drawing indicating the assembly of pumps & major parts thereof with materials of construction and special features, complete descriptive and illustrated literature on the equipment and accessories offered& proposed to be used before initiation of procurement and approval of QAP.

PART – 2.0 SPECIFICATION FOR 415 V INDUCTION MOTORS

2.1 TYPE

The motor shall be horizontal SOLID shaft squirrel cage type for clear water pumps suitable to operate on 415 V, 3 phase, 50 Hz. AC supply (with allowable variation of 10%) directly coupled with pumps. The rotations of clear water pumps shall be 1500 RPM. The motor rating generally conform to latest revision of IS 325-1996 and other relevant BS/IS/ISO.

2.2 VARIATION IN SUPPLY VOLTAGE

The motors shall be capable of delivering integrated output and rated power factor with following variations:

VOLTAGE	:	±10%
FREQUENCY	:	±5%
COMBINED	:	±10%
PHASE IN BALANCE	:	±5%

2.3 RATED CAPACITY

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

2.4 ACCELARATION CHARACTERISTICS

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

2.5 METHOD OF STARTING

The motors shall be designed for star/delta/soft/starting at full voltage with starting current not exceeding 2 times the rated full load current. The motor shall also be designed for a minimum pull out torque of 200%.

2.6 NUMBER OF START

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

2.7 CLASS OF INSULATION

The motor winding shall be provided with insulation conforming to thermal class F. The maximum temperature rise of the winding shall not exceed the limits specified for class 'B' insulation. The insulation shall be given tropical and fungicidal treatment for successful operation of motor in hot, humid tropical climate. It shall be of thermo-setting type and shall remain unaffected by heat. The coils shall be highly uniform with uniform insulation strength and uniform dielectric losses. The dielectric losses shall be low and the star delta measurement should not exceed 1% at 440V.

MAKE OF MOTOR CROMPTON, KEC, ABB AND SEIMENS ONLY.

2.8 MOTOR CONSTRUCTION

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

2.9 MOTOR FRAME

Motor frame shall be of rigid cast steel. They shall be suitably annealed to eliminate up any residual stresses introduced during process of fabrication and machining.

2.10 STATOR LAMINATIONS

Stator laminations shall be made of suitable grade sheet varnished on either side and shall be adequately designed to avoid over heating during the starting and running conditions stipulated above.

2.11 ROTOR

Rotor should be desisted dynamically balanced and having carbon steel shaft hydraulically fitted.

2.12 LOCKED ROTOR WITH STAND TIME

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

2.13 TYPE OF ENCLOSURE & DEGREE OF PROTECTIONS

The degree of protection provided by the enclosures of motor shall conform to IS : 4691(1985). The enclosure for the motors shall be Closed Air Circuit Air Cooled (CUIDSSMT) type, having of protection I.P. 55.

2.14 SHAFT INSULATION

Suitable insulation shall be provided on shaft bearing housing to prevent shaft current. The insulation provided shall be such that it shall retain its dialectical properties even after its handling for number of times during dismantling and reassembly.

2.15 BEARING ASSEMBLY

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

2.16 EARTHING

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

2.17 TERMINAL BOXES

Separate terminal boxes shall be provided for main-Terminals of the motors and for R.T.D. and for space heaters. The terminals box for main terminals of motor shall be segregated type suitable for 3 core. 440 V. Aluminum conductor PVC insulated armored cables. The terminal boxes shall be spacious, dust & house proof designed and properly insulated. Adequate clearance should be given between live motor terminals and covers.

2.18 TEMPERATURE DETECTORS

Motors shall be provided with embedded temperature detectors, two for each phase winding at the location where the high temperatures may be expected in the stator winding. The temperature detectors shall also be provided in bearing assembly for monitoring the bearing temperature. The temperature detectors shall be connected with digital temperature scanners with alarm and trip points in the control panel.

2.19 ANTI - CONDENSATION HEATERS

Motors shall be have space heaters suitable for 240 V. single phase 50 Hz. A.C. supply, space heaters shall have adequate capacity to maintain motor internal temperature above due point to prevent moisture condensation on insulation during shut down periods.

2.20 DIMENSIONS OF MOTORS

Motors shall be properly dimensioned to have greater stability and low vibration limits. Mounting dimensions should confirm to IS : 2254(1985).

2.21 COUPLING TO PUMPS

The motors shall be coupled to the pumps by means of polished steel shaft and flexible coupling. The size of line shaft and flexible coupling shall be calculated on the basis of maximum combined shear stress as per the relevant IS and shall not exceed 30% of the elastic limit in tension or 10% of ultimate tensile stress, shaft shall be designed taking into consideration that critical speed of the shaft which shall be higher than the operating or runaway speed.

2.22 DETAILS OF MOTORS TO BE FURNISHED

The successful TENDERER shall furnish, the details of efficiency, total losses and power at different loads etc. as required in the form of guaranteed performance and technical particulars of motors in before procurement and approval of QAP.

2.23 TESTING

All the motors shall be tested at the manufacturer's workshop in the presence of Engineer-in-charge of work or his authorized representative or a third party inspection directed by Employer.

PART-3.0 CABLING AND MOTOR CONTROL PANNEL

3.1 CABLE SEWAGE PUMP HOUSE

In case of sewerage pump house, the soft starter panel of each motor of sewage centrifugal pump shall be connected in L.T. panel in the pump house, through 300sqmm 3-1/2 core armored cable. Thus in all 2 Nos. of 300sqmm 3-1/2 core armored cable shall be laid in suitable duct and as per I.E.RULE and a loop of about 1m should be given in each cable.

3.2REACTOR TYPE MOTOR SOFTSTARTER [MOTOR CONTROL PANEL]

TECHNICAL SPECIFICATIONS:

TYPE OF SOFT STARTER	NEUTRAL/LINE REACTOR SOFT STARTER
PRINCIPAL	SRSS[SERIES REACTOR SOFT STARTER]
APPLICABLE STANDARD	IS 3914(1967) [MOTOR STARTER STANDARD GUIDELINE]
REACTOR	AIR CORE TYPE 100% COPPER WINDING
REACTOR CONNECTION	REACTOR TO BE IN SERIES ON LINE OF MOTORS
STARTING CURRENT LIMIT	2-3 TIMES OF FLSC IN STEPS [DEPENDING UPON LOAD TORQUE REQUIREMENT AND SETTABLE AT SITE]
HARMONIC	REACTORS USED IN SOFT STARTERS CIRCUITS OF AIR CORE SHOULD NOT DEVELOP HARMONIES IN THE CIRCUITS
DUTY CYCLE	6 NO EQUAL SPACED STARTS /PER HOUR
METHOD OF COOLING	AIR COOLED

SPECIFICATIONS FOR OTHER ITEMS SHOULD BE EQUIPPED WITH REQUIRED SWITCH GEAR PROTECTIONS AND INDICATIONS

3.3 PUMP WELL WATER LEVEL INDICATOR

One No. electrical water level indicator with alarming system shall be provided for the pump well near which the pump house of sewage has been constructed.

3.4 CIVIL WORK

3.4.1 Construction of covered cable trenches / cable tray from L.T. panel to panel board in pump house. The cable trenches should be covered with sand and type should be broken type connected to bridge with bolts etc. by suitable civil work and shall be covered with chequered plates of 7 mm (minimum) thickness.

3.4.2 Construction of all other allied civil works required for erection of pump and motor with all foundation, bolts, nuts and washers including all work pertaining to it.

PART – 4.0 NON RETURN VALVE

4.1 GENERAL

The non-return valves shall be single door type, free acting quick opening, giving rapid non-clam closure & with low head loss characteristics when in open position. The valves shall be provided with by passes and isolating valves conforming to relevant Indian Standard.

Specification ofthe valves shall generally conform to IS : 5312(1986) (Part-II)

4.2 MATERIALS OF CONSTRUCTION

Body, Cover, Door and Hinges	:	Cast steel construction
Hinge pins, Door pins & Door	:	12% Chromium steel conforming to IS:1570
Suspension pins		
Bearing Bushes	:	Leaded Gun Metal Gr. 2, Conforming to IS: 318
Body rings and door faces	:	Leaded Gun Metal Gr.2, conforming to IS: 318

4.3 TESTING

The valves shall be subjected to closed ends tests as per relevant IS standard. Test certificate in triplicate shall be furnished. If necessary, test shall be witnessed by the Engineer's representative.

WORKING PRESSURE	:	20 KG/SQ.CM.
TEST PRESSURE BODY	:	40 KG/SQ.CM.
SEATING	:	20 KG/SQ.CM.

PART – 5.0 DELIVERY PIPES

5.1 GENERAL

The scope of the work is providing, laying & jointing of all delivery pipes, specials valves of all the pump and their connection to the common manifold as shown in drawing inclusive of the jointing of the manifolds to the respective conveyance mains.

5.1.1 The contractor shall design and fabricate the common manifold which would be made out of 6mm thick MS plates conforming to IS : 2026(2011)in such a way that it gives minimum frictional loss of head to the flow of water and also avoid cavitations or vortices in the manifold. The manifolds should be in line and coated with suitable material to protect it from corrosion in case of sewage.

5.1.2 The contractor shall provide an expansion joint of his own design duly approved by the Engineer-in-charge.

5.1.3 Flanged joints shall be adopted for valves and butt welding joints or flanged joints in jointing of delivery pipe with dismantling joints.

5.1.4 Concrete saddles for valves and thrust blocks shall be provided by the contractor as per the design and drawings to be furnished by the contractor and subsequently approved by Engineer-in-charge.

5.2 MATERIAL OF CONSTRUCTION

All the pipes of works shall be fabricated out of steel plates conforming to IS:2026-2011. The fabrication of pipes shall generally conform to IS: 3589-2001.

5.3 TESTING

The pipes and common manifold shall be hydraulically tested to a pressure of 2 times the working pressure. Test certificate to that effect shall be furnished by the contractor.

The Engineer-in-charge witness the above test if so desired, the contractor shall arrange for such test in presence of Engineer-in-charge.

PART –6.0 RATING AND NAME PLATES

6.1 RATING PLATE

Each main and auxiliary item of plate shall have permanently attached to it a rating plates in a conspicuous position. This shall be a non-corrodible material preferably chromium plates steel. The inscription shall be engraved in black on the plate.

6.2 NAME PLATE

6.2.1 Each item of plant shall be provided with a name plate or label designating the service of the particular equipment. The shape and size of the plate and inscription shall be approved by the Engineer-in-charge.

6.2.2 Such name plate shall be non-corrodible material preferably chromium plated steel having engraved black lettering.

6.2.3 In case of indoor equipment like circuit breakers, starters etc. the plate shall be of transparent plastic material with black lettering engraved on the back.

6.2.4 The name plate shall be screwed to the body of the equipment.

Chapter 6

DETAILED TECHNICAL SPECIFICATION FOR SUITABLE ELECTRIC SUB STATION (for each STP)

1.0 LOCATION OF WORK:-

Providing, supplying, erection and commissioning of Transformer of 100 KVA, or suitable rating to be installed in an electric sub-station of 33KV/0.44 KV located at STP.

2.0 SCOPE OF WORK

The Scope of works includes design, supply erection construction commissioning and testing of 100 KVA, electric substation (as per I.E. rules and specification) which mainly includes supply of transformer, outdoor, substation structure, cables, other electrical equipment, accessories, and other allied required civil work etc. complete.

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

2.1 SUB STATION STRUCTURE AND ASESSORIES. :-

33/0.44KV outdoor substation comprising of 2 pole substation structure made of Double M.S. Girders & channels of adequate section (not less than ISHC 200x10 and ISMB 100x50) and length, with provision of 33 KV lightening arrester, A.B. switch, D.I. set, disc and post insulators with hardware substation premises as per I.e. rules. Structure shall be complete with necessary painting of primary red oxide and finished with two coat of aluminium paint.

2.2 TRANSFORMER

One number transformer each of rating 100 KVA, at STPs,

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

2.4 CIVIL WORK:

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

2.5 FENCING FOR 33 KV SUBSTATION YARD.

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

2.6 LIGHTING:-

Substation yard lighting provision in panel.

2.7 SUPPLY OF SAFETY DEVICES:-

Supply of safety devices like rubber mating, hand gloves, first Aid box, danger boards, first Aid, charts, 0.5 Kg. Capacity Co_2 type fire extinguishers and sand buckets etc. complete required as per specification and I.E. rules One set.

2.8 OPERATION OF SUB STATION:

The contract include as Operation and Maintenance (O&M) of the contract includes substation after commissioning and training to departmental staff for 7days complete job.

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

2.10 PANEL INSTLATIONS;

Panel is to be installed in substation or at place specified by the Employer/Engineer-in-Charge.

3.0 IMPORTANT CONDITIONS:-

3.1 The BIDDER shall submit the brand names, & efficiencies at various at various points and design calculation for each and every equipment so as to assess and decide suitable offer.

3.2 A licensed class A electrical contractor authorized under I.E. Rules shall only carry out the work.

3.3 The Successful BIDDER on award of contract shall have to prepare and submit the detailed drawing of the work duly approved by the Chief Electrical Inspector and Electrical Adviser, Govt. of M.P. After completion of work the representative of the Chief Electrical Inspector and Electrical Adviser shall inspect the same. The inspection fee shall be borne by the contractor and electrical substation shall be charged only after approval and permission of the competent authority as per I.E. Rules.

3.4 Supply and inspection of all the equipment shall be as per relevant BIS/IS/ISO Specification and latest I.E. Rules.

3.5 Make, Materials, Technical specification, Circuit diagrams and connection details of each and every equipment and its major parts offered should be as specified in the TENDER.

3.6 Test certificates guarantee, certificate and operation manual shall be submitted along with the supply of equipment.

3.7 After commissioning of all the equipment successful trial will have to be given for at least 72 Hours.

3.8 Maintenance and training of department staff:-

After installation, commission and official testing of electric substation and other equipment satisfactorily, the contractor shall have to run and maintain and electric substation to the complete satisfaction of the Engineer in charge for a period of at least 7 days round the clock through his experienced and competent staff under supervision of his experienced and qualified engineer.

3.9 Any work equipment not specified in particular but considered necessary to complete the works as per specification and I.E. Rules are also included in this TENDER.

4.0 DESIGN DATA:-

4.1 All the equipment shall be designed for operation in tropical humid climate subject to heavy rainfall and frequent thunderstorms with ambient air temperature of 50 deg. ^{0}c (max)

4.2 The single line diagram of proposed 33 KV/0.44 KV substation, main electric panel board, bus bar is shown in separate drawing which can be seen in the office. The proposed site plan showing the relative location of substation with respect to pump house are shown in separate drawing, which can be seen in office. The above drawing is only for the guidance of the BIDDER.

4.3 The rating and specification of transformers and other electrical equipment shown in the drawing and specification are indicative only The BIDDER shall check-up the rating of the equipment and satisfy thoroughly regarding their adequacy.

4.4 All the materials used in this work must be strictly in accordance with the relevant BIS/IS/ISO specification and I.E. rulers.

4.5 On completion of work, the contractor shall submit the completion drawing. Circuit diagram and detailed electrical mechanical drawing of the equipment and the maintenance manuals in form as desired by the Engineer-In-Charge.

5.0 DETAILED TECHNICAL SPECIFICATION:

5.1 TRANSFORMER:-

(a) 100 KVA,33/ 0.44 KV,3 phase, 50 Hz Oil immersed, Natural selfcooled type Onan, core type with class "A" insulation, double wound with off load tape changer outdoor distribution transformer with accessories designed and manufactured with particular reference to tropical condition conforming to IS 1026: 1981 as per IE rules and as per detailed specification.

Rating	100 KVA, OR OF SUITABLE RATING
No load voltage ratio	(HV/LV 33 KVA/0.44 KV
Winding materials	Copper
No of phases	Three
Vector	Dy 11
Connection On (HV/LV)	Delta Star
Frequency	50 Hz
Installation	Outdoor
Type of cooling	Onan
Temperature rise in oil by thermometer	45 Deg. C
In winding of resistance	55 Deg. C
Terminal Arrangement	
*(a) Primary	Bare
(b) Secondary	Weather proof bare bushing
Type of tap changer	Off load top changer
Tapes step on HV	+5% - 5% in steps of 2.50%
Fitting and accessories	shall be provided as per IS 2026: 1981

5. 2 CONSTRUCTION:

5.2.1 CORE:-

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

5.2.2 WINDING:-

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

5.2.3 TANK:-

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

5.2.4 FITTING AND ACCESSORIES:-

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

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

5.2.5 PAINTING:-

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

5.2.6 DRAWING:-

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

i. Indicating lamps for breaker ON/OFF Spring charge trip circuit healthy.
ii. Alarm Bell for S/C and E/F indication.
iii. Push button for test /reset/acknowledge.

6.0 PANEL BOARD

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

1 Nos. of incoming ACB OF suitable rating make L&T Siemens, Alstom C&S and Schneider

1Nos. SFU OF suitable rating

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

7.0 CABLES:-

Power cable of PVC, aluminum armored cable of size 3x400mm with require lugs gland. Total to be considered for lump sum offer is 20 meter each from transformer to panel.

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

Unit's rates of cable to be quoted for any addition as required at time of execution.

8.0 SUB STATION STRUCTURE ADN ACCESSORIES.

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

8.2 SUB STATION STRUCTURE:-

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

8.3 33 KV LIGHTNING ARRESTERS:

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

8.4 AIR BREAK SWITCHES:-

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

8.5 DROP OUT FUSES:-

Drop out fuses 33 KV outdoors drop out fuse cut out of expulsion type compete with insulators mounted on bas channels and suitable for cross arm mounting for a working current up to 400 amps. Complete with fuse holders, fuse elements and operating rod. All hardware pa5rts shall be hot dip galvanized each set comprise for 3 Mps single pole drops fuses. The drop out fuse set shall be for control of 500 KVA Transformer Primary One set.

8.6 POST PIN AND DISC INSULATORS:-

33KV disc insulator complete with hardware.

33 KV pin post complete with GI pin

8.7 ALUMINUM TUBULAR BUSBAR.-

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

8.8 PAINTING

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

9.0 SHIFTING OF TRANSFORMER

There is no work of shifting of old transformer.

10.0 CIVIL WORK

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

11.0 EARTING SYSTEM:-

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

11.1 EARTHING MATERIAL

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

Copper earthing strip 50x 5 mm as required

GI earthing plate of size 6.3 x 600x600mm

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

CI main hole cover for earthing pits.

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

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

12 FENCING FOR 33 KV SUBSTATION YARD

Industrial type fencing arrangement using 65 mm x 6mm angle iron post each of 3 meter height fixed as required at a spacing of 2 meter with 2 meter high GI chain link wire mesh

fencing of minimum opening of 75mm x 75mm 2 meter wide main gate with locking arrangement and etc complete as per IE rules complete job.

13 LIGHTING

Substation lighting provision in panel is to be done.

14 SUPPLY OF SPARES

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

15 Supply of essential tools

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

16 SUPPLY OF SAFETY DEVICES:

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

Chapter 7
Specification Road Work

The specification for road work shall be governed by "Specifications for Road and Bridge works, (5th Revision, 2013) Ministry of Road Transport and Highways, Govt. of India".

The Sections- 200,400,500 and 600 of specifications for Road and Bridge works, (5th Revision, 2013) Ministry of Road Transport and Highways, Govt. of India and relevant IRC codes shall also apply.

Chapter 8
Suggested Brands of Equipment

The equipment of following brand shall be required & accepted.

S. No.	Equipment	Acceptable makes
1.	Transformer	NGEF, Crompton, Alstom, Kirloskar,Voltemp, btcl, TESLA
2.	33 KV VCB	CROMPTON, ALSTHOM, ABB, JYOTI, SIEMENS, BHEL, NIEPE-BANGLORE
3.	AIR CIRCUIT BREAKER	L & T, SIEMENS, ABB, JYOTI, CROMPTON, C & S
4.	CTS PTS	CROMPTON, ALSTHOM, UNIVERSAL, JYOTI, C&S
5.	33 KV LIGHTING ARRESTER	IGE, OBLUM ALPRO, CROMPTON
6.	RELAYS	L & T, SIEMENS, ABB, JYOTI, C&S
7.	AIR BREAKS SWITCHES	SIL, WSL, KIRON TEXTILE
8.	POST AND DIS INSULATORS	SIL, WSI, KIRON TEXTILE, ATLAS JAIPURIA, JYOTI
9.	ALUMINUM TUBULAER BUSBAR	AS PER IE RULE AND AS PER RELATIVE STANDARD
10.	CABLES	FINOLEX UNIVERSAL HAVELLS NICCO CCI
11.	DROP OUT FUSES	SIL, WSI, KRON TEXTILE, ATLAS, JAIPURIA
12.	EARTHING MATERIAL	AS PER IE RULES AND AS PER RELATIVE STANDARD D
13.	SAFETY DEVICE	AS PER IE RULE AND AS PER RELATIVE STANDARD
14.	METERS	AE, MECO, Secure meters,Genius

The following manufacturers are recommended to be used for the proposed work. The Bidders may substitute alternative equivalent brand names with prior approval of Engineer in charge.

Item / Component	**Recommended makes**
VT and Centrifugal Pump	Kirloskar / Jyoti / Mather+Platt / WPIL/ Darling /Aqua
Pump motor	KEC/Kirloskar/ Jyoti / Crompton / ABB / Alstom / Siemens
Electro Magnetic Flow Meter	Krohne-Marshall / Yokogawa / Emerson- Rosemount.
Sluice Valve / Scour Valve/Butterfly	Kirloskar / IVC / VAG / IVI / MARCK/ FOURESS
Non-return / Check Valve	Kirloskar / IVC / VAG / IVI / MARCK
Kinetic Air Valve	Kirloskar / IVC / VAG / IVI / MARCK
Valve Actuator	Auma / Rotork / Limitork
Single faced Sluice Gate / Stop-log	Kirloskar / JASH / VAG
Flow & Pressure regulating Valve	Darling Muesco / VAG / Keystone
Electro-magnetic Flow meters – Battery operated	Emerson / Krohne Marshall / Yokogawa
Water Hammer Control	Sureseal or equivalent
D.I. pipe Specials & Fittings	Electrosteel / KISWOK / Jindal / Kejariwal
Electro-fusion & Compression fittings	Glynwed / Georg Fisher/Astore/Magnum
Power Transformers	ABB / Crompton / Emco / Siemens / Alstom
HT Switch Gear	Alstom / Jyoti / Crompton / Siemens
Vacuum Circuit Breaker (VCB)	Siemens / Schneider M.G. / Jyoti / L & T
Air Circuit Breaker (ACB)	Siemens / Schneider M.G. / Jyoti / L & T
Moulded Case Circuit Breaker MCCB	Siemens / Schneider M.G. / Jyoti / L & T
Soft starters	Siemens / Alstom / Jyoti / ABB
Relay and Contactors	Siemens / Alstom / Jyoti / ABB / L&T
Cables	Tropodur / Finolex / Asian / Gloster / Incab / Universal / Polycab
EOT crane	Hitech / Indef / Hiking / Ambika

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