

MUMBAI MUNICIPAL CORPORATION
CITY ENGINEER DEPARTMENT




Re- E-Tender For The Work Of
NAME OF WORK : 24 X 7 WATER SUPPLY SCHEME OF
BELAPUR WARD NAVI MUMBAI UNDER AMRUT 2.0
MISSION

Sr.No	Stage	Start Date & time	Expiry Date & Time
1	Release of Tender	02 / 06 /2023 12.00	03 / 07 /2023 15.00 p.m.
2	Tender Download & Bid Preparation	02 / 06 /2023 12.00 a.m.	03 / 07 /2023 15.00 p.m.
3	Technical Envelope 1 opening	03 / 07 /2023 (If possible) at 16.00 p.m.	
4	Financial Envelope 2 Opening	03 / 07 /2023 (If possible)	

Re- E-TENDER NOTICE NO: NMMC/CE/ 97 /2023-24
(Website: <https://nmmc.etenders.in>)

ADDRESS FOR COMMUNICATION

Navi Mumbai Municipal Corporation, City Engineer Department, 2nd Floor, Plot No 1 & 2,
Sector 15 A, CBD Belapur, Navi Mumbai, Maharashtra 400614, +91 22 27567070

	नवी मुंबई महानगरपालिका नमूमपा मुख्यालय, भु.क्र.१, किल्ले गावठाणजवळ, पामबीच जंक्शन, सेक्टर -१५ए, सी.बी.डी., बेलापूर, नवी मुंबई - ४०० ६१४ दुरध्वनी क्र. : २७५६ ७१३०	NAVI MUMBAI MUNICIPAL CORPORATION NMMC Headquarter, Plot No. 1, Near Kille Gaonthan, Plambeach Junction, Sector-15A, C.B.D., Belapur, Navi Mumbai - 400 614. TEL. No. : 2756 7130
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City Engineer Department
Re-E-tender Notice No: NMMC/CE/ 97 /2023-2024

Navi Mumbai Municipal Corporation hereby invites online tender from experienced and qualified contractors through E- tendering website <https://nmmc.maharashtra.etenders.in> for the below mention work.

Name of work	Type of tender	EMD (Rs)	Blank tender Fee (Rs)	Work period
24 X 7 Water supply scheme of Belapur ward Navi mumbai Under Amrut 2.0 Mission	B-1	Rs 59,18,158.00 /-	Rs 5900/-	18 Months (Excluding one Monsoon)

Blank Tender forms will be available on website <https://nmmc.etenders.in>

Details for online submission of e-Tender are as per the table given below,

Details for Online Submission

Release of e-Tender and Bid Preparation	From Date- 02 / 06 /2023 (Morning 12.00) to Date- 03 / 07 /2023 (Noon 15.00 pm)
Pre Bid Meeting Dt.	Date- / /2023 (Noon 15.00 pm) at the City Engineering Department Conference Hall, second floor, NMMC Head Office Building, CBD Belapur.Pre bid is mandatory for all bidders.
Submission of e-Tender	From Date- 02 / 06 /2023 (Noon 15.01 pm) to Date- 03 / 07 /2023 (Noon 15.00 pm)
Tender opening date	Date- 03 / 07 /2023 (Noon 15.00 pm (Noon 16.00 pm, if possible)

Bidder shall pay Tender form fee, Earnest Money Deposit and service charges through online payment gateway. The above mentioned charges shall be paid by Debit card of any bank, Credit card or through Net banking. Please note that the above mentioned fees will not be accepted directly at Account Department of NMMC.

Bids will be opened on date - 3 / 07 /2023 (Noon 16.00 pm, if possible). Bidders who have not paid tender fee, will not be considered. Navi Mumbai Municipal Corporation reserves the right to reject any or all tenders without assigning any reason thereof.

City Engineer
Navi Mumbai Municipal Corporation

Contractor

No. of correction

City Engineer

PRESS TENDER NOTICE

नवी मुंबई महानगरपालिका
फेर -ई-निविदा सुचना क्र./शअ / 97 /2023-24

केंद्र शासनाच्या अमृत २.० अभियाना अंतर्गत बेलापुर वार्ड नवी मुंबई करीता २४ x ७ पाणी पुरवठा योजना राबवणे, नवी मुंबई जि.ठाणे या कामाची निविदा नवी मुंबई महानगरपालिका यांच्याकडून मागविण्यात येत आहे. कामाची अंदाजित किंमत रु 118,36,31,598.00 असून या कामासंबंधीच्या सविस्तर तपशील <https://nmmc.etenders.in> या वेबसाईटवर उपलब्ध आहे.

दिनांक :

सही/-
शहर अभियंता,
नवी मुंबई महानगरपालिका

**NAVI MUMBAI MUNICIPAL CORPORATION,
NAVI MUMBAI.**

Re-E-tender Notice No: NMMC/CE/ 97 /2023-2024

Navi Mumbai Municipal Corporation invites e-Tender for the work of 24 X 7 Water Supply Scheme Of Belapur Ward Navi Mumbai Under Under Amrut 2.0 Mission in the State of Maharashtra, valued at Rs. 118,36,31,598.00 Please visit website <https://nmmc.etenders.in> for detailed information.

Date:

Sd/-

CityEngineer

**NAVI MUMBAI MUNICIPAL
CORPORATION**

NAVI MUMBAI MUNICIPAL CORPORATION
CITY ENGINEER DEPARTMENT

Name of work : 24 X 7 WATER SUPPLY SCHEME OF BELAPUR WARD NAVI MUMBAI
 UNDER AMRUT 2.0 MISSION
Re-E-tender Notice No: NMMC/CE/ 97 /2023-2024

I N D E X

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DETAILED TENDER NOTICE

**NAVI MUMBAI MUNICIPAL CORPORATION
CITY ENGINEER
DEPARTMENT**

Re-E-tender Notice No: NMMC/CE/ 97 /2023-2024

Online percentage rate basis Tender in B-1 Form in two envelopes system are invited for the following works from the contractors registered with MJP in class I (civil) or registered in CIDCO/MIDC OR ANY GOVERNMENT DEPARTMENT IN INDIA in equivalent class of MJP, by the City Engineer Navi Mumbai Municipal Corporation, (on behalf of The Commissioner, Navi Mumbai Municipal Corporation) on the Government of Maharashtra e-Tendering Portal : <https://nmmc.etenders.in>

- a) **NAME OF WORK** : 24 X 7 WATER SUPPLY SCHEME OF BELAPUR WARD NAVI MUMBAI UNDER AMRUT 2.0 MISSION.
- b) **ESTIMATED TENDER COST**: Rs. 118,36,31,598.00/-
- c) **EARNEST MONEY DEPOSIT**: Rs. 59,18,158.00 /-(0.50% of the cost put to tender)
- d) **DOWNLOADING COST OF TENDER DOCUMENTS**:- Rs. 5,900 /- (Including GST) (Non-refundable).
- e) **CLASS OF CONTRACTOR** : Class-I (Civil)

1. EARNEST MONEY DEPOSIT/TENDER FEES :

EMD should be 0.50% of Estimated amount Payable through online payment gateway by Debit/Credit Card/RTGS/NEFT/DD/FDR of any Bank or by Net Banking from bidders/ Agencies bank account only, in favour of Navi Mumbai Municipal Corporation. Online receipt for the same should be uploaded with the technical documents. **Fixed EMD is not Considered for any Tender.**

The online payment procedure can be seen on <https://nmmc.etenders.in> →
Announcement → online payment procedure.

Online payment requires 48 hours in Bank working days for clearance and hence, payment should have been made accordingly.

The EMD will be retained in the pooling account and will be refunded to the unqualified / unsuccessful bidders after award of tender to the successful lowest bidder.

The EMD of successful bidder will be ultimately refunded or will be adjusted against the security deposit after selection of the successful bidder at the time of execution of the contract. In case, the Commissioner decided to forfeit / adjust the EMD amount of the bidder, the EMD amount in such cases shall be credited to the bank account of the Corporation. The mandate for EMD refunds / forfeit / adjustment against security deposit shall trigger from e-tender application of NIC portal.”

NOTE - The bidder should make the payment well in advance so as to ensure that the payment reaches to Bank 4 (four) days before date and time for submission of tender.

2. SECURITY DEPOSIT

- 4% of the Estimated cost or Accepted Tender cost whichever is higher
- **Initial Security Deposit.**

2% of estimated cost or accepted tender cost whichever is higher in the form of Fixed Receipt OR Bank Guarantee from Nationalized / Scheduled Bank in the name of Commissioner, Navi Mumbai Municipal Corporation, Navi Mumbai for initial minimum period of 18 months (time limit) and shall be extended suitably if the work is not completed within the time limit.

- **Deductions through R.A. Bills.**

Balance 2% amount will be recovered through each running bill at 5% of the gross amount of R.A. Bill to the extent that total required security deposit is to be recovered.

2.1 Additional Security Deposit. (Performance security)

- If the tenderer has quoted the offer below than the estimated rates put to the tender, the tenderer shall have to submit Additional Security Deposit (ASD) (Performance security) in the form of bank guarantee of any nationalise or scheduled Bank in favour of the “Navi Mumbai Municipal Corporation, Navi Mumbai.”
- The tenderer shall submit the Bank Guarantee of Additional Security Deposit (ASD) within 8 days from opening of Financial Bid to the office of “Navi Mumbai Municipal Corporation”.
- If the first lowest (L-1) tenderer failed to submit the Additional Performance Security Deposit within eight days then his tender shall be liable for rejection and his EMD will be forfeited. In such case, if the second lowest (L-2) tenderer agree to

execute the work at less than the rates of first lowest tenderer, then his tender will be accepted. The 2nd lowest tenderer will have to submit the Additional Performance Security Deposit in form of Bank Guarantee / Demand Draft.

- The amount of the (ASD) Bank Guarantee shall be calculated by the tenderer in accordance with this following manner.
- If the tenderer has quoted below the estimated rates, the ASD (Performance security) shall be paid additionally as mentioned below.

Rate quoted to Estimated Rate	Additional Security Deposit (Performance security)
Below 0 % to below 1 %	1) NIL
Lower than below 1% to below 10%	2) 1 % of estimated cost put to tender
Lower than below 10% to below 15%.	3) 1% + (% rate quoted -10%) For example : If 15% below is quoted the amount of performance security (Additional Security Deposit) shall be 1+ (15-10) = 6% Performance Security of estimated cost put to tender. If the amount is less than Rs. 1000/-, then minimum to be Rs. 1000/-
Lower than 15 % below	4) % as per Sr. No. 3 + (% rate quoted -15%) x 2 For example : If 19% below is quoted the amount of performance security (Additional Security Deposit) shall be 6+(19-15)x2 = 6%+8% = 14% Performance Security of estimated cost put to tender. If the amount is less than Rs. 1000/-, then minimum to be Rs. 1000/-.

- The bank Guarantee shall be valid upto defect liability period of the tender. It should bear MICR and IFC code.
- In case it is found that documents / Bank Guarantees submitted by the tenderer are false or misleading his earnest money shall be suspended for the period of 1 year. Additionally legal action may be initiated against the tenderer .
- The work order shall be given to the concerned tenderer after the clearance of the Bank Guarantee submitted by him.

REFUND OF PERFORMANCE SECURITY

- The amount of the performance security in the form of Bank Guarantee shall be released after completion of defect liability period of the tender.
- Non submission of additional security deposit in the form of Bank Guarantee shall be liable to summary rejection of his tender.

The initial Security Deposit and additional security deposit may be in the form of Fixed deposit receipt OR Bank Guarantee by a Nationalized/Scheduled Bank in the name of “Commissioner/, Navi Mumbai Municipal Corporation, Navi Mumbai and shall be for a minimum period of 18 months (time limit) and shall be extended suitably if the work is not completed within the time limit. The tenderer shall have to furnish this security deposit with initial security deposit.

3. STAMP DUTY

The contractor shall bear the revenue stamp duty on total security deposit of the agreement and/or Additional Security Deposit (payable as per tender condition), as per the Indian Stamp Duty (1985) (latest revision) provision applicable during contract period.

4. TIME OF COMPLETION

18 (Eighteen) calendar months, Excluding one Monsoon. This will be counted from the date of issue of the work order.

5. Price variation clause as mentioned in tender is applicable.

6. DETAILED TENDER SCHEDULE

Sr. No.	Activities	Date & Time
1	Tender publishing date	02/06 /2023
2	Documents download start date	02/06 /2023 at 12
3	Documents download end date	03/07 /2023 at 15.00
4	Pre-bid meeting date	/ /2023 15.00
5	Bid submission start date	02/06 /2023 at 15.01 p.m.
6	Bid submission closing date	03/07 /2023 at 15.00 pm
7	Bid opening date (Technical Bid)	03/07/2023 at 16.00 pm
8	Bid opening date (Commercial Bid)	03/07 /2023 (if possible)

7. PRE QUALIFICATION CRITERIA

- The firm / contractor should registered with MJP in class I/MIDC/CIDCO OR ANY GOVERNMENT DEPARTMENT IN INDIA in class- I & above (Civil)(equivalent class of MJP). The validity of registration should be at least upto the last date for submission of tender, then only pre-qualification will be considered. It is necessary to renew the registration before issue of work order. Bidder need to submit online copy of registration.
- The agency shall submit previous three financial years tmaximum turnover. The turnover shall not be less than 75% of payable annual cost of work.
(Annual Cost of Work) = (Total Cost of Work)/(Work Period in year)
- Note: A certificate of Chartered Accountant (CA) as a proof of Turnover/value of work, value of work at current rate, bid capacity statement etc. Chartered Accountant should have its registration number allotted by ICAI.
- The agency shall have experience successful completion and commissioning of the works listed below with any Govt/Semi Govt./ corporation or equivalent organization. The experience of each work should be under single agreement.
- A] Three Similar Completed works costing Not less than the Amount Equal To 40% of the Estimated Cost. 0
- OR
- B] Two Similar Completed works costing Not less than the Amount Equal To 50% of the Estimated Cost.
- OR
- C] One Similar Completed work costing Not less than the Amount Equal To 80% of the Estimated Cost.

AND

Sr.No	Components in project	Minimum Experience required for
1.	Rising mains pipelines/ Distribution system /gravitymain (for single dia.)	250 mm Dia. DI/CI - 11814 mtr. in length
	Transmission mains pipe/gravity main lines	400 mm Dia. MS - 2203 mtr. in length
2	Elevated service reservoir	Total capacity of ESR 5.22 ML and one ESR of minimum 1.49 ML capacity Staging. Height.- 20 m (minimum)
3	Pumping Machinery	
		1) Total installed capacity = 540 HP
		2) Individual capacity = 60 HP
		Transformer

		1) Total Transformer installed capacity = 305 kVA
		2) Individual Transformer installed capacity = 125 kVA
4	MS Fabricated Bridge	a) Experience of 75 mtr of total length MS fabricated bridge for water supply pipeline works such as creek or river crossing. b) Experience of pile foundation of min. 800 mm dia.
5	Microtunneling	Casing Diameter
		600 mm diameter
		Total Length of crossing
		131 mtr of total length
		Minimum Length of one crossing : 50 mtr
Note :- The above work of pipe line shall be inclusive of successful Hydraulic Testing.		
6	Automation/SCADA	Experience of successful installation and commissioning of automation and SCADA in minimum one water supply scheme with automation at head works, pumping machinery operations, WTP, and ESR operations which shall include Pressure Transmitter, Level Transmitter, PLC integration, Energy Monitoring System, PLC based control, monitoring and communication system with flow meters.

- The bidder shall submit online, required experience certificate. The certificate of experience shall have to be issued by the officer not below the rank of City Engineer/ Executive Engineer and counter signed by the City/Hydraulic/Superintending Engineer or equivalent officer or head of Govt/Semi Govt./, Corporation or councils. Except Automation work, the certificate issued by Private Individuals/ Private Organization will not be considered.
- Joint venture and collaboration agreement shall not be accepted for any type of work. experience as a sub-contractor shall not be accepted.
- In case LT installation The certificate of experience shall have to be issued by the officer not below the rank of Executive Engineer/ City Engineer or equivalent officer or Head of Govt/Semi Govt./, Corporation.
- The firm shall have valid GST registration No.
- The firm shall have valid PAN No.
- Tenderer / Bidder should submit Affidavit on Rs. 500/- Stamp Paper in the prescribed format attached herewith regarding the false documents submitted in the tender as per the GR No. सीएटी/2018/प्र.क्र.127/इमा-2, दि.28/11/2018. If bidder fails to submit the said Undertaking in technical documents his bid will be rejected

All the documents pertaining to pre-qualification criteria shall be submitted separately online in Envelop No.1 (Technical Bid)

BID CAPACITY (For the tender costing above Rs.5 cr)

The bidder shall have a bid capacity more than the value of this bid. Bidding capacity of contractor for completion of work will be decided by following formula.

$$\text{BIDDING CAPACITY} = (2 \times N \times A) - B$$

Where ..

A =	<p>Average of engineering works of maximum value executed by the contractor in any three years of last five years, upgraded to the present year (i.e. tender accepted year) by the formula given below</p> $1 + \frac{(\text{WPI Present} - \text{WPI Max Value years})}{\text{engineering WPI Max. value years}} \times \text{Maximum value of works executed in a year}$ <p>WPI Present :- Wholesale price index of the month and year in which tender is invited.</p> <p>WPI Max. value years :- Average wholesale price index of the year in which the max. value of engineering works executed</p>
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N = Number of years prescribed for completion of the work for which present bids are invited.

B = Value of existing commitment & ongoing works to be completed during the period of completion of the work (i.e. work in hand)

ठेकेदाराने Self Declaration सदर करणे आवश्यक राहिल. (Annexure XV)

Bid capacity calculation ठेकेदाराने सादर करताना

- प्रगतीप्रथावरील तसेच ठेकेदाराने नुनतम देकार भरलेल्या निविदा स्वीकृत झालेल्या तथापि कार्यादेश देणे बाकी निविदा इ. कामांची माहिती दर्शविणारा Annexure-A मधील सर्व विवरणपत्रांमध्ये किमान कार्यकारी अभियंता पेक्षा कमी नसलेल्या पदावरील अधिकाऱ्यांची स्वाक्षरी असणे आवश्यक आहे किंवा सनदी लेखपालामार्फत प्रमाणित करणे आवश्यक आहे. या सर्व विवरणपत्रांमध्ये ठेकेदारांची स्वाक्षरी अनिवार्य राहिल तसेच नगरपालिका/ महानगरपालिका इ. स्थानिक स्वराज्य संस्थांच्या कामाच्या बाबतीत संस्थेतील प्रशासकीय प्रमुखांची स्वाक्षरी असणे आवश्यक आहे किंवा सनदी लेखपाला मार्फत प्रमाणित करणे आवश्यक आहे. या सर्व विवरण पत्रांमध्ये ठेकेदारांची स्वाक्षरी अनिवार्य राहिल.
- वर्ष निहाय Turnover त्याच प्रमाणे Bid Capacity Calculation चार्टर्ड अकाउंटंटचे कडून तपासून घेवून CA आणि ठेकेदारांच्या स्वाक्षरीसह ठेकेदारांच्या

लेटर हेड वर असणे आवश्यक आहे.

3. Bid Capacity Calculations सोबत ठेकेदाराने द्यावयाच्या प्रगतीपथावरील कामे व त्याचप्रमाणे न्यूनतम देकार भरण्यात येऊन Letter of Indent प्राप्त झालेल्या कामांच्या बाबतीतील विवरण पत्राचा नमूना Annexure-XIV नुसार संलग्न केला आहे.

4. ठेकेदाराने त्यांच्याकडील प्रगतीपथावरील कामे व त्याच प्रमाणे न्यूनतम देकार भरण्यात आलेल्या निवेदांच्या बाबतीत Letter of Indent मिळालेल्या कामाचा समावेश करावा मात्र, निविदा प्रक्रियेत भाग घेवून, केवळ न्यूनतम देकार भरलेल्या कामांचा समावेश करण्यात येवू नये.

5. Contractor should submit Bid Capacity calculations with works in hand also lowest Bid and letter of indent in Annexure-XIV

6. Contractor should submit Statement of work in hand or incomplete work duly signed by not less than City Engineer, in case of municipal or municipal corporation statement should be signed by Hydraulic Engineer respectively.

7. Contractor should submit year wise turnover and Bid capacity calculation on his/her letterhead duly signed by Chartered accountant.

8. With Bid capacity calculation contractor should submit affidavit as per (Annexure-XIV).

9. Contractor should submit list of works in hand and list of tenders with lowest also letter of for which he is L1 (lowest 1) and also submit list of tenders for which letter of Indent or letter of acceptance issue to him.

10. Networth = PRE-QUALIFICATIONS CRITERIA (FINANTIAL)

- The networth is applicable to tenders costing more than 25 crores.
- The networth calculation should be certified by chartered accountants.
- The Bidder should have networth 8% of tender cost of continues 3 years from the financial year. In which he desires to take work.

11. The bidder shall disclose the litigation history in Technical Documents under the head “Details of Litigation History” along with all supporting documents.

If there is no Litigation History, the bidder shall specifically mention that there is “No Litigation History” against him as per the clause of Litigation History. If bidder fails to submit this, his bid will be technically rejected.

In case there is litigation History-Litigation History must cover - Any action of blacklisting, debarring, banning, suspension, deregistration and cheating with any Local self Government Authority, State Govt., Central Govt. or any authority under State or Central Govt. / Govt. Organization initiated against the company, firm, directors, partners or authorized signatory shall be disclosed for last 5 years from the date of submission of bid. Also, bidder must disclose the litigation history for last 5 years from the date of submission of bid about any action like show cause issued, blacklisting, debarring, banning, suspension, deregistration and cheating with any Local self Government Authority & Any Local self Government Authority is party in the litigation against the company, firm, directors, partners or authorized signatory for carrying out any work for any Local self Government Authority and the orders passed by the competent authority or by any Court where any Local self Government Authority is a party.

While taking decision on litigation history, Hon. Municipal Commissioner, City Engineer, as may be the case, should consider the details submitted by bidder and take decision based on the gravity of the litigation and also the details submitted by the bidder and take decision based on the gravity of the litigation and the adverse effect of the act of company, firm, directors, partners or authorized signatory on any Local self Government Authority works which can spoil the quantity, output, delivery of any goods or any work execution and within the time frame.

In case of Litigation History If bidder fails to submit the litigation history his bid will be technically rejected.

8. COST OF BLANK TENDER FORM

- Rs. 5,900/- per set (including GST).
- Blank Tender documents will not be sold by this office. Interested contractors have to download tender documents from the website.
- Cost of blank tender form shall not be accepted in the form of cash or cheque. The cost of the tender documents will not be refunded under any circumstances.

9. ISSUE OF BLANK TENDER FORM

The blank tender forms will have to be downloaded, from the website <https://nmmc.etenders.in> as per online schedule.

10. PRE-TENDER CONFERENCE

Pre-Tender conference is open to all prospective tenderers and will be held on **12/04/2023** at 15.00 hours in the office of the City Engineer, Navi Mumbai Municipal Corporation, Navi Mumbai wherein the prospective tenderers will have opportunity to obtain clarifications regarding the work and the tender conditions. The bidders shall note that in order to understand the project the prospective bidders prebid attendance is mandatory.

The prospective tenderers are free to ask for any additional information or clarification either in writing or orally and the reply to the same will be given in writing and this clarification referred to as common set of conditions, shall also be common and applicable to all tenderers. The minutes of this meeting along with the letters of tenderers will form the part and parcel of the tender documents. Bidder need to submit online signed copy of pre bid minutes in a technical bid.

11. VALIDITY OF THE OFFER

120 days from the date opening of tender.

12. LAST DATE & TIME OF ONLINE SUBMISSION OF TENDER FORM

17/05/2023 up to 15:00 Hrs.

13. DATE & TIME OF ONLINE OPENING OF TENDER

17/05/2023 at **17:00 (if possible)** in the office of City engineer, Navi Mumbai Municipal Corporation, Navi Mumbai.

14. SUBMISSION OF TENDER

Bids must be accompanied with:

- a) Copy of online payment receipt of Tender documents .
- b) Copy of online payment receipt of EMD
- c) Scanned copy of all documents, certificates specified in Pre-qualification Criteria in Point No.6.

- d) Scanned copy of duly signed declaration of contractor in prescribed format filled in agency's letterhead attached with the tender.
(Annexure-A)
- e) Scanned copy of minutes of Pre-bid meeting duly signed by Contractor.

Bid shall be treated as invalid if scanned copies as mentioned above are not submitted online along with the bid.

The guidelines, "to download the tender document and online submission of bids procedure of tender opening" can be downloaded from website "<https://nmmc.etenders.in>".

- 14.1 The two envelopes No. 1 & 2 shall be digitally sealed and signed and submitted online as per the online tender schedule.
- 14.2 The date and time for online submission of envelopes shall strictly apply in all cases. The tenderers should ensure that their tender is prepared online before the expiry of the scheduled date and time and then submitted online before the expiry of the scheduled date and time. Offers not submitted online will not be entertained.
- 14.3 If for any reason, any interested bidder fails to complete any of online stages during the complete tender cycle, department shall not be responsible and any grievance regarding that shall not be entertained.

15. OPENING OF TENDER

The tenders will be opened on the date specified in the tender notice or on the date intimated to prospective bidders, in the presence of the intending bidders or their authorized representative to whom they may choose to remain present along with the copy of the original documents submitted for Pre Qualification. Following procedure will be adopted for opening of the tender.

Envelope No. 1 (Technical Bid)

First of all, Envelope No. 1 of the tenderer will be opened online through e-Tendering procedure to verify its contents as per requirements. Scanned copies of following documents shall be in Envelope No. 1.

- a) Copy of online payment receipt of Tender documents .
- b) Copy of online payment receipt of EMD
- c) Scanned copy of all documents, certificates specified in Pre-qualification Criteria in Point No.6.
- d) Scanned copy of duly signed declaration of contractor in prescribed format filled in agency's letter head attached with the tender.
(Annexure-A)

e) Scanned copy of minutes of Pre-bid meeting duly signed by Contractor.

If the various documents contained in this Envelope do not meet the requirements as stated above, a note will be recorded accordingly by the tender opening authority and the envelope No. II of such tenderers will not be considered for further action and the same will be rejected. Also tender will be liable for rejection if bidder mention his commercial offer anywhere in envelop No.1

Envelope No. II (Commercial Bid)

This envelope shall be opened online through e-Tendering procedure after opening of envelope No. 1 only, if the contents of Envelope No. 1 are found to be acceptable to the Corporation. The tendered rate shall then be read out by the tender opening authority.

16. RIGHT RESERVED

Right to reject any or all tenders without assigning any reason thereof is reserved by the competent authority, whose decision will be final and legally binding on all the tenderer.

Tender with stipulations for settlement of a dispute by reference to Arbitration will not be entertained.

Signature of Tenderer No. of Corrections Signature Executive Engineer Signature Add. City Engineer Signature City Engineer

Contractor

No. of correction

City Engineer

GENERAL CONDITIONS OF CONTRACT

**NAVI MUMBAI MUNICIPAL CORPORATION, NAVI MUMBAI
WATER SUPPLY DEPARTMENT**

**Name of work : 24 X 7 WATER SUPPLY SCHEME OF BELAPUR WARD NAVI MUMBAI
UNDER AMRUT 2.0 MISSION.**

GENERAL CONDITIONS OF CONTRACT

1. DEFINITIONS

1.1 In the contract, the following terms shall be interpreted as indicated.

- a) "UDD" means Urban development department
- b) "AMRUT" means Atal mission for rejuvenation and urban transformation
- c) "The Contract" means the agreement entered into between the owner and the contractor as recorded in the contract form signed by the parties, includes all attachments and appendices there to and all documents incorporated by references therein. Contract is the deed of contract together with all its original accompaniments and those later incorporated in it by internal consent.
- d) "The Contract Price" means the price payable to the contractor under the contract for the full and proper performance of its contractual obligations.
- e) "The Goods" means all of the equipments, machinery and/or other materials which the contractor is required to supply to the owner under the contract.
- f) "Services" means services ancillary to the contract such as transportation and insurance and any other incidental services, such as Provision of Technical Assistance, Trial Runs, Commissioning, Training to staff and other such obligations of the contractor covered under the contract.
- g) "The Owner" means, the Commissioner Navi Mumbai Municipal Corporation, Navi Mumbai, the person, for the time being holding that Office and also his successors and shall include any Engineer authorized by him.
- h) The "Contractor" means successful tenderer, that is the tenderer, who's tender has been accepted and who has been authorized to proceed with the work.

- i) "M.C" meansMunicipal Corporation
 - j) "M. J. P." means, Maharashtra Jeevan Pradhikaran.
 - k) "The Executive Engineer NMMC. " shall mean Executive Engineer NMMC., the person, for the time being holding that Office and also his successors and shall include any Engineer authorized by him.
 - l) "The Commissioner, Navi Mumbai Municipal Corporation, Navi Mumbai means the Engineer, so designated by the Navi Mumbai Municipal Corporation, Navi Mumbai or any other Engineer who is for the time being entrusted with his functions, duties and powers and so notified.
 - m) "Tender" means the proposal of the contractor submitted in prescribed form setting-forth the prices for the goods to be supplied and other related services to be rendered and setting forth his acceptance of the terms and obligations of the conditions of contract and specifications.
 - n) "Contract Time" means period specified in the document for the entire execution of contracted works and other services to be rendered commencing from the date of notification of award including monsoon period.
 - o) "Month" means calendar month.
 - p) "Site" means location at which the contractor will have to execute the
 - q) "The Engineer or Engineer-in-charge" shall mean the City Engineer /DE Engineer authorized by the Municipal Corporation .
 - r) PMC means Project Management consultant appointed by the Navi Mumbai Municipal Corporation.
2. All the water retaining structures shall be designed in M25 and constructed in M30.
 3. Contractor shall take trial pits and trial bores at site at his own cost to ascertain the bearing capacity of the strata and accordingly submit the designs.
 4. Contractor shall submit designs and drawings for all structures such as Pump House, (Hydraulic and structural), Sump, ESR, GSR, Thrust blocks/anchor blocks, Pumping machinery and its layout, all allied electrical and mechanical equipments as directed by City Engineer. This designs and drawings shall be got checked from IIT at contractors own cost.
 5. The contractor shall maintain the record of these materials in the prescribed proforma and registers as directed by the City Engineer. The sample of prescribed proforma is attached herewith. These registers shall be signed by both contractors and representative of Engineer-in-Charge. These registers shall be made available for inspection, verification for the department as and when required. These registers shall be in the custody of department and shall be maintained by the department.

6. Contractor shall take photographs and videos of all sub-works during construction and submit two copies in hard and soft along with final bill.
7. Contractor shall prepare record drawings of all sub-works as per execution in details by using Auto Cad programme; as directed by the City Engineer. He should submit 3 Nos. C.D. (R.W) along with three hard copies during the submission of final bill. Final bill will not be passed unless and until this is submitted. No extra payment will be made for submission of CDs.
8. Contractor shall maintain register for dewatering having details such as BHP of pumps, start and stop of dewatering pumps, Fuel consumed etc.
9. The material i.e. cement, steel, sand, metal, bricks, alum pipes valves etc. brought on the work site shall be accompanied with the necessary company/manufacturing firm's test certificate. In addition these materials shall be tested as per frequency prescribed by the department and the cost of such testing shall be borne by the contractor. If the test results are satisfactory, then and then only the material shall be allowed to be used on the work. If the test results are not as per standards, these materials shall be immediately removed from the work site at contractor's cost. In case of cement, if so requested by the contractor in writing, material will be allowed to be used before receipt of test results but this will be entirely at the risk and cost of the contractor.
10. All the formwork used for construction shall be of steel or with lining of steel. Wooden shutters may be allowed at the discretion of the City Engineer for minor works.
11. Contractor shall have Cube Testing machine on site. Test cubes shall be tested in front of City Engineer or his representative and a register for it shall also be maintained.
12. RCC designer appointed by the Contractor shall visit and inspect the work at various stages of construction and comply with the query of the department without any extra cost.
13. **SCOPE AND MEANING OF CONTRACT:**

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

The NMMC, an Government undertaking /urban local body of Government of Maharashtra, has proposed to execute the following work under sanctioned scheme “24X7 WATER SUPPLY SYSTEM FOR BELAPUR WARD NAVI MUMBAI UNDER AMRUT-2”

This tender includes-

Design & Construction of Working survey, Transmission Main,RCC GSR & Sump,Pump House, Installation of pumping machinery,Substation room, Pure water rising main,Dismantaling of ESR & GSR.Repairs of ESR & GSR, Construction of RCC ESR, Distribution networok system ,Road restoration,test & trial run.

14. IMPORT LICENSE AND FOREIGN EXCHANGE :

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

15. ACQUITTANCE WITH WORKS AND SITE CONDITIONS:

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

16. OBSTRUCTIONS IN THE WORK :

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

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

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

18. LABOUR CAMPS :

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

19. WORK THROUGH OTHER AGENCY IN THE SAME AREA :

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

20. SPECIFICATIONS

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

It is presumed that the Contractor has gone carefully through the standard specification (Vol. I & II, 1981 edition) and the Schedule of rate of the Division, and has also studied site conditions before arriving at rates quoted by him. The special provisions and detailed specification of wording of any item shall gain precedence over the corresponding contrary provisions (if

any) in the standard specification given without reproduction the details in contract. Decision of City Engineer/Engineer in charge shall be final in case of interpretation of specifications.

21. WATER AND ELECTRICITY

The contractor shall make his own arrangements at his own cost for water required for construction and hydraulic testing as well as for labour camp. The Navi Mumbai Municipal Corporation does not take any responsibility for supply of water to contractor for construction or testing purposes during the entire work. If water is supplied by Corporation, Contractor shall take connection at his cost and provide water meter on it. Water charges shall be paid by contractor as per prevailing water rates to Corporation regularly every month. Power supply from MSEDCL if required for construction of work as well as for labour camp will have to be arranged by the contractor at his cost. Electricity bill shall be paid by contractor as per Bill produced by MSEDCL regularly every month. NMMC does not take guarantee for continuous power supply at site.

22. LINE OUT

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

23. PROGRAMME AND PROGRESS SCHEDULE

The contractor shall furnish within 15 days from the date of work order a progress schedule indicating the date of starting, quarterly progress expected to be achieved and anticipated date of completion of each major item of the work. The schedule should be capable of achievement towards completion of whole work in the stipulated time.

- i. The Contractor shall submit his own programme as per time limit stipulated in the tender, in the form of Bar Chart which should give details of milestones of physical stages of each sub work. Simultaneously with the execution of the Contract Agreement, the Contractor shall submit to The Engineer his item-wise monthly programme, which shall be nothing but detailing of the programme,
- ii. The programme shall also state the milestones of part commissioning and part completion of the sub-work included in the tender. The programme shall also provide the information as to required approvals to drawings, samples, materials, equipments and their time of submissions to the Corporation. The progress shall be submitted by the Contractor visa-a-vis programme every month. The works team of the Contractor shall be so motivated to know the balance work at the

end of each week and the rate required in the balance period to complete the work and therefore, shall endeavor to complete the task assigned for each week timely. In case, where the updated and revised schedule is required, the same shall be submitted to the owner for approval.

If deviation exceeds 10% in scheduled programme, competent authority has right to reject the tender of successful tenderer.

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

24. CHECKING QUALITY OF THE WORK :

The Engineer in charge should consider it necessary to satisfy himself to the quality of work, the contractor shall at any time during continuance of the contract period produce sample of work done or if necessary pull down a responsible part of the work enough for such inspection and testing as the Engineer in charge may direct. The contractor shall make good the same at his cost and to the satisfaction of the Engineer in charge without extra cost.

25. CHANGES :

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

26. INSURANCE OF WORKERS :

The successful tenderer should get the labour insurance done, on account of risk involved within a month from the date of work order, failing which Rs. 2,00,000/- will be withheld from the R. A. bills of the work and it will not be refunded till labour insurance is done and a documentary evidence to this effect is produced by the contractor. The successful contractor tenderer should purchase insurance policy identifying the Commissioner therein.

27. ARBITRATION

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In case any dispute arises out during execution of works, no arbitrator shall be appointed for redressal of the dispute. In this regard, decision of the commissioner, NMMC shall be final and remain binding on both parties.

28. INTENT AND INTERPRETATION OF CONTRACT DOCUMENTS

- 28.1** The contract documents are complementary and what is called for by one is as binding as if called for by all. Any work that may be reasonably inferred from the drawings or specifications as being required to produce the intended result shall be provided by the contractor whether or not it is specifically called for, in Schedule- 'B'.w

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

28.2 Interpretations

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

28.3 Drawings

Figured dimensions on drawings shall govern over scaled dimensions and detailed drawings shall govern over general drawings. The Contractor shall submit six sets of drawings according to the design.

28.4 Signed Drawings

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

28.5 Technical Words

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

29. LANDS, CONDITION AND LAYOUT

29.1 Line out of the Work

29.2 Surveys and Measurements

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

29.3 Contractor's Verification

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

29.4 Site Office

The Contractor shall construct at his cost a semi-permanent nature site office with minimum of 20 Sq.m area and shall be provided with minimum two tables, two almaries, six Nos of chairs. The office and the furniture shall be provided and maintained by the contractor throughout the contract period at his cost. The use of the site offices shall be adequate size to accommodate the inspecting Engineers of NMMC/ any other inspection committee/agency appointed by the Government of India/Maharashtra/Collector/Municipal Administration to discuss and review progress of work. No extra payment will be made on this account.

The site office shall be provided at all the conspicuous structures to be		
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constructed/components to be executed.

30. SECURITY DEPOSIT AND INDEMNITY BOND

30.1 *Security Deposit*

The security deposit shall be returned to the contractor without any interest when the contractor ceases to be under any obligation under the contract. This shall be read with Clause No.1 and 20 of B-1 Form for Security Deposit and Defect Liability Clause respectively.

30.2 *Loss or Damage Indemnity Bond*

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

31. SUPERVISION AND SUPERINTENDENCE

31.1 SUPERVISORY STAFF :

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

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

31.2 Agent

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

32. CARE AND USE OF SITE

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

33. OVERLOADING

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

34. USE OF EXPLOSIVES

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

35. MANUFACTURER'S INSTRUCTIONS

The Contractor shall compare the requirements of the various manufacturer's instructions with requirements of the contract documents, shall promptly notify to the Engineer in writing of any difference between

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such requirements and shall not proceed with any of the works affected by such difference shall until an interpretation or clarification is issued pursuant to article.

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

36. PROTECTION

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

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

37. UTILITIES AND SUB-STRUCTURES

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

37.1 Restoration and Repair

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

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

38. WORKMEN

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

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

38.1 Work during Night or On Sundays and Holidays

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

38.2 Workmanship

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

39. MATERIALS AND EQUIPMENT

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

39.1 *Optional Materials*

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

40. USE OF APPROVED SUBSTITUTIONS OR EQUALS

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

41. LAWS AND REGULATIONS

42. Governing Law

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

43. Resolving the disputes:

In case of disputes, between a Contractor and NMMC, the decision of the Commissioner will be final and binding. In case of any further dispute, the decision of the Commissioner will be final

44. BURIED AND CONCEALED WORK

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

45. SAFETY PRECAUTIONS AND EMERGENCIES

Contractor's Responsibility for Safety

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

On the occurrence of an accident arising out of the works which result in death or which is so serious as to be likely to result in death, the contractor shall within one hour of such accident intimate in writing to the Engineer the facts stating clearly and with sufficient details the

circumstances of such accidents and subsequent action taken by him. All other accidents on the works involving injuries to the persons or property other than that of the contractor shall be promptly reported to the Engineer clearly and with sufficient details the facts of such accidents and the action taken by the contractor. In all cases, the contractor shall indemnify the Engineer against all losses or damages, resulting directly from the contractor's failure to report in the manner aforesaid.

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

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

46. WARNINGS AND BARRICADES

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

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

The Engineer shall have the authority to enforce compliance with the contract documents. On all questions relating to quantities, the acceptability of materials, equipment, or works, the adequacy of the performance of the work and the interpretation of the drawings and specifications, the decision of the Engineer shall be final and binding and shall be precedent to any payment under the contract agreement unless otherwise provided in the contract documents. The Engineer shall have the authority to stop the work or any part thereof as may be

necessary to ensure the proper execution of the work, disapprove or reject the works which is defective, to require the uncovering and inspection or testing of the works to require re-examination of the works, to issue interpretations and clarifications, to order changes or alterations in the works, and other authority as provided elsewhere in the contract documents.

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

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

48. DUTIES OF ENGINEER'S REPRESENTATIVE

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

Approval for or acceptance of any work or material or failure to disapprove any work or material by the representative of the Engineer shall not prejudice the power of the Engineer thereafter to disapprove such work of material and to order removal or modification thereof. If the contractor shall be dissatisfied with any decision of the representative of

the Engineer, he shall be entitled to refer the matter to the Engineer, who shall thereupon confirm, reserve or vary such decision only in genuine cases.

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

49. DEFECTS AND RECTIFICATION

For period specified in the Clause 20 of B.1 form for the defect liability period for the individual type of work from the date of issuance of the completion certificate in accordance with Condition "Final Inspection and Acceptance" mentioned herein after, contractor shall remain liable for any of the works or parts thereof or equipment and fittings supplied which in the opinion of the Engineer fail to comply with the requirements of the contract or are in any way unsatisfactory or defective except fair wear and tear. The process of the assembly commissioning of all sections of pipe lines, tested hydraulically in patches, will involve some additional measures such as shaft of suitable height, fixing of air valves at more number of places on the alignment and all such measures shall be done by the contractor.

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

if any, shall be disbursed. The Contractor shall submit the operation and maintenance manual for the fruitful operation of the works. The Contractor will have a liberty to visit the operating works during the defect liability period and satisfy himself about the on-going operations in case he do not visit and a defect is observed then the Engineer's opinion shall be final and binding as to the application of defect liability.

50. RIGHT TO WITHHOLD

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

51. FINAL INSPECTION AND ACCEPTANCE

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

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

52. CONTINUING OBLIGATION OF THE CONTRACTOR

The Contractor's obligation to perform and complete the work in accordance		
Contractor	No. of correction	City Engineer

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

53. TAXES TO BE DEDUCTED AT SOURCE

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

54. RECORDS AND MEASUREMENTS

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

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

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

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

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

Normally only excavation will not be measured. When the pipes and specials are laid in position, then only the excavation and other items will be measured.

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

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

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

55. WRITTEN NOTICE

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

56. USE OF COMPLETED PORTIONS

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

57. CLEANING UP

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

58. OWNER'S RIGHT TO CLEAN UP

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

59. FOSSILS ETC.

All fossils, coins, articles of value of antiquity and structures or other remains or things of geological or archaeological interest discovered on the site shall be deemed to be the property of the owner and the Contractor shall take reasonable precautions to prevent his workmen or any other person from removing or damaging any such article or thing and shall immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out at the expenses of the Engineer's order as to the disposal of the same.

60. LABOUR RULES

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

liable, for any pecuniary liability arising on account of any violation of the provisions of this act, by him.

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

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

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

61. STATUTORY INCREASE IN DUTIES, TAXES ETC.

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

62. INSPECTION, TESTING & FEES.

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

63. MACHINERY REQUIRED

All machinery required for erection/execution purposes such as cranes, trucks, etc. shall be arranged by the Contractor. Department shall not take any responsibility for providing such machinery even on rental basis. No

concreting shall be permitted unless centering and reinforcement is approved by the Engineer-in-Charge.

64. WORK ORDER BOOK

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

65. DISCREPANCIES AND OMISSIONS

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

66. PRICE VARIATION - AUTHORITY

Price variation is (As per Clause 59) applicable to this tender.

67. NO INTEREST ON DUES

No interest shall be payable by the Corporation on amounts, due to contractors pending final settlement of claim. Further, no interest shall be payable by Corporation on any amount/payment.

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

Secured Advance will be granted as per provisions made in MPW Manual and MPW Account Code.

69. **Mobilization Advance will not be granted.**
70. The tenderer is entitled to avail exemption from central excise tax, to all items of machinery, including instruments, apparatus and appliances, auxiliary equipment and their components/parts required for setting up a water treatment plants intended to treat water to make it fit for consumption of humans or animals. Central excise duty will also be exempted on pipes of sizes 100 mm and above required for obtaining untreated (raw) water from its source to the plant and for supplying the treated (potable drinking) water to the storage place from which it would be further supplied for consumption of humans or animals. The concession would be subject to the certification by the Collector/District Magistrate/Deputy Commissioner of the District in which the water treatment plant is to be set-up. To avail exemption on duty the tenderer himself shall pursue the matter with different Government Departments. Any co-operation in this regard will be extended to the tenderer. The tenderer shall quote his offer taking into account above exemption which he may available.
71. The Hydraulic & RCC designs of GSR, ESR, pumping stations and allied structures / units shall be got proof checked and approved from IIT Bombay for various components and hydraulic design of all distribution/rising main/Feeder mains etc.

SPECIAL CONDITIONS

**NAVI MUMBAI MUNICIPAL CORPORATION, NAVI MUMBAI
WATER SUPPLY DEPARTMENT**

**Name of work : 24X7 WATER SUPPLY SYSTEM FOR BELAPUR WARD NAVI
MUMBAI UNDER AMRUT 2.0 MISSION**

SPECIAL CONDITIONS

1) Payment against Excess quantities of various items.

Before making payment of excess quantities as per rules, the concerned City Engineer of Navi Mumbai Municipal Corporation, shall get himself satisfied regarding genuineness of the claim and he should also exercise a compulsory check of minimum 10 % of measurements for a particular item. Responsibility of informing the excess quantities as per Schedule „B' of the tender for approval of Competent authority of Corporation and also for correctness of claim to be submitted in future shall rest with Junior Engineer, a auditor and divisional Accountant also. While submitting the proposal for approval, concerned authorities should consider the exact position of the revised estimates, if necessary due to this excess.

For executing any quantity, the excess over the quantity specified in the tender, the contractor should be authorized by the City Engineer, NMMC in writing.

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

2) General

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

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

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

3) Outline of works

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

The item of work and their approximate quantities are given in schedule „B' of the tender. The quantities are approximate and are liable to vary on plus or minus side.

4) Unit

The rates quoted for each item are for units mentioned in Schedule „B' against each item.

5) Site conditions

1. It shall be presumed that the Contractor has satisfied himself as to the nature of the works, general and local conditions, particularly on those bearings on transport handling, storage of materials, availability of labour, weather conditions and has estimated the cost and quoted his rates accordingly City Engineer of Corporation will bear no responsibility for lack of such acquaintance with site conditions and consequences thereof.
2. Set of tender documents and conditions (up to a maximum of three sets) at the discretion of City Engineer of Corporation will be supplied to the contractor after acceptance of tender.

6) Extras, Omissions and Discrepancies.

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

7) Supply of material by the contractor.

- 7.1 The contractor should supply all the material mentioned in Schedule “B”. This shall be conforming to relevant IS & approved MJP/NMMC vendors. All types of pipes, valve and specials will be accepted only after due satisfactory inspection by Mechanical engineer of NMMC The charges for the same shall be borne by the contractor.
- 7.2 Other material such as cement, tor steel etc. shall be conforming to relevant ISS testing charges for cement, steel shall be borne by the contractor. Ultra Tech cement (Ultra tech) shall be preferably be used for water retaining structures.
- 7.3
 - 1) For supply of pipes, valves, specials etc. -70% payment shall be released after supply, 10% after lowering, laying & jointing, and 10 % after satisfactory hydraulic testing.
 - 2) 10% cost total subwork of pipeline work shall be retained till hydraulic testing is given as per IS code of as per tender condition.

- 7.4 The contractor shall provide, at the site of work, satisfactory storage for not less than one month's average consumption of works and shall keep the cement of storage and utilization of cement in the order of its arrival at the stores and the contractor shall maintain satisfactory records, which would at any time show the dates of receipt and proposed utilization of cement lying in the storage.
- 7.5 The City Engineer of Corporation shall at all the times have access to the stores and sites, method of storage, records and securities provided by the contractor. The contractor shall comply with instruction that will be given by City Engineer of Corporation, in this behalf.
- 7.6 The contractor shall further at all times satisfy the City Engineer of Corporation on demand any production of books, of submissions of returns in Performa as directed, other proofs, that, the cement supplied is being used for the purpose for which it is supplied and available to the City Engineer of Corporation.

7 TIME OF COMPLETION OF WORK:-

If at any stage of work, it is found that the execution of work is not as per the programme given in the Bar Chart, a fine shall be imposed on the contractor as mentioned in the agreement form.

9. APPOINTMENT OF ARBITRATOR:-

In case of any disputes raised between contractor and City Engineer/Engineer in charge during the course of contract regarding work, there shall be no provision for the appointment of an Arbitrator. The decision of the Commissioner of NMMC shall be held as valid and final. If the contractor files a case in appropriate court, the action of withdrawing the work and allotting it to any other agency shall be deemed to be continued as per the practice in vogue in the larger interest of implementation of work in time and as per original time schedule.

10. STRATA :

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

11. CHANGE IN SITE:

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

12. TOOLS AND PLANT:

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

13. EXCAVATED MATERIALS:

All excavated stuff shall be CORPORATIONS property and shall be disposed off at lead and lift by the Contractor in a manner as directed by the Engineer.

14. DAMAGES TO UNDER/ ABOVE GROUND UTILITY

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

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

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

15. Though the contractor is required to do refilling before hydraulic testing to avoid traffic hurdle, no payment for refilling of the trenches of pipe line shall be payable till satisfactory hydraulic testing is given. Re-excavation required if any during testing shall be done by contractor at his own cost.
16. The works of cross connections to existing lines are to be arranged in such a way as no major shutdowns are required to be taken and work should be completed within minimum period of time, without interrupting the major water supply in the area.
17. Activity in Bar chart and network diagram (CPM / PERT) shall be modified regularly in case any activity could not be done in time due to some extraordinary reason. The same modified Bar Chart/Network diagram should be

submitted for approval of Engineer-in-Charge or competent authority of Corporation.

18. Work shall be executed in stages as mentioned Government Resolution issued by the Urban Development department.

19. INCENTIVE BONUS

As an encouragement to the early completion of the project an incentive bonus will be payable to the contractor.

If contractor completes the work before scheduled time limit, he will be paid incentive bonus at the rate of 0.5% of the initial contract value or revised contract value whichever is less for every one month of early completion ahead of the original completion period or revised completion period whichever is less.

Maximum incentive payable shall not be more than 3% of the original value or revised value whichever is less.

This incentive scheme shall not apply if extension to the original completion period is required irrespective of on whose account (Owner or Contractor's account). Period less than a month will not reckoned for the incentive bonus calculations.

20. All the bills in RA bill format shall be submitted to the Navi Mumbai Municipal Corporation, by the contractor. The bills will be checked and scrutinized by consultant appointed by NMMC and will be submitted to the NMMC for Recording, Passing and Payment by the NMMC.
21. The bills will be normally cleared and payment will be released within a period of 30 days from the receipt of suchvetted bills
22. Extension of time limit will be granted by City Engineer/ Commissioner after obtaining approval/consent of competent authority of Municipal Corporation.
23. Presently comprehensive O&M contract for water supply distribution system in Belapur ward has been awarded to private contractor /operator by NMMC. The O & M agency is responsible for annul maintance of distrubution pipe line preventive & brakdown maintenance of pumping machinery, day to day operation of ESR & GSR for interrupted water supply in Belapur ward. Under the scope of this tender the existing GSR, ESR & pumping repairs/upgradation/demolition & construction of new ESR, GSR & pumping capital work along with nessesary automation system is to be carried out by the successful bidder. Therefore the works under this contract shall be carried out in coordination with the existing O&M contractor for Belapur ward so that the daily water supply is not affected for Belapur node.
24. After successful completion of 24 X 7 water supply Scheme in Belapur ward successful The Agency (successful Agency) shall be responsible for providing nessesary training & Technical support for 24 X 7 water

supply scheme to existing comprehensive contractor and existing Transmission main from WTP to Belapur Ward comprehensive contractor for initial period of one year after commissioning of the work. In addition to this entire Technical support from OEM and Agency shall be provided during defect liability period. The successful contractor shall be submitted necessary undertaking of Rs. 500 stamp paper from OEM for pumps, Electric motors, All types of Software's including SCADA system, Valves, Pressure Transmitters, Flow Meters after approval of manufacturer of equipment from NMMC and this shall be part of contract of this tender.

25. The successful bidder shall carry out the entire work as per the latest operational guidelines and SOP's for 24 X 7 water supply issued by Govt. Of India, CPHEEO and Govt. Of Maharashtra time to time.
26. The successful bidder shall carry out the work of design and drawing as per the directives of NMMC. Bidder shall install pressure gauges at critical locations in coordination with existing O & M contractor and the existing hydraulic model shall be calibrated for current pressures.
27. The successful bidder shall carry out consumer survey of all properties in Belapur Node of NMMC and shall submit the report to NMMC.

INSTRUCTIONS TO TENDERER

NAVI MUMBAI MUNICIPAL CORPORATION, NAVI MUMBAI
WATER SUPPLY DEPARTMENT

Name of work : 24X7 WATER SUPPLY SYSTEM FOR BELAPUR WARD NAVI MUMBAI
 UNDER AMRUT 2.0 MISSION

INSTRUCTIONS TO TENDERER

1. AWARD CRITERIA

The Owner will award the contract to the successful bidder whose bid has been determined to be substantially responsive and has been determined as the lowest evaluated bid, provided further that the Bidder is determined to be qualified to perform the contract satisfactorily. The tender will be awarded after bid evaluation report approved by the appropriate competent authority.

2. ACCEPTANCE OF THE TENDER

2.1 The acceptance of the tender rests with the appropriate competent authority. The right to reject any or all the tenders without assigning any reason thereof is reserved by appropriate competent authority. The tenderer whose tender is accepted will have to enter into regular agreement in the type and form prescribed in the tender and abides by all the rules embodied therein, cost of agreement etc. should also be borne by the tenderer.

2.2 No corrections, additions or alterations in the tender document shall be made. No special stipulations in the tender document shall be permitted.

2.3 The tender shall be liable to be rejected outright if while submitting the same.

i) The Tender is not submitted on E-tendering portal specified in the Tender Notice.

ii) The Tenderer proposes any conditions and alterations in the obligatory conditions of the tender.

iii) Any of the pages of the tender is removed/replaced or spoiled badly.

iv) If the offer in words and in figures is not filled in appropriate place of B.1 Form.

v) If the specified Earnest Money in specified form is not paid.

vi) Any erasures are made in the tender documents.

The tenderer or in case of firm or company authorized person does not sign the tender documents in the place provided for the purpose, in B.1 Tender form.

- 2.4 If the tendering contractors are a firm or company, they shall in their forwarding letter should mention the names of all the partners of the firm or the company as the case may be and the names of the partners who hold the power of attorney authorizing him to conduct transactions on behalf of the Company/Firm.
- 2.5 Rules and conditions of the contract are subject to amendment till the time of acceptance of tender.
- 2.6 The notes and conditions stipulated in this notice will form a part of the agreement.

3.0 **SIGNING OF CONTRACT**

At the same time as the Owner notifies the successful Bidder that the bid has been accepted, the Owner will send the Bidder an acceptance letter informing the Bidder, the further necessary line of action including signing of contract etc.

4.0 **FOR SPECIAL ATTENTION OF TENDERER**

The tenderer is expected to visit the site before quoting the tender and get himself acquainted with the site conditions and site requirements. The contracting firm shall study the site and general conditions in respect of approaches, labour, water supply, climate, quarries and the data included in the tender papers and get verified from the actual inspection of site etc. before submitting the tender. In case of any doubt about any item or data included in the tender or otherwise, it shall be got clarified by applying in writing to the tender inviting authority at least 3 days before the date of pre-tender conference. Once the tender is submitted, it shall be concluded with all the details required for completing the work as per tender conditions and specifications.

Responsibility of Departmental staff will be nominal and limited to extending all possible help in solving local problems for obtaining permission, obtaining power supply etc.

5.0 **LOCAL ROADS**

The existing public roads that are near the site of work are shown in Drawing accompanying the Tender documents. The contractor may construct and maintain additional roads as required at his own expenses.

6.0 **MEDICAL AND SANITARY ARRANGEMENT TO BE PROVIDED FOR LABOUR EMPLOYED IN THE CONSTRUCTION BY THE CONTRACTOR**

- a) The contractor shall provide an adequate supply of pure and wholesome water for the use of labourers on works and in camps.

- b) The contractor shall construct trenches, semi permanent latrines for the use of labourers , Separate latrine shall be provided for men and women.
- c) The contractor shall construct sufficient number of huts on a suitable plot of land for use of the labourers according to the following specifications.
 - i) Hut of Bomboobs and Grass may be constructed.
 - ii) A good site not liable to submergence shall be selected on high ground remote from jungle but well provided with trees shall be chosen wherever it is available. The neighborhood of land, jungle s trees or woods should be particularly avoided . Camp should not be established close to large cutting of earth work.
 - iii) The lines of huts shall have open space of at least 10 meters between rows. When a good natural site is not available in this case. Particular attention should be given to the drainage.
 - iv) There should be no over crowding , floor space at the rate of 3 sqm. (30 sq.ft) per head shall be provided . Care should be taken to see that the huts are kept clean and in good order.
 - v) The contractor must find his own land and if he wants Govt. land he should apply for it. Assessment for it if demanded will be payable by contractor. However the department does not bind itself for making available the required land.
- d) The contractor shall construct a sufficient number of bathing places. Washing places should also be provided for the purpose of washing clothes.
- e) The contractor shall make sufficient arrangement for draining away the surface and sullage water as well as water from the bathing and washing places and shall dispose off this waste water in such a way as not to cause any nuisance.
- f) The contractor shall engage a medical officer with a traveling dispensary for a camp containing 500 or more persons, If there is no Govt. Or other private dispensary situated within 8 kilometers from the camp. In case of emergency the contractor shall arrange at his cost free transport for quick medical help to his sick workers.
- g) The contractor shall provide the necessary staff for erecting the satisfactory conservancy and cleanliness of the camp to the satisfaction of the Engineer-In-Charge. At least one sweeper per 200 persons should be engaged.
- h) The Assistant Director of Public Health shall be consulted before opening a labour camp and his instructions on matters such as Water Supply, sanitary, convenience for the camp site accommodation and food supply be followed by the contractor etc.
- i) The contractor shall make arrangement for all antimalarials measures to be provided for the labours employed on the work. The anti measures

shall be as directed by Assistant Director of public health.

- j) In addition to above all provisions of the relevant labour Act pertaining to basic amenities to be provided to the labourer shall be applicable which will be arranged by the contractor.

7. MISCELLANEOUS

- 7.1** For providing electric wiring or water ling etc. Recesses shall be provided if necessary through walls, slabs, beams, etc. and later-on refilled it who out any extra cost.
- 7.2** In case it becomes necessary for the due fulfillment of contractor for the contractor to occupy land outside the department, limits the contractor will have to make his own arrangements with the land owners and pay such rents if any, which are payable as mutually/agreed between them.
- 7.3** The contractor shall duly comply with provisions of the Apprentices Act 1961 (III of 1961) and the rules and order made there under from time to time under the said rules and on this failure or neglect to do so he shall subject to all the liabilities and penalties provided by the said Act and Said Rules.
- 7.4** It is presumed that the contractor has gone carefully through the standard specification (Vol I and II 1981 edition) and the schedule of rates of the Division, and studies of site condition before arriving at rates quoted by him. The special provisions and detailed specification of wording of any item shall gain precedence over the corresponding contrary provisions (if any) in the standard specification given without reproducing the details in contract. Decision of Engineer in charge shall be final in case of interpretation of specification.
- 7.5** If the standard specifications fall short for the items quoted in the schedule of this contract, reference shall be made to the latest Indian standard specifications, I.R.C. code, if any of the item of this contract do not fill in reference quoted above the decision and specification as directed by the Engineer-In -Charge. Shall be final.
- 7.6** The stacking and storage of building materials at site shall be in such a manner as to prevent deterioration or inclusion of foreign material and to ensure the preservation of the quality. Properties and fitness of the work. Suitable precautions shall be taken by contractor to protect the materials against atmospheric action, fire and other hazards. The materials likely to be carried away by wind shall be stored, in suitable stores or with suitable barricades and where there is likelihood of subsidence of soil, heavy ,materials shall be stored on paved platforms. Suitable separation barricades and enclosure as directed shall be provided to separate materials brought by contractor and material issued by Govt. To contractor under Schedule- A. Same applies for the materials obtained from different source of supply.

8. HANDING OVER OF WORK

All work and material before taken over by Municipal Corporation will be entire responsibility of the contractor for guarding, maintaining and making good, any damage of any magnitude. Interim payments made for such work will not alter this position. The handing over by the contractor and taking over by the City Engineer/ Engineer in charge or his authorized agent will be always in writing, copies of which will go to the City Engineer, signed by authorized representative of Municipal Corporation and the contractor. It is however understood that before taking over of such work Municipal Corporation will not put the system into its regular use, casual or incidental one, except as specifically mentioned elsewhere in this contract or mutually agreed to.

**ACQUAINTANCE WITH SITE CONDITIONS
AND WORK CONDITIONS**

**NAVI MUMBAI MUNICIPAL CORPORATION, NAVI MUMBAI
WATER SUPPLY DEPARTMENT**

**NAME OF WORK : 24X7 WATER SUPPLY SYSTEM FOR BELAPUR WARD NAVI
MUMBAI UNDER AMRUT 2.0 MISSION**

**ACQUAINTANCE WITH SITE CONDITIONS
AND WORK CONDITIONS**

1. The Contractor shall study the site conditions, general conditions and data included in the tender papers and get it verified from actual inspection of the site etc. before submitting the tender. In case of doubts about any items or data included in this tender or otherwise, it shall be got clarified by applying in writing to the Commissioner, 15 days in advance before date of submission of the tender. Once the tender is submitted, it shall be considered that the Contractor has verified and made himself conversant with all the details as required for quoting the rates and completing the work as per tender conditions and specifications.
2. Contractor shall not sell or otherwise dispose off or remove except for the purpose of this contract, the rubble, stone metal, sand or other material which may be obtained from any excavation made for the purpose of the contract. All such materials shall be Corporation's property and shall be disposed off in the manner and at place as may be directed by the Engineer-in-charge. Contractor may with the permission of the Engineer-in-charge in writing and when directed by him, use any of the materials free of cost.
3. Other unforeseen items to be done in the course of work will have to be done by the Contractor as per specifications in P.W.D. Hand book volume I and II and will be paid at mutually agreed rates, ISS and standard practice in vogue.
Extra charge of claims in respect of extra work shall not be allowed unless the work to which they relate are in the spirit and meaning of the specifications or unless such works are ordered in writing by the Engineer-in-charge and claimed for in the specified manner before the work is taken in hand.

MATERIALS:

4. The Contractor shall make his own arrangements for obtaining rubble, khandki, headers, metal, sand, murum etc. from Corporation or private quarry. Applications of the Contractor for reasonable area of Government land required for this purpose can be recommended to Revenue Authorities without any guarantee of making the land for quarry available.

All the materials involved in the construction shall be of best quality and specifications and shall be got approved from the Engineer-in-charge before use. If necessary, materials shall be got tested from the Laboratory at his cost. Samples requiring approval shall be submitted by the Contractor to the Engineer-in-charge in good time before the use of each material. The samples shall be properly marked to show the name of the materials place.

5. The Contractor shall provide all labour, skilled as well as unskilled, pages, lime, strings, site-rails (wooden as well as Steel etc.) as and when required as per approved design and make available such other materials for surveying, lining out, setting out, checking of work, taking measurements, testing of hydraulic and other structures, without any payment by the Corporation to him. He will also provide proper approach and access to all his works and stores without any extra cost over tendered rates for the items to be inspected.
6. Rates quoted include clearance of site (prior to commencement of work and its closure) in all respects and hold good for work under all conditions of sites, moisture, weather etc.
7. Failure to comply with any of the above instructions will result in the Corporation's doing the needful at the risk and cost of the contractor. These conditions are for all items and as such no extra payment shall be made for observing these conditions.
8. The contractor shall make his own arrangements for quarrying of rubble, stone, murum, sand, lime, metal etc.
9. Overburden in a quarry will have to be removed by the contractor at his own cost.
10. Unless a separate item is provided in Schedule 'B' minor dewatering of foundations in excavation and during the construction of foundation Masonry if required shall be done by the Contractor without claiming extra cost.
11. Masonry shall be kept wet for atleast 15 days and concrete work shall be kept wet for atleast 21 days commencing from the date of its final laying in position. In case during execution curing is found inadequate it will be carried out Corporation's and the cost thereof shall be recovered from the contractor. The contractor shall make his own arrangements for getting water at site at his own cost.
12. The proportions of cement concrete specified in the Schedule „B' are nominal and are only an indication of approximate proportion of cement, fine aggregate and coarse aggregate which may have to be altered suitably at site to obtain the desired strength and workability. However quantity of cement shall not be less than the one specified below.

NOMINAL MIX:

1:11/2:1	(M-300)	9.00 bags/one cum of cement concrete
1:1:5: 3	(M-200)	7.90 bags/one cum of cement concrete
1:2:4	(M-150)	6.30 bags/one cum of cement concrete
1:3:6	(M-100)	4.40 bags/one cum of cement concrete
1:4:8	(M-80)	3.40 bags/one cum of cement concrete

In case of major items of concrete for R.C.C. works, the Contractor shall prepare test blocks as per I.S. specifications for testing its tensile and compressive strength at his own cost. These block will be tested in any of the Government Test Laboratories at the cost of the Contractor. The number of test blocks, frequency etc. shall be directed by Engineer-In-Charge.

13. DAMAGE BY FLOODS OR ACCIDENT:

The Contractor shall take all precautions against damage by floods and from accidents. No compensation will be allowed to the contractor for his plant, material and work etc. Lost or damaged by floods or from other causes. The Contractor shall be liable to make good any part of material which is in charge of the Contractor and which is lost or damaged by floods or from any other cause. If the work executed is damaged, trenches filled due to any reason, Contractor shall have to make it good at his cost only.

14. SUPPLY OF RATE-ANALYSIS IN CASE OF EXTRA ITEMS

In case of the EIRL the Contractor shall supply Rate Analysis based on labour and material in case he is called upon to do so.

15. WATER REQUIRED FOR CONSTRUCTION :-

The Contractor has to make his own arrangements at his cost for water required for construction, testing, filling, structures, etc. either from local bodies or from tertiary treated water wherever available, by paying the charges directly and arranging tankers etc. as per necessity. No claim for extra payment on account of non-availability of water nearby, or extra lead for bringing water shall be entertained. All required piping arrangements and pumping if required for water shall be made by the Contractor at his cost.

If Contractor fails to pay the water charges to local bodies or private parties these shall be recovered by the Corporation from his bills. In case Corporation 's water supply is available, a connection at a suitable place may be sanctioned but all further arrangements of pumping if required, piping etc. shall be done by the Contractor at his cost, and water charges in such a case, shall be paid by the Contractor at the rates as decided by the Commissioner, which shall be final and binding on the Contractor.

Whenever Schedule „B" provides for any dewatering item, payment shall be admissible under that item, but apart from that item no extra claims for dewatering required for executing various tender items, and for executing

such items in wet condition shall be entertained as all these expenses are deemed to be included in the dewatering item.

16. LEADS AND LIFTS :-

Unless otherwise specifically mentioned in the tender item, the tendered rate for all items in tender shall cover all lifts and leads encountered for the executions of the work as directed.

17. Unless otherwise specifically provided for in the tender or a separate item is provided in Schedule 'B', all the sides of excavated trenches after the work is completed or in progress are to be filled by the Contractor to the original ground level from excavated stuff at no extra cost to the Corporation ,

18. Unless otherwise specifically mentioned in tender items, the net dimensions of RCC or CC members actually cast are only admissible for payment under RCC or Plain CC items. No increase in dimensions due to plastering or finishing shall be admissible for payment under RCC or plain CC items.

19. No claims for any desilting of trenches, foundation etc. filled due to floods, untimely rains, or any other reasons whatsoever shall be entertained and Contractor shall have to do this desilting operation together with dewatering operations entirely at his cost.

20. Electricity supply required for construction of work/labour camp, etc. shall be arranged by the contractor at his own cost.

FORM-B.1

Contractor

No. of correction

City Engineer

FORM B.1
PERCENTAGE RATE TENDER AND CONTRACT FOR WORKS

DEPARTMENT Navi Mumbai Municipal Corporation
REGION Kokan
NAME OF WORK 24X7 WATER SUPPLY SYSTEM FOR BELAPUR WARD NAVI MUMBAI
 UNDER AMRUT 2.0 MISSION

GENERAL RULES AND DIRECTIONS FOR THE GUIDANCE OF CONTRACTORS

1. All works proposed to be executed by contractor shall be notified in a form of invitation to tender pasted on a Board hung up in the office of the Commissioner and signed by the Commissioner.
 This form will state the works to be carried out as well as the date of submitting and opening tenders and the time allowed for carrying out the work, also the amount of earnest money to be deposited with the tender and the amount of the security deposit to be deposited by the successful tenderer and the percentage, if any to be deducted from bills. It will also state whether a refund of quarry fees, royalties and ground rents will be granted. Copies of the specifications, designs and drawings and estimated rates, schedule rates and any other documents required in connection with the work which will be signed by the Commissioner for the propose of identification shall also be open for Inspection by contractors at the office of the Commissioner during office hours.
 Where the works are proposed to be executed by the contractor according to the specifications recommended and approved by a competent authority on behalf of the Corporation, such specification with designs drawings shall form part of the accepted tender.
2. In the event of the tender being submitted by a firm, it must be signed separately by each partner thereof, and in the event of the absence of any partner, it shall be signed on his behalf by a person holding a power - of - attorney authorizing him to do so.

i) The contractor shall pay along with the tender the sum, of (Rs. -----) (Rs. ----- only) as and by way of earnest money. The EMD shall be paid by Net Banking. The said amount of earnest money shall not carry any interest whatsoever.

ii) In the event of his tender being accepted, to the provision of sub-clause(iii), below,

a) the said amount of earnest money shall be appropriated towards the amount of security deposit payable by him under conditions of General conditions of contract.

iii) If, after, submitting the tender, the contractor withdraws his offer or modifies the same, or if after the acceptance of his Tender, the contractor fails or neglects to furnish the balance security deposit without prejudice to any other right and powers of the Corporation hereunder, or in law, Corporation shall be entitled to forfeit the full amount of the earnest money deposited by him.

iv) In the event of his Tender not being accepted, the amount of earnest money deposited by the contractor shall, unless it is prior thereto forfeited under the provision of sub-clause (iii) above, be refunded to him on his passing receipt therefore.

3. Receipts for payments made on account of any work, when executed by a firm should also be signed by all the partners except where the contractors are described in their tender as a firm. In which case the receipt shall be signed in the name of the firm by one of the partners or by some other person have authority to give effectual receipts of the firm.
4. Any person who submits tender shall fill up the usual printed form stating at what percentage above or below the rates specified in Schedule - B (memorandum showing items of work to be carried out) he is willing to undertake the work. Only one rate or such percentage on all the Estimated rates/ Schedule rates shall be named. Tenders which propose any alteration in the work specified in the said form of invitation of tender, or in the time allowed for carrying out the work, or which contain separate percentage over estimated rates / schedule rates for different sub work or item, or which any other conditions of any sort which are not filled with the percentage as the space provided for the purpose and not signed at proper place in the printed B-1 Tender Form will be liable to rejection. No printed form of tender shall include a tender for more than one work. But, if contractors who wish to tender for more works, shall submit a separate tender for each work. Tenders shall have the name and the number of work to which they refer, written outside the envelopes.

5. The competent authority shall open tenders in the presence of any intending contractors who have submitted tenders or their representatives who may be present at the time, and he will enter the amount of the several tenders in a comparative statement in a suitable form. In the event of a tender being accepted, the contractor shall for the purpose of identification, sign copies of the specifications and other documents mentioned in Rule 1. In the events of a tender being rejected, commissioner shall arrange / authorized to refund the amount of the earnest money deposited to the tenderer, on his giving a receipt for the return of the money.
6. Municipal Commissioner is the final authority to reject all or any of the tenders.
7. No receipt for any payment alleged to have been made by a contractor in regard to any matter relating to this tender or the contract shall be valid and binding on Corporation unless it is signed by the City Engineer.
8. The memorandum of the work to be tendered for and the schedule of materials to be supplied by the Corporation (herein before and after called as MC) and their rates shall be filled in and completed by the office of the City Engineer /Commissioner before the tender form is issued. If a form issued to an intending Tender has not been so filled in and completed, he shall request the said office to have this done before he completes and delivers his tender.
9. All work shall be measured net by standard measure and according to the rules and customs of the PWD/MJP and without reference to any local custom.
10. Under no circumstances shall any; contractor be entitled to claim enhanced rates for items in this contract.
11. Every registered contractor should produce along with his tender certificate of registration, as approved contractor in the appropriate class and renewal of such registration with date of expiry.
12. Corrections and additions should be initialed.
13. The measurements of work will be taken according to the usual methods in use in the PWD/MJP/NMMC and no proposals to adopt alternative methods will be accepted. The Engineer's decision as to what is the usual method in use will be final.

Contractor

No. of correction

City Engineer

14. A tendering contractor shall furnish a declaration along with the tender showing all works for which he has already entered into contract, and the value of work that remains to be executed in each case on the date of submitting the tender. Such certificate shall be in the proforma attached in the tender documents.
15. In view of the difficult position regarding the availability of foreign exchange no foreign exchange would be released by the corporation for the purchase of plant and machinery or any other purpose for the execution of the work contracted for.
16. The contractor will have to construct shed, for storing controlled and valuable material issued to him under Schedule "A" of the agreement or brought him on work site, at work site having double locking arrangement. The materials will be taken for use in the presence of the department person. No. materials will be allowed to be removed from the site of works without written permission of the Engineer-in-charge.
17. The tenderer will have to produce to the satisfaction of the accepting authority a valid and current license issued in his favour under the provision of Contractor Labour Regulation and Abolition Act. 1973 before starting work, failing with acceptance of the tender will be liable for withdrawal and Earnest money / Security Deposit will be forfeited to the Corporation.
18. The contractor shall comply with the provision of the Apprentices Act. 1961 and the rules and orders issued there under from time to time. The contract shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the Act.
19. In this tender sub-works as mentioned in BOQ are included .As per Government resolution the work will be taken up in three phases. The work order will be issued accordingly by fixing time limit. Contractor has to complete the work within stipulated time for each phase. If he fails, action as per clause 2 will be initiated against the contractor.
20. As per clause 6 of B-1 form, extension of time limit will be governed. If contractor fails to apply for extension of time limit as per clause 6 to keep the tender alive, Municipal Corporation will grant the extension considering the progress of work and in the light of clause 2.

21. The tender Rates are inclusive of all taxes except GST. Contractor shall be deemed to have examined the work and site conditions including labour, the general and special conditions, specifications and drawings and shall be deemed to have visited the worksite and to have fully informed himself regarding the local conditions and carried out his own investigations to arrive at rates quoted in the tender.

There shall be no corrections or overwriting and if any that shall be dully initialed by Contractor himself.

Note: The Commercial Offer must be filled online using individual's digital certificate. (An online form will be provided for this during online bid preparation stage).

22. I / We hereby, tender for the execution for the Navi Mumbai Municipal Corporation, Navi Mumbai (herein before and herein after referred to as NMMC) for the work specified in the underwritten memorandum within the time specified in such memorandum at-----
----- (-----
-----) in figures as well as in words percent below/above the estimated rates entered in schedule „B“ memorandum showing items of work to be carried out and in accordance with all respects with the specifications, designs, drawings, and instructions in writing referred to in Rule hereof and in clause 12 of the annexed conditions of the contract and agree that what materials for the work are provided by the Corporation such materials are at the rates to be paid for them shall be as provided in schedule “A” here to.

Memorandum

a) General description : 24X7 WATER SUPPLY SYSTEM FOR
BELAPUR WARD NAVI MUMBAI UNDER AMRUT-2

*a) if several sub works are
included they should be
detailed in a separate list*

b) Estimated Cost. Rs. 118,36,31,598.46 /-

c) Earnest Money. Rs. 59,18,158.00 /-

*c) The amount of earnest
money to be deposited shall
be in accordance with the
provision of paras 206 and
207 of the M.P.W. Manual.*

d) **Security Deposit.**

Total 4% of estimated cost put to tender or accepted tender
cost whichever is higher

*d) This deposit shall, be in
accordance with paras 213
and 214 of the M.P.W.
Manual.*

i) **Initial Security Deposit**

2% of estimated cost put to tender or accepted tender cost
whichever is higher shall be in form of FDR from any
Nationalized / Scheduled Bank or Bank Guarantee

ii) Balance 2% amount of Security deposit, will be recovered
through
each Running Bill at The rate of 5% of the gross amount of
running bill till the required total amount of Security Deposit is
recovered

e) Percentage, if any, to be deducted from bills so as to make
up the total amount required as security deposit by the
time, half the work as measured by the cost is done.
5% (Five) Percent

*e) This percentage where
no security deposit is taken,
will vary from 5 % to 10 %
according to the
requirement of case where
security deposit is taken see
note to clause 1 this
conditions of contractor.*

f) Additional Security Deposit.

If the tender is proposed to be accepted at the rates quoted less than estimated cost put to tender security deposit over and above 4% in (d) at the below rate shall have to be paid by Tender.

i) For offer upto 10% below 2% Initial + 2% through R.A.Bill.

ii) For 10% to 15% below 4% Intial + 2% through R.A.Bill.

iii) For offer more than 6%Intial + 2% through R.A.Bill.
15% below

Additional security is to be paid by the successful bidder initially only in addition to 2% original Security Deposit.

(Security Deposit shall be based on estimated cost put to

Tender or tendered cost whichever is higher)

g) Time allowed for the work from date of written order to commence.

----- (-----) Calendar Months. (Including monsoon)

I/We agree that the offer shall remain open for acceptance for a minimum period of 120 days from the date fixed for opening for the same and thereafter until it is withdrawn by me/ us notice in writing duly addressed to the authority opening the tenders and sent by registered post A.D. or otherwise delivered at the office of such authority. Term deposit Receipt No./Demand draft No. dated and date in respect of the sum of `..... (in wards `.....) is herewith forwarded. The amount of earnest money shall not bear interest and shall be liable to be forfeited to the Municipal Corporation should I/We fail to

(i) abide by the stipulation to keep the offer open for the period mentioned above of (ii) sign and complete the contract documents as required by the Engineer and furnish the security deposit as specified in item. (d) of the memorandum contained in paragraph (1) above within the time limit laid down in clause (1) of the annexed General Conditions of contract, the amount of earnest money may be adjusted towards the security deposit or refunded to me/us in writing unless the same or any part thereof has been forfeited as aforesaid.

I/We have secured exemption from payment of earnest money after executing the necessary bond in favour of the Municipal Corporation a true copy of which is enclosed herewith should any occasion for forfeiture of earnest money for this work arise due to failure on my/our part to abide by the stipulations to keep the offer open for the period mentioned above or to sign and complete the contract documents and furnish to security deposit as specified in item (d) of the Memorandum contained in paragraph (1) above within the time limit laid down in clause (i) of the annexed General Conditions of contract, the amount payable by me/us at the option of the Engineer, be recovered out of the amount deposited in lump sum for securing exemption in so far as the same may be extend in terms of the said bond and in the event of the deficiency out of any other moneys which are due to payable to me/us by the Municipal Corporation under any other contract or transaction of any nature whatsoever or otherwise.

Should this tender be accepted I/We hereby agree to abide by and fulfill all the terms and provisions of the conditions of contract annexed hereto so far as applicable and in default thereof to forfeit and pay Municipal Corporation the sum of money mentioned in the said conditions. Term Deposit Receipt No. Dated from The Bank..... at in respect of sum of Rs. Is herewith forwarded representing the earnest money (a) the full value which is to be absolutely forfeited to the Corporation should I/We not deposit in the full amount of security deposit specified in the above memorandum in Accordance with (d) of clause (i) of the tender for works shall be refunded.

Strike out (a) such security deposit is to be taken.

Contractor

Signature of the contractor
before submission of tender.

Address

date of 2023

Witness

Signature of witness to
contractor's signature.

The above tender is hereby accepted by me for and one
behalf of the Navi Mumbai Municipal Corporation, Navi
Mumbai

Dated

City Engineer/Commissioner
Navi Mumbai MUNICIPAL Corporation

CONDITIONS OF CONTRACT

(Modification as per the GR PWD NO. CAT-1087/ CR- 94/Bldg-2, dated 14.6.1989) \

Clause 1 : The person / person whose tender may be accepted *Security Deposit* (hereinafter called the Contractor, which expression shall unless excluded by or repugnant to the context include his heirs, executors, administrators and assigns) shall (A) within ten days (which may be extended by the Commissioner concerned upto 15 days if the Commissioner thinks fit to do so) of the receipt by him of the notification of the acceptance of his tender deposit with the Engineer in-charge in Cash or Government securities endorsed to the Engineer in charge (if deposited for more than 12 months) of sum sufficient which will make up the full security deposit specified in the tender or (B) (permit Corporation at the time of making any payment to him for work done under the contract to deduct such sum as will amount to 4% of all moneys so payable; such deductions to be held by Corporation by way of security deposit). Provided always that in the event of the Contractor depositing a lumpsum by way of security deposit as contemplated at (A) above, then and in such case, if the sum so deposited shall not to 4% of the total estimated cost of work or tendered cost whichever is higher, it shall be lawful for Corporation at the time of making any payment to the contractor for work done under the contract to make-up the full amount of Four (4) percent by deducting a sufficient sum from every such payment as last aforesaid until the full amount to the security deposit is made up. All compensation or other sums of moneys payable the contractor to Corporation under the terms of his contract may be deducted from or paid by the sale of sufficient part of his

security deposit or from the interest arising there from, or from any sums which may become due by Corporation to the contractor under any other contract or transaction on any account whatsoever and in the event of his security deposit being reduced by reason of any such deduction or sale as aforesaid, the contractor shall, within ten days thereafter, make good in cash or Government securities endorsed as aforesaid or Bank Guarantee issued by bank for any sum or sums which may have been deducted from or raised by sale of his security deposited or any part thereof. The Security deposit referred to, when paid in cash may, at the cost of the depositor, be converted into interest bearing securities provided that the depositor has expressly desired this in writing.

If the amount of the security deposit to be paid in a lump sum within the period specified at (A) above is not paid the tender/contract already accepted shall be considered as cancelled and legal steps taken against the Contractor for recovery of the amounts. The amount of security deposit lodged by Contractor shall be refunded along with the payment of the final bill, if the date upto, which the Contractor has agreed to maintain the work in good order, is over.

In the event of Contractor failing or neglecting to complete rectification work within the period upto, which the Contractor has agreed to maintain the work in good order then subject to provisions of Clause 17 and 20 hereof, the amount of security deposit retained by Corporation shall be adjusted towards the excess cost incurred by the Corporation rectification work.

Clause 2 : The time allowed for carrying out the work as entered in the agreement shall be strictly observed by the Contractor and shall be reckoned from the date on which the order to commence work is given to the Contractor. The work shall throughout the stipulated period of the contract be proceeded with, all due diligence (time being deemed to be essence of the contract on the part of the Contractor) and the Contractor shall pay as compensation an amount equal to one percent or such smaller amount as the City Engineer/Commissioner (whose decision in writing shall

***Compensation
Delay***

be final) may decide of the amount of the estimated cost of the whole work as shown by the tender for everyday that the work remains uncommenced or unfinished after the proper dates. And further to ensure good progress during execution of the work, the Contractor shall be bound in all cases in which the time allowed for any work exceeds one month to complete, for complete minimum quantum of work as compared to accepted tender cost as stated below.

$\frac{1}{4}$ of the work in $\frac{1}{4}$ of the time.

$\frac{1}{2}$ of the work in $\frac{1}{2}$ of the time.

$\frac{3}{4}$ of the work in $\frac{3}{4}$ of the time.

Full work in 24 months including monsoon

Note: The quantity of the work to be done within a particular time to be specified above shall be fixed by an Officer competent to accept the contracts after taking into consideration the circumstances of each case and insert in the blank space kept for the purpose

In the event of the contractor failing to comply with these conditions he shall be liable to pay as compensation an amount equal to one percent or such smaller amount as Commissioner (whose decision in writing shall be final) may decide of the said estimated cost of the whole work for everyday that the due quantity of work remains incomplete provided always that the total amount of compensation to be paid under the provisions of this clause shall not exceed 10% of the estimated cost of the work as shown in the tender. Commissioner should be the final authority in this respect, irrespective of the fact that tender is accepted by State level technical Committee. However Commissioner shall seek the consent or approval of the State level technical committee.

Clause 3: If any clause in which under any clause of this contract the Contractor shall have rendered himself liable to pay compensation amounting to the whole of his security deposit (whether paid in one sum or deducted by installment) or in the case of abandonment of the work owing to serious illness or death of the Contractor or any other cause, the Engineer in charge on behalf of the Corporation shall have power to adopt any of the following courses, as he may deem best suited to the interest of the Corporation.

Action when whole of security deposit is forfeited.

- a) To rescind the contract (for which rescission notice in writing to the Contractor under the hands of Engineer in-charge shall be conclusive evidence) and in that case the security deposit of the Contractor shall stand forfeited and be absolutely at the disposal of the Corporation
- b) To carry out the work or any part of the work departmentally debiting the Contractor with the cost of the work, expenditure incurred on tools, plant and charges on additional supervisory staff including the cost of work-charged establishment employed for getting unexecuted part of the work completed and crediting him with the value of the work done departmentally in all respects in the same manner and at the same rates as if it has been carried out by the Contractor under the terms of his contract. The certificate of the Engineer in-charge as to the cost and other allied expenses so incurred and as to the value of the work so done departmentally shall be final and conclusive against the Contractor.
- c) The order that work of the Contractor be measured up and take such part thereof as shall be unexecuted out of his hands and to give it to another contractor to complete in which case all expenses incurred on advertisement for fixing a new contracting agency, additional supervisory staff including the cost of work-charged establishment and the cost of the work executed by the new contract agency will be debited to other contractors and the value of the work done or executed through the new contractor shall be credited to the Contractor in all respects and in the same manner and at the same rates as if it had been carried out by the Contractor under the terms of his contract. The certificate of the Engineer in-charge as to all the costs of the work and other expenses incurred as aforesaid for getting the unexecuted Work done by the new contractor and as to the value of the work so done shall be final and conclusive against the Contractor.

In case the contractor shall be rescinded under clause (a) above, the contractor shall not be entitled to recover or to be paid, any sum for any work therefore actually performed by him under this contract unless and until the City Engineer /Commissioner shall have certified in writing the performance of such work and the amount payable to him in respect thereof and he shall only be entitled to be paid the

amount so certified. In the event of either the courses referred to in clause (b) or (c) being adopted and the cost of the work executed departmentally or through a new contractor and other allied expenses exceeding the value of such work credited to the contractors, the amount of excess shall be deducted from any money due to the contractor by Corporation under the contract or otherwise however or from his security deposit or the sale proceeds thereof provided however that the contractor shall have to claim against Corporation event if the certified value of the work done departmentally or through a new contractor exceeds the certified cost of such work and allied expenses, provided always that whichever of the three courses mentioned in clauses (a), (b) and (c) is adopted by the Corporation, the contractor shall have no claim to compensation for any loss sustained by him by reason of not having purchased or procured any materials, or entered into any engagements, or made any advance on account of or with a view to the execution of the work or the performance of the contract. The extra cost involved in the completion of the balance work carried out through the other contractor under

Amount of 3 (c) shall be recoverable from the contractor over and above the compensation levied under Clause 2 and the Security Deposit shall be apportioned against the total recoveries for this purpose also.

Clause 4 : If the progress of the any particular portion of the work is unsatisfactory, the Corporation shall notwithstanding that the general progress of the work is in accordance with the condition mentioned in clause 2 be entitled to take action under clause 3(b) after giving the contractor 10 days notice in writing. The contractor will have no claim for compensation, for any loss sustained by him owing to such action.

Action when the progress of any particular portion of the work is unsatisfactory.

Clause 5 : In any case in which any of the powers conferred upon Corporation by Clause 3 and 4 hereof shall have become exercisable and the same shall not have been exercised the non exercise thereof shall not constitute waiving of any of the conditions hereof the such powers shall notwithstanding be exercisable in the event of any future case of default by the contractor for under any clauses hereof he is declared liable to

Contractor liable to pay compensation if action not taken under clause 3 and 4.

pay compensation amounting to the whole of his security deposit and the liability of the contractor for past and future compensation shall remain unaffected. In the event of the Corporation taking action under Sub-Clause (a) or (c) of clause 3, he may, if he so desires, take possession of all or any tools and plants, materials and stores, in or upon the work or the site thereof or belonging to the contractor, or procured by him and intended to be used for the execution of the work or any part thereof paying or allowing for the same in account at the contract rates or in the case of contract rates not being applicable at current market rates to be certified by the Corporation whose certificate thereof shall be final. In the alternative the Corporation may after giving notice in writing to the contractor or his clerk of the work, foreman or other authorized agent require him to remove such tools, plant, materials or stores from the premises within a time to do specified in such notice, and in the event of the contractor failing to comply with any such requisition, the Corporation may remove them at the contractor's expense or sell them by auction or private sale on account of the contractor and at his risk in all respects, and the certificate of the Corporation as to the expenses of any such removal and the amount of the proceeds and expense of any such shall be final and conclusive against the contractor

Clause 6 : If the contractor shall desire an extension of the time for completion of work on the ground of his having been unavoidably hindered in its execution or on any other ground, he shall apply in writing to the Corporation before the expiration of the period stipulated in the tender on before the expiration of 30days from the date on which he was hindered as aforesaid or on which the cause for asking extension occurred, whichever is earlier and the Corporation in the opinion of City Engineer/Commissioner/, as the case may be, if in his opinion, there were reasonable grounds for granting the extension, grant such extension as he think necessary or proper. The decision of the Corporation in this matter shall be final. *Extension of time*

Clause 7 : On the completion of the work the contractor shall be furnished with a certificate by the Corporation (hereinafter and hereinbefore called the Engineer-in-charge) of such completion but neither such certificate shall be given nor *Final Certificate.*

shall the work be considered to be complete until the contractor shall have removed from the premises on which the work shall have been executed, all scaffolding surplus materials and rubbish, tools, plants and equipments and shall have cleaned off the dirt from all woodwork, doors, windows, walls, floor or other parts of any building in or upon which the work has been executed or of which he may have had possession for the purpose of executing the work nor until the work shall have been measured by the Engineer-in-charge or where the measurements have been taken by his subordinate until they have received approval of the Engineer-in-charge the said measurements being binding and conclusive against the contractor, if the contractor shall fail to comply with the requirements of this clause as to the removal of scaffolding, surplus materials and rubbish and cleaning off the dirt on or before the date fixed for the completion of the work, the Engineer-in-charge may at the expense of the contractor, remove and rubbish and dispose off the same as he thinks fit and clean off such dirt as aforesaid and the contractor shall forthwith pay the amount of all expenses so incurred but shall have no claim in respect of any such scaffolding tools and plants equipments or surplus materials as aforesaid except for any sum actually realized by the sale thereof.

Clause 8 : No payment shall be made for any work estimated to cost less than Rupees one thousand till the whole of work shall have been completed and a certificate of completion given. But in the case of works estimated to cost more than Rupees one thousand the contractor shall on submitting a monthly bill therefore be entitled to receive payment proportionate to the part of the work then approved recommended by the Engineer-in-charge, whose certificate of such recommended and passing of the sum of payable shall be final and conclusive against the contractor. All such intermediate payments shall be regarded as payment by way of advance against the final payments only and not as payments for work actually done and completed and shall not preclude the Engineer-in-charge for requiring any bad, unsound, imperfect or unskillful work to be removed or taken away and reconstructed or re erected nor shall any such payment be considered as an admission of the due performance of the contract or any part thereof in any respect or the occurring of any claim nor shall it conclude determine or affect in any other way the powers of the Engineer-in-charge as to the final settlement and adjustment of the accounts or otherwise or in any other way very

Payment on intermediate certificate to be regarded as advance.

or affect the contract. The final bill shall be submitted by the contractor within one month of the date fixed for the completion of the work otherwise the Engineer-in-charge's certificate of the measurements and of the total amount payable for the work shall be final and binding on all parties.

Clause 9: The rates for several items of works estimated to cost more than ` 1000/- agreed to within, shall be valid only when the item concerned is accepted as having been completed fully in accordance with the sanctioned specification. In cases where the items of are work not accepted as so completed by the Engineer-in-charge may make payment on account of such items at such reduced rates as he may consider reasonable in the preparation of final or on account bills.

Payment at reduced rates on account of items of work not accepted as completed, to be at the discretion of the Engineer-in-charge.

Clause 10 : A bill shall be submitted by the contractor in each month on or before the date fixed by the Engineer-in-charge for all work executed in the previous month and the Engineer-in-charge shall take or cause to be taken the requisite measurements for the purpose of having the same verified and the claim, so far as it is admissible shall be adjusted and paid if possible within ten days from the presentation of the bill. If the contractor does not submit the bill within the time fixed as aforesaid, the Engineer-in-charge may depute a subordinate to measure up the said work in the presence of the contractor or his duly authorized agent whose counter signature to the measurement list shall be sufficient warrant and the Engineer-in-charge may prepare a bill from such list which shall be binding on the contractor in all respects

Bills to be submitted monthly

Clause 11 : The contractor shall submit all bills on the printed forms to be had on application at the office of the Engineer-in-charge. The charges to be made in the bills shall always be entered at the rates specified in the tender or in the case of any extra work ordered in pursuance of these conditions and not mentioned or provided for in the tender at the rates hereinafter provided for such work

Bills to be on printed form.

Clause 12 : If the specification or estimate of the work provides for the use of any special description of materials to be supplied from the store of the Corporation or if it is required that the contractor shall use certain stores to be provided by the Engineer-in-charge (such material and stores and the prices to be charged therefore as hereinafter mentioned being so far as practicable for the convenience of the contractor but not so as in

Stores supplied by NMMC

any way to control the meaning or effect of this contract specified in the schedule or memorandum hereto annexed) the contractor shall be supplied with such materials and stores as may be required from time to time to be used by him for the purposes of the contract only and value of the full quantity of the materials and stores so supplied shall be set off or deducted from any sums then due, or thereafter to become due to the contractor under the contract or otherwise or from the security deposit or the proceeds of sale thereof if the security deposit is held in Government Securities, the same or a sufficient portion thereof shall in that case be sold for the purpose. All materials supplied to the contractor shall remain the absolute property of Corporation and shall not be removed from the site of the work and shall at all times be open to inspection by the Engineer-in-charge. Any such materials issued at cost but remained unused and in perfectly good condition at the time of completion or termination of the contract shall be returned to the Corporation, store if the Engineer-in-charge so required by a notice in writing given under his hand, but the contractor shall not be entitled to return any such material supplied to him as aforesaid but remaining unused by him or for any wastage in or, damage to any such materials. The contractor shall, however return all unused material at the time of completion, which was issued to him free of cost by the Engineer in charge and which has remained surplus with the contractor after accounting for the actual utilization of such material from the total quantity that was issued by the Engineer in charge. Cost of any material issued free of cost by the engineer and which has remained surplus with the Engineer from the contractor as mentioned in Schedule - „A'

Clause 12 (A) : All stores of materials such as cement, steel etc. supplied to the contractor by Corporation should be kept by the contractor in a separate store near the work site under lock and key and will be accessible for inspection by the Corporation or his agent at all the times.

Storage of controlled material

Clause 13 : The contractor shall execute the whole and every part of the work in the most substantial and workman like manner and both as regards materials and every other respect in strict order accordance. The contractor shall also conform exactly fully and faithfully to the designs, drawings and instructions in writing relating to the work signed by the Engineer-in-charge and lodged

Works to be executed in accordance with specifications drawings.

in his office and to which the contractor shall be entitled to have access for the purpose of inspection at such office or on the site of the work, during office hours. The contractor will be entitled to receive one sets of contract drawing and working drawings as well as one certified copy of the accepted tender along with the work order free of cost. Further, copies of the contract drawings and working drawings if requires by him shall supplied at the rate of ` 2000/- per set of contract drawings and ` 100/- per working drawing except where otherwise specified.

Clause 14 : The Engineer-in-charge shall have power to make any alterations in or additions to the original specifications, drawing, design and instructions that may appear to him to be necessary or contracts, advisable during the progress of the work and the contractor shall be bound to carry out the work in accordance with any instructions in this connection which may be given to him in writing signed by the Engineer-in-charge and such alterations shall not invalidate the contract and any additional 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 agreed to do the main work and at the same rates as are specified in the tender for the main work. And if the additional and altered work includes any class of work for which no rate is specified in this contract, then such class of work shall be carried out at the rates entered in the Schedule of Rates of the Division with due consideration for leads and lifts involved for materials and labour or at the rates mutually agreed upon between the Engineer-in-charge and the contractor, whichever are lower However, if the Engineer-in-charge is not empowered by Corporation to approve the rates of such additional or altered work then as far as possible he shall obtain prior approval to the changes and to the rates payable for

Alteration in specifications & designs not to invalidate

Such changes from competent authority of

Corporation not entered in before ordering the Contractor to take up the alternation/ additional work. If the additional or altered work for which no rate is in the schedule or rates of the Division, is ordered to be carried out before the rates are agreed upon then the contractor shall within seven days of the date of receipt by him of the order to carry out the work, inform the Engineer-in-charge of the rate which it is his intention to charge for such class of work, and if the Engineer-in-charge does not agree to this rate he shall by notice in writing be at liberty to cancel his order carry out such class of work and arrange to carry

out in such manner as he may consider advisable provided always that if the contractor shall commence the work or incur any expenditure in regard thereto before the rates shall have been determined as lastly hereinbefore mentioned then in such case he shall only be entitled to be paid in respect of the work or incur any expenditure in regard there to before the rates shall have been determined as lastly hereinbefore mentioned then in such case he shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of the determination of the rate as aforesaid according to such rate or rates as shall be fixed by the Engineer-in-charge. In the event of a dispute the decision of the City Engineer will be final.

Where, however, the work is to be executed according to the designs, drawings and specifications recommended by the contractor and accepted by the competent authority the alterations above referred to shall be within the scope of such designs, drawings and specifications appended to the tender. The time limit for the completion of the work shall be extended in the proportion that the increase in its cost occasioned by alterations or additions bears to the cost of the original contract work and the certificate of the Engineer-in-charge as to such proportion shall be conclusive.

Extension of time in consequences additions or alterations

Clause 15 :

- i) If at any time after the execution of the contract documents the engineer shall for any reason what so ever (other than default on the of the contractor for which the Corporation is entitled to rescind the contract) desires that the whole or any part of the work specified in the tender should be suspended for any period of that the whole or part of the work should not be carried at all, he shall give to the contractor a notice in writing of such desire and upon the receipt of such notice the contractor shall forthwith suspend or stop the work wholly or in part as required after having due regard to the appropriate stage at which the work should be stopped or suspended so as not to cause any damage or injury to the work or any part of it could be or could have been safely stopped or suspended shall be final and conclusive against the Contractor. The Contractor shall have no claim to any payment or compensation whatsoever by reason of or in pursuance of any notice as aforesaid on account of any suspension, stoppage or curtailment except to the extent specified hereinafter.

No claim to any payment or compensation for alteration in or restriction of Work except specified in this clause.

- ii) Where the total suspension of work ordered as aforesaid continued for a continuous period exceeding 90 days the contractor shall be at liberty to withdraw from the contractual obligations under the contract so far as it pertains to the unexecuted part of the work by giving a 10 days prior notice in writing to the Engineer within 30 days of the expiry of the said period of 90 days of such intention and requiring the Engineer to record the final measurements of the work already done and to pay final bill. Upon giving such notice the Contractor shall be deemed to have been discharged from his obligation to complete the remaining unexecuted work under his contract. On receipt of such notice the Engineer shall proceed to complete the measurement and make such payment as may be finally due to the Contractor within a period of 90 days from the receipt of such notice in respect of the work already done by the Contractor. Such payment shall not in any manner prejudice the right of the Contractor to any further compensation under the remaining provisions of this clause.

- iii) Where the Engineer in-charge requires the Contractor to suspend the work for a period in excess of 30 days at any time or 60 days in the aggregate, the contractor shall be entitled to apply to the Engineer within 30 days of the resumption of work after such suspension for payment of compensation to the extent of pecuniary loss suffered by him in respect of working machinery rendered idle on the site or on the account of his having had to pay the salary or wages to labour engaged by him during the said period of suspension, provided always that the Contractor shall not be entitled to any claim in respect of any such working machinery ,salary or wages for the first 30 days whether consecutive or in the aggregate of any suspension whatsoever occasioned by unsatisfactory work or other default on his part. The decision of the Engineer- in -charge in this regard shall be final and conclusive against the Contractor.

- iv) In the event of
 - a) any total stoppage of work on notice from the Engineer under sub-clause (1) in that behalf.
 - b) Withdrawal by the Contractor from the contractual obligation to complete the remaining un-executed work under sub-clause (2) on account of continued suspension of work for a period exceeding 90 days.

- c) Curtailment in the quantity of item or items originally tendered on account of any alteration, omission or substitutions in the specifications, drawings, designs or instructions under Clause 14 where such curtailment exceeds 25% in quantity and the value of the quantity curtailed beyond 25% at the rates for the item specified in the tender is more than ` 5,000/-

It shall be open to the Contractor within 90 days from the service of

- i) the notice of stoppage of work or
 - ii) the notice of withdrawal from the contractual obligations under the contract on account of the continued suspension of work or
 - iii) notice under Clause 14(i) resulting in such curtailment
- to produce to the Engineer satisfactory documentary evidence that he had purchased or agreed to purchase material for use in the contracted work before receipt by him of the notice of stoppage, suspension or curtailment and required the Corporation to take over on payment such material at the rates determined by the Engineer, provided, however, that such rates shall in no case exceed the rates at which the same was acquired by the Contractor. The Corporation shall thereafter take over the material so offered, provided the quantities offered are not in excess of the requirements of the unexecuted work as specified in the accepted tender and are of quality and specifications approved by the Engineer

Clause 15 A : The Contractor shall not be entitled to claim any compensation from Corporation for the loss suffered by him on account of delay by Corporation in the supply of materials entered in Schedule „A’ where such delay is caused by.

No. claim to compensation on account of loss due to delay in supply of material by NMMC

- i) Difficulties relating to the supply of railway wagons.
- ii) Force majeure.
- iii) Act of God.
- iv) Act of enemies of the State or any other reasonable cause beyond the control of Corporation.

In the case of such delay in the supply of materials, NMMC shall grant such extension of time for the completion of the works as shall appear to the Corporation to be reasonable in accordance with the circumstances of the case. The decision of the Corporation as to the extension of time shall be accepted as final by the Contractor.

Clause 16 : Under no circumstances whatsoever shall the Contractor be entitled to any compensation from Corporation on any account unless the Contractor shall have submitted claim in writing to the Engineer-in-charge within one month of the case of such claim occurring.

Time limit for unforeseen claims.

Clause 17 : If at any time before the security deposit or any part of thereof is refunded to the Contractor it shall appear to the Engineer-in-charge or his subordinate -in-charge of the work that any work has been executed with unsound, imperfect or unskilled workmanship or with materials of inferior quality, or that any materials or articles provided by him for the execution of the work are unsound or quality is inferior to that contracted for, or are otherwise not in accordance with the contract, it shall be lawful for the Engineer-in-charge to intimate this fact in writing to the Contractor and then notwithstanding the fact that the work, materials or articles complained of may have been inadvertently passed, certified and paid for, the Contractor shall be bound forthwith to rectify, or remove and reconstruct the work so specified in whole or in part, as the case may require or if so required shall remove the materials or articles at his own charge and cost and in the event of his failing to do so within a period to be specified by the Engineer-in-charge in the written intimation aforesaid, the Contractor shall be liable to pay compensation at the rate of one percent on the amount of the estimate for everyday not exceeding 10 days during which the failure so continues and in the event of any such failure the Engineer-in-charge may rectify or remove and re execute the work or remove and replace the materials or articles complained of as the case may be at the risk and expense in all respects of the Contractor. Should the Engineer in charge consider that any such inferior work or materials as prescribed above may be accepted or made use of, it shall be within his discretion to accept the same reduced rates as he may fix therefore.

Action and compensation payable in case of bad work.

Clause 18 : All work under or in course of execution or executed in pursuance of the contract shall at all times be open to inspection and supervision of the Engineer-in-charge and his subordinates and the Contractor shall at all times during the usual working hours, and at all other times at which reasonable notice of the intention of the Engineer-in-charge and his subordinates to visit the works shall have been given to the Contractor, either himself be present to receive orders and instructions or have a responsible agent duly accredited in writing present for that purpose. Orders given to the Contractor's

Work to be open to inspection.

Contractor or responsible agent to be present

duly authorized agent shall be considered to have the same force and effect as if they had been given to the Contractor himself.

Clause 19 : The Contractor shall give not less than five days' notice in writing to the Engineer-in-charge or his subordinate in-charge of the work before covering up or otherwise placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions thereof taken before the same is so covered up or placed beyond the reach of measurement and shall not cover up or place beyond the reach of measurement any work without the consent in writing of the Engineer-in-charge or his subordinate in-charge of the work, and if any work shall be covered up or placed beyond the reach of measurement, without such notice having been given or consent obtained, the same shall be uncovered at the Contractor's expense, and in default thereof no payment or allowance shall be made for such work or for the materials with which the same was executed.

*Notice to be given
before work is covered
up*

Clause 20 : If during the period as listed below, from the date of completion as certified by the Engineer-in-charge pursuant to Clause 7 of the Contract or for the period as mentioned below after commissioning the work whichever is earlier in the opinion of the Engineer in-charge, the said work is defective in any manner whatsoever the contractor, shall forthwith on receipt of notice in that behalf from the Corporation, duly commence execution and completely carry out at his cost in every respect all the work that may be necessary for rectifying and setting right the defects specified therein including dismantling and reconstruction of unsafe portion strictly in accordance with and in the manner prescribed and under the supervision of the Corporation. In the event of the Contractor failing or neglecting to commence execution of the said rectification work within the period prescribed therefore in the said notice and/ or to complete the same as aforesaid as required by the same notice, the Corporation may get the same executed and carried out departmentally or by any other agency at the risk, on account and at the cost of the Contractor. The Contractor shall forthwith on demand pay to the Corporation the amount of such costs, charges and expenses sustained or incurred by the Corporation of which the certification of the Corporation shall be final and binding on the Contractor, Such costs, charges and expenses shall be deemed to be arrears of land revenue and in the event of the Contractor failing or

*Contractor liable for
damage done and for
imperfections*

neglecting to pay the same no demand as aforesaid without prejudice to any other rights and remedies of the Corporation, the same may be recovered from the Contractor as arrears of land revenue. The Corporation, shall also be entitled to deduct the same from any amount which may then be payable or which may thereafter become payable by the Corporation to the contractor either in respect of the said work or any other work whatsoever or from the amount of security deposit retained by the Corporation. During defect liability period, the work of daily maintenance and general repairs and expenses thereon would be out of scope of the tender. However, if any defects in the sub work or in the material are found, the same will be rectified by the Contractor at his cost and will be binding on him, failing to which legal action would be taken as per tender clauses. Ten percent amount will be withheld from security deposit depending upon the nature of work, till the defect liability period is over.

1. Pumping Machinery.

- a) Pumping machinery and other allied mechanical, Five Years
 electrical installation (excluding those in the
 treatment plant contract), surge arrestors, water
 hammer control devices, chlorinators (excluding
 those provided in the treatment plant contract) as
 per the shedule "B"

Repairs to the works at (a) above. Five Years

2. WTP/ESR/GSR/BPT, Sump and Pump House, Balancing Tank Etc.
 head works, approach bridge

a) Based on Contractor's own design.	Five Years.
b) Based on Departmental design.	Five Years
c) Special repairs to ESR/ GSR/ BPT	Five Years
d) Ordinary repairs to ESR/GSR/BPT Sump and Pump House, etc.	Five Years
3. Pipe Lines.	
i) Pumping Mains, Gravity Mains, Leading Mains including all the fixtures	Five Years
ii) Distribution system, for Watersupply system, etc.	Five Years
iii) Repairs to pipe lines under the works at (a) and (b) above.	Five Years
iv) Gravity main of 800 mm dia pipe line from kalmboli to belapur	Five Years
v) Structure bridge at taloja creek	Ten Years

The instructions contained in the Government of Maharashtra (Public Works Department) Resolution dated 14th June, 1989 shall henceforth be applicable to all the works for which defect liability periods have been specified as above

Clause 21 : The Contractor shall supply at his own cost all material (except such special materials, if any, as may in accordance with the contract be supplied from the Corporation stores), plant, tools, appliances, implements, ladders, tackles, scaffolding and temporary works requisite or proper execution of the work, in the original, altered or substituted from the whether included in the specification or other documents forming part of the contract of referred to in these conditions or not and which may be necessary for the purpose of satisfying or complying with the requirements of the Engineer in charge as to any matter as to which under these conditions he is entitled to as satisfied or which he is entitled to require together with the carriage therefore to and from the work

Contractor to supply plant, ladders, scaffoldings, etc.

The Contractor shall also supply without charge the requisite number of persons with the means and materials necessary for the purpose of setting out works and counting, weighing and assisting in the measurement or examination at any time and from time to time of the work or the materials, Failing which the same may be provided by the Engineer-in-charge at the expense of the Contractor and expenses may be deducted from any money due to the Contractor under the contract or from his security deposit or the proceeds of sale thereof or a sufficient portion thereof. The Contractor shall provide all necessary fencing and lights required to protect the public from accident and shall also be bound to bear the expenses of defense of every suit, action or other legal proceedings that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any such suit action or other legal proceedings that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any such suit action or proceedings to any such person, or which may with consent of the Contractor be paid for compromising any claim by any such person. List of machinery in contractors possession and which he proposes to use on the work should be submitted along with the tender.

And is liable for damages arising from non-provisions of lights, fencing, etc

Clause 21 A : The Contractor shall provide suitable scaffolds and working platforms, gangways and stairways and shall comply with the following regulations in connection herewith.

- a) Suitable scaffolds shall be provided for workmen for all works that cannot be safely done from a ladder or by other means.
- b) A scaffolds shall not be constructed, taken down or substantially allowed except
 - i) Under the supervision of a competent and responsible person, and
 - ii) As far as possible by competent workers possessing adequate experience in this kind of work.
- c) All scaffolds and appliances connected herewith and ladders shall.
 - i) be of sound material
 - ii) Be of adequate strength having regard to the loads and strains to which they will be subjected, and
 - iii) Be maintained in proper condition.
- d Scaffolds shall be so constructed that no part thereof can be displaced in consequence of normal use.
- e Scaffolds shall not be over - loaded and so far as practicable the load in consequence of normal use
- f Before installing lifting gear on scaffolds special precautions shall be taken to ensure the strength and stability of the scaffolds.
- g Scaffolds shall be periodically inspected by a competent person.
- h Before allowing a scaffold to be used by his workmen the Contractor shall whether the scaffold has been erected by his workmen or not, take steps to ensure that it complies fully with the regulations herein specified.
- i Working platform, gangway, stairways shall:-
 - 1) be so constructed that no part thereof can sag unduly or unequally.
 - 2) be so constructed and maintained, having regard to the prevailing conditions as to reduce as far as practicable risks of persons tripping or slipping, and
 - 3) kept free from any unnecessary obstruction.
- j) In the case of working platform, gangways, working places and stairways at a height exceeding 2 meters (to be specified).
 - a) every working platform, gangways shall be closely boarded unless other adequate measures are taken to ensure safety,
 - b) every working platform, gangway shall have adequate width, and
 - c) every working platform, gangway, working place and stairway shall be provided with railing/ barricading

- k) Every opening in the floor of a building or in a working platform shall except for the time and to the extent required to allow the excess of persons or the transport or shifting of material be provided with suitable means to prevent the fall of persons or material.
- l) When persons are employed on a roof where there is a danger of falling from the height exceeding 3 meters (to be specified) suitable precautions shall be taken to prevent the fall of persons or material
- m) Suitable precautions shall be taken to prevent persons being struck by articles, which might fall from scaffolds or other working places.
- n) Safe means of access shall be provided to all working platforms and other working places.
- o) The Contractor will have to make payments to laborers as per Minimum Wages Act.

*Liability of contractors
for any damage done in
or outside the work
area*

Clause 21 B : The Contractor shall comply with the following regulations as regards the Hoisting appliances to be used by him.

- a) Hoisting machines and tackles, including their attachments, anchorages and supports shall.
 - i) be of good mechanical construction, sound material and adequate strength and free from patent defect, and
 - ii) be kept in good repairs and in good working order.
- b) Every rope used in hoisting or lowering materials or as a means of suspension shall be of suitable quality and adequate strength and free from patent defect.
- c) Hoisting machines and shackles shall be examined and adequately tested after erection on the site and before use and be re-examined in position at intervals to be prescribed by the Corporation.
- d) Every chain, ring, hook, shackle, swivel and pulley block used in hoisting or lowering materials or as means of suspension shall be periodically examined.
- e) Every crane driver or hoisting appliance operator shall be properly qualified.
- f) No person who is below the age of 18 years shall be in control of any hoisting machine, including any scaffold, which gives signals to the operator.
- g) In case of every machine and every chain, ring, hook, Shackle, swivel and pulley block used in hoisting or lowering or as a means of suspension, the safe working load shall be ascertained by adequate means.

*Employment of female
labor work on Sunday*

- h) Every hoisting machine and all gear referred to in proceeding regulation shall be plainly marked with the safe working load
- i) In case of hoisting machine having a variable safe working load, each safe working load and the conditions under which it is applicable shall be clearly indicated.
- j) No part of any hoisting machine or any gear referred to in regulation (g) above shall be loaded beyond the safe working load except for the purpose of testing.
- k) Motors, gearing, transmissions, electric wiring and other dangerous parts of hoisting appliances shall be provided with efficient safeguards.
- l) Hoisting appliances shall be provided with such means, which will reduce to minimum, and the risks of the accidental descend of load.
- m) Adequate precaution shall be taken to reduce to a minimum the risk of any part of suspended load becoming accidentally displaced

Clause 22 : The Contractor shall not set fire to any standing jungle, trees, brushwood or grass without a written permission from the Corporation. When such permission is given and also in all cases when destroying, cut or dug up trees, brushwood, grass, etc. by fire, the Contractor shall take necessary measures to prevent such fire spreading to or otherwise damaging surrounding property. The Contractor shall make his own arrangements for drinking water for the labor employed by him.

Measures for prevention of fire.

Clause 23 : Compensation for all damages done intentionally or unintentionally by Contractor's labour whether in or beyond the limits of the Corporation property including any damage caused by the spreading of fire mentioned Clause 22 shall be estimated by the Engineer-in-charge or such other officer as he may appoint and the estimate of the Engineer-in-charge subject to the decision of the City Engineer/ Commissioner on appeal shall be final and the Contractor shall be bound to pay the amount of the assessed compensation on demand, failing which the same will be recovered from the Contractor as damage in the manner prescribed in Clause 1 or deducted by the Engineer-in-charge from any sums that may be due or become due from Corporation to Contractor under this contract or otherwise.

Liability of Contractor for any damage done in or outside work area.

The Contractor shall bear the expenses of defending any action or other legal proceedings that may be brought by any person for injury sustained by him owing to neglect of precautions to prevent the spread of fire and he shall pay any damages and cost that may be awarded by the court in consequence.

Clause 24 : The employment of female laborers on works in neighborhood of soldiers barracks should be avoided as far as possible. *Employment of female labor*

Clause 25 : No work shall be done on Sunday without the sanction in writing of the Engineer-in-charge. *Work on Sunday.*

Clause 26 : The contract shall not be assigned or sublet without the written approval of the Engineer-in-charge, and if the Contractor shall assign or sublet his contract or attempt to do so, or become insolvent or commence any proceedings to get himself adjudicated and insolvent or make any composition with his creditors or attempt so to do so or if bribe, gratuity, gift, loan, perquisite, reward of advantage, pecuniary or otherwise shall either directly or indirectly be given, promised or offered by the Contractor or any of his servants or agents to any public officer or person in the employment of Corporation in any relating to his office or employment or if any such officer or person shall become in any way directly or indirectly interested in the contract, the Engineer-in-charge may thereupon by notice in writing rescind the contract, and the security deposit of the Contractor shall thereupon stand forfeited and be absolutely at the disposal of Corporation and the same consequences shall ensure as if the contract had been rescinded under Clause 3 hereof and in addition the Contractor shall not be entitled to recover or be paid for any work thereof actually performed under the contract. *Work not to be sublet.. Contract may be rescinded and security deposit forfeited for subletting it without approval or for bribing a Public Officer or if Contractor becomes insolvent.*

Clause 27 : All sums payable by a Contractor by way of compensation under any of these conditions shall be considered as a reasonable compensation to be applied to the use of Corporation without reference to the actual loss or damage sustained, and whether any damage has or has not been sustained *Sum payable by way of compensation to be considered as reasonable without reference to actual loss*

Clause 28 : In the case of tender by partners, any change in the constitution of a firm shall be forthwith notified by the Contractor to the Engineer-in-charge for his information. *Changes in the constitution of the firm to be notified.*

Clause 29 : All works to be executed under the contract shall be executed under the direction and subject to the approval in all respects of the City Engineer/ Commissioner, for the time being, who shall be entitled to direct at what point or points and in what manner they are to be commenced and from time to time carried out. *Directions and control of the Engineer incharge*

Clause 30.1 : Except where otherwise specified in the contract and subject to the powers delegated to him by Corporation under the code, rules then in force, the decision of the City Engineer/Commissioner for the time being shall be final, conclusive and binding on all parties of the contract, upon all questions relating to the meaning of the specifications, designs, drawings and instruction herein before mentioned and as to the quality of workmanship, or materials used on the work or as to any other question, claim, right, matter or thing whatsoever, in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions, orders, or these conditions, or otherwise concerning the works, or the execution, or failure to execute the same, whether arising during the progress of work, or after the completion or abandonment thereof.

*Directions and control
of the Engineer in
charge .*

Clause 30.2 : The Contractor may within thirty days of receipt by him of any order passed by the Commissioner as aforesaid appeal against it to the City Engineer with the contract work or project provided that.

- a) The accepted value of the contract exceeds ` 10 lakhs (`. Ten lakhs)
- b) Amount of claim is not less than ` 1.00 lakh (`. One Lakh).

Clause 30: If the contractor is not satisfied with the order passed by the Commissioner as aforesaid, the contractor may, within thirty days of receipt by him of any such order, appeal against it to the UDD-2 Secretary who if convinced that prima facie, the contractors, claim rejected by City Engineer/Commissioner is not frivolous and that there is some substance in the claim of the contractor as would merit a detailed examination in the claim of the contractor and decision by Secretary Urban development department for suitable decision. The decision of the UDD-2 shall be final and binding on the contractor and the Engineer-in-charge.

Clause 31 : Deleted

Clause 32 : When the estimate on which a tender is made includes lump sums in respect of parts of the work, the Contractor shall be entitled to payment in respect of the items of work involved or the part of the work in question at the same rates as are payable under this contract for each item, or if the part of the work in question is not in the opinion of the engineer-in-charge capable of measurement, the Engineer-in-charge may at his discretion pay the lump sum amount entered in the estimate and the certificate in writing of the Engineer-in-charge shall be final and conclusive against the Contractor with regard to any sum or sums payable to him under the provisions of this clause.	Lump sums in estimates	
Clause 33 : In the case of any class of work for which there is no such specification as is mentioned in Rule I of Form B-1, such work shall be carried out in accordance with the Divisional specifications and in the event of there being no Divisional specifications, the work shall be carried out in all respect in accordance with all instructions and requirements of the Engineer-in-charge.	Action where no specifications	
Clause 34 : The expression „Work' or „Works' where used in these conditions, shall unless there be something in the subject or context repugnant to such construction, be constructed to mean the work or works contracted to be executed under or in virtue of the contract, whether temporary or permanent and whether original, altered, substituted or additional.	Definition of work	
Clause 35 : The percentage referred to in the tender shall be deducted from/ added to the gross amount of the bill before deducting the value of any stock issued.	Contractor's percentage whether applied to net or gross amount of bill.	
Clause 36 : All quarry fees, royalties, octroi duties and ground rent for stacking materials, if any should be paid by Contractor, which will not be entitled to a refund of such charges from the Corporation. (Please see special clause for royalty).	Quarry fees and royalties	
Clause 37 : The Contractor shall be responsible for and shall pay any compensation to his workmen payable under the Workmen's Compensation Act., 1923 (VIII of 1923), (hereinafter called the said Act) for injuries caused to the workmen. If such compensation is payable/ paid by the Corporation as principal under sub-section (1) of Section 12 of the said Act on behalf of the Contractor, it shall be recoverable by the Corporation from the Contractor under the sub-section (2) of the said section. Such compensation shall be recovered in the manner laid down in Clause 1 above.	Compensation under Workmen's Compensation Act.	
Contractor	No. of correction	City Engineer

Clause 37 A : The Contractor shall be responsible for and shall pay the expenses of providing medical aid to any workman who may suffer a bodily injury as a result of an accident. If such expenses are incurred by Corporation, the same shall be recoverable from the Contractor forthwith and be deducted without prejudice to any other remedy of the Corporation from any amount due or that may become due to the Contractor.

Clause 37 B : The Contractor shall provide all necessary personal safety equipment and first aid apparatus available for the use of the persons employed on the site and shall maintain the same in condition suitable for immediate use at any time and shall comply with the following regulations in connection herewith.

- a) The workers shall be required to use the equipments so provided by the Contractor and the Contractor shall take adequate steps to ensure proper use of the equipment by those concerned
- b) When work is carried on in proximity to any place where there is a risk of drowning, all necessary equipment shall be provided and kept ready for use and all necessary steps shall be taken for the prompt rescue of any person in danger.
- c) Adequate provision shall be made for prompt first-aid treatment of all injuries likely to be sustained during the course of the work.

Clause 37 C : The Contractor shall duly comply with the provisions of „The Apprentices Act, 1961' (III of 1961), the rules made thereunder and the orders that may be issued from time to time under the said Act and the said Rules and on his failure or neglect to do so he shall be subjected to all the liabilities and penalties provided by said Act and said Rules.

Clause 38 : I) Quantities in respect of the several items shown in the tender are approximate and no revision in the tendered rate shall be permitted in respect of any of the items so long as subject to any special provision contained in the specifications prescribing a different percentage of permissible variation in the quantity of the item does not exceed the tender quantity to more than 25% and so long as the value of the excess quantity beyond this limit at the rate of the item specified in the tender, is not more than ` 5,000/- (Whichever is more)

*Quantities put to tender are approximate.
Excess quantity beyond quantity put to tender will be governed as per Cl.38*

ii) the Contractor shall, if ordered in writing by the Engineer so to do, also carry out any quantities in excess of the limit mentioned above in sub -clause (1) hereof on the same conditions and in accordance with the specifications in the tender and the rates

- a) derived from the rates entered in Current Schedule of Rates and in the absence of such rates
- b) At the rates prevailing in the market.

The said rates being increased or decreased as the case may be by the percentage which the total tendered amount upon the schedule of rates applicable to the year in which the tender were accepted

For the purpose of operation of this clause ,this cost shall be worked out from the DSR prevailing at the time of inviting of tender. The cost of Clause 38 is Rs ----- (Rs.-----
----- Only)

- iii) This clause is not applicable to extra items.
- iv) Claims arising out of reduction in the tendered quantity of any item beyond 25% will be governed by the provision of Clause 15 only when the amount of such reduction beyond 25% at the rate of the item specified in the tender is more than ` 5,000/- This reduction is exclusively the reduction in Clause Nos. 14 & 15 of the work and site conditions.
- v) There is no change in the rate if the excess is less than or equal to 25%. Also there is no change in the rate if the quantity of work done is more than 25% of the tendered quantity, but the value of the excess work at the tendered rates does not exceed ` 5,000/-
- vi) The quantities to be paid at the tendered rates shall include,
 - a) tendered quantity plus 25% excess of tendered quantity or the excess quantity of the value of ` 5,000/- at tendered rate whichever is more

Clause 38 A : The City Engineer /Engineer in charge / of Municipal corporation shall see that claim towards excess quantity under this clause 38 is submitted to higher authority immediately on its cropping up. The City Engineer/ Commissioner of Navi Mumbai Municipal Corporation, Navi Mumbai while making such payment shall see that the total expenditure shall not exceed sanctioned cost of the scheme. If the proposal of Clause 38 is submitted to competent authority for payment then interim 50% payment will be released as under

Interim payment for excess quantity

- a) At accepted tender rate or current schedule rate whichever is less subject to condition that total expenditure on the tender shall not exceed sanctioned cost of the scheme

Clause 38-B : If the rate entered in to schedule B for the work of excavation of pipeline is a combined rate for different strata then the rate entered in Schedule-B will be applicable for quantity 25% in addition to the quantity mentioned in schedule-B of all items of excavation for pipe line trenches and for excess over 25% of Schedule-B quantity ,the rate payable to the contractor shall be worked out from the CSR by considering following percentage of excavation in different strata irrespective of actual strata met at the site for the increased quantity.

Payment for average rate of excavation

- 1) Excavation in all types of soils, . Sand, gravel and soft murum with lead up to 50 meter and lift as involved. Including dewatering, shoring and strutting etc. excluding refilling etc. % of average rate for lift 0.00 to 1.50 meter and_% for lift_.
- 2) Excavation in hard murum and boulders with lead up to 50 m and lead and lift as involved including dewatering, shoring and strutting etc. excluding refilling etc._% of average rate for lift _____meter and %____for lift ____.
- 3) Excavation in soft rock and old cement and lime masonry with lead upto 50 m and lift as involved, including dewatering, shoring and strutting, excluding refilling etc._% of average rate for lift ____and ____% for lift_____.
- 4) Excavation in hard rock and concrete road by chiseling wedging line drilling by mechanical means or by all means other than blasting with lead upto 50m and lift as involved, including dewatering, shoring and strutting etc. excluding refilling_% of average rate for lift 0.00 to 1.590 m_% and 1.50 to 3.00 m.

(Note-Sheet is attached separately)

Clause 39 : The Contractor shall employ any famine, convict or other labour of a particular kind or class if ordered in writing to do so by the Engineer-in-charge.

Employment of famine labour, etc

Clause 40: No compensation shall be allowed for any delay caused in the starting of the work on account of acquisition of land or, in the case of clearance works, on account of any delay in accordance to sanction of estimates.

Claim for compensation for delay in starting the work.

Clause 41: No compensation shall be allowed for any delays in the execution of the work on account of water standing in borrow pits or compartments. The rates are inclusive for hard or cracked soil, execution in mud, sub-soil, water standing in borrow pits and no claim for an extra rate shall be entertained unless otherwise expressly specified.

Claims for compensation for delay in execution of the work.

Clause 42 : The Contractor shall not enter upon or commence any portion of work except with written authority and instructions of the Engineer-in-charge of his subordinate in charge of the work. Failing such authority the Contractor shall have no claim to ask for measurements of or payment for work.

*Entering upon or
commencing any portion
of work*

Clause 43 :

i) No Contractor shall employ any person who is under the age of 18 years.

ii) No Contractor shall employ donkeys or other animals with breaching of string or thin rope. The breaching must be at least three inches wide and should be of tape (Nawar).

iii) No animal suffering from sores, lameness or emaciation or which is immature shall be employed on the work.

iv) The Engineer-in-charge or his agent is authorized to remove from the work, any person or animal found working which does not satisfy these conditions and no responsibility shall be accepted by the Corporation for any delay caused in the completion of the work by such removal.

*Minimum age of persons
employed,
the employment of
donkeys and other
animals and the
payment of fair wages.*

v) The Contractor shall pay fair and reasonable wages to the workmen employed by him in the contract undertaken by him, In the event of the dispute arising between the Contractor and his workmen on the grounds that the wages paid are not fair and reasonable, the dispute shall be referred without delay to the Engineer in charge who shall decide the same. The decision of the City Engineer shall be conclusive and binding on the Contractor but such decision shall not in any way affect the conditions in the contract regarding the payment to be made by the Corporation at the sanctioned tender rates.

vi) Contractor shall provide drinking water facilities to the workers. Similar amenities shall be provided to the workers engaged on large work in urban areas

vii) Contractor to take precautions against accidents which taken place on account of labour using loose garments while working near machinery.

Clause 44: Payment to Contractors shall be made by cheque drawn on Commissioner in charge's account provided the amount exceeds ` 1000/- Amounts not exceeding 1000/- will be paid in cash (As per present practice the payment will be made online as applicable).

Method of payment

Clause 45: Any Contractor who does not accept these conditions shall not be allowed to tender for work.

Acceptance of conditions compulsory before tendering for work.

Clause 46 : If Government declares a site of scarcity or famine to exist in any village situated within 16 Kms of the work, the Contractor shall employ upon such parts of the work, as are suitable for unskilled labour, any person certified to him by the City Engineer/ Commissioner of Navi Mumbai Municipal Corporation, Navi Mumbai, or by any person to whom the City Engineer/ Commissioner of Navi Mumbai Municipal Corporation, Navi Mumbai may have delegated this duty in writing to be in need on relief and shall be bound to pay to such person wages not below the minimum wages which Government may have fixed in this behalf. Any disputes which may arise in connection with the implementation of this clause shall be decided by the Engineer in charge whose decision shall be final and binding on the Contractor.

Employment of scarcity labour

Clause 47: The price quoted by the Contractor shall not in any case exceed the control price, if any, fixed by Government or reasonable price which is permissible for him to charge a private purchaser for the same class and description, the control price or the price permissible under the provisions of Hoarding and Profiteering Preventing Ordinance, 1948 as amended from time to time. If the price quoted exceeds the controlled price or the price permissible under Hoarding and Profiteering Prevention Ordinance, the Contractor will specifically mention this fact in his tender along with the reasons for quoting such higher prices. The purchaser at his discretion will in such case exercise the right of revising the price at any stage so as to conform to the controlled price as permissible under the Hoarding and Profiteering Prevention Ordinance. This discretion will be exercised without prejudice to any other action that may be taken against the Contractor.

Price not to exceed controlled price fixed by Govt.

- a) Bidder shall quote his rate excluding GST.
 - b) GST shall be paid on the amount of bill of the work done as per prevailing guide lines rate of GST during the period of work done as applicable.
 - c) The rates quoted by the contractor shall be deemed to be inclusive of the labour welfare cess and other taes (other than GST) that the contractor will have to pay for the performance of his contract. The employer will perform such duties in regard to the deduction of such taxes at source as per applicable law.
- 2) a) Bidder shall quote his rate considering the provisions counted under GST Act 2017.
- b) Amount of GST 2% I.E.CGST and SGST each 1% will be deducted at source (T.D.S.) from 01.10.2018.

Clause 48 : In case of materials that may remain surplus with the Contractor from those issued, the date of ascertainment of the materials being surplus will be taken as the date of sale for the purpose of C will be recovered on such date.

Sale tax on surplus material

Clause 49 : Deleted.

Clause 50 : The Contractor shall employ at least 80 percent of the total number of unskilled labour to be employed by him on the said work from out of the persons ordinarily residing in the district in which site of the said work is located. Provided, however, that if required number of unskilled labour from that district is not available, the Contractor shall in the first instance employ such number of persons as is available and thereafter may with the previous permission in writing of the Engineer-in-charge of the said work obtain the rest of the requirement of unskilled labour from outside of district.

Employment of local labour

Clause 51 : The Contractor shall pay the labourers - skilled and unskilled according to the wages prescribed by Minimum Wages Act applicable to the area in which the work of the Contractor is located. The Contractor shall comply with the provision of the Apprentices Act, 1961 and the Rules and Orders issued there under from time to time.. The Contractor shall be liable for any pecuniary liability arising on account of any violation by him of the provisions of the Act. The Contractor shall pay the labourers - skilled and unskilled- according to wages prescribed by Minimum Wages Act applicable to the area in which the work lies.

Wages to be paid to the skilled and unskilled labours employed by contractor.

Clause 52 : All amounts whatsoever which the Contractor is liable to pay to the Corporation in connection with the execution of the work including the amount payable in respect of
i) materials and/ or stores supplied/ issued hereunder by the Corporation to the Contractor,

ii) hire charges in respect of heavy plant, machinery and equipment given on hire by the Corporation to the Contractor for execution by him of the work and/ or for which advances have been given by the Corporation to the Contractor shall be deemed to be arrears of the land revenue and Corporation without prejudice to any other rights and remedies of the Corporation recover the same from the contractor as a arrears of land revenue

Clause 53 : The Contractor shall duly comply with all the provisions of the Contract Labour (Regulation and Abolition) Act, 1970 (37 of 1970) and the Maharashtra Contract Labour (Regulation and Abolition) Rules 1971 as amended from time to time and all other relevant statutes and statutory provisions concerning payment of wages particularly to workmen employed by the contractor and working on the site of the work. In particular and contractor shall pay wages to each worker employed by him on the site of the work at the rates prescribed under the Maharashtra Contract Labour (Regulation and Abolition) Rules 1971. If the contractor fails or neglect to pay wages at the said rates or makes short payment and the Corporation makes such payment of wages in full or part thereof less paid by the contractor, as the case may be, the amount so paid by the Corporation to such workers shall be deemed to be debt payable by the Contractor and the Corporation shall be entitled to recover the same as such from the contractor or deduct same from the amount payable by the Corporation to the contractor hereunder or from any other amounts payable to him by the Corporation.

Clause 54 : Where the worker are required to work near Machine and are liable to accident they should not be allowed to wear loose clothes like Dhoti, Jhabba etc.

Clause 55 : The Contractor shall comply with the provisions of the Apprentices Act, 1961 and the Rules and Orders issued there under from time to time

Clause 56 : In view of the difficult position regarding the availability of the Foreign exchange, no foreign exchange, will be released by the Department for the purchase of the Plant and Machinery required for the execution for the work concerned work.

Clause 58 (A) : Conditions of Malaria Eradication.

Anti-Malaria and other health measures.

- a) The anti malaria and the health measures shall be as directed by the Joint Director (Malaria and Filarial) of Health Service, Pune.
- b) Contractor shall see that most autogenic conditions are not created so as to keep vector population to minimum level
- c) Contractor shall carry out anti malaria measures in the area as per guidelines prescribed under National Malaria Eradication Programme and as directed by the Joint Director (M & F) of Health Services, Pune
- d) In case of default in carrying out prescribed anti malaria measures resulting in increase in malaria incidence contractor shall be liable to pay to Government the amount spent by Government on anti malaria measures to control the situation in addition to fine.
- e) Relations with Public Authorities.
The contractor shall make sufficient arrangements for draining away the sullage water as well as water coming from the bathing and washing places and shall dispose of this water in such a way as not to cause, any nuisance. He shall also keep the premises clean by employing sufficient number of sweepers.

The contractor shall comply with all rules, regulations, bye-laws and directions given from time to time by any local or public authority in connection with this work and shall pay fees or charge which are leviable on him without any extra cost to Government

Clause 58 (B) : The successful contractor will have to enter into agreement in form specified by Corporation on a stamp of required amount as per rules in force. The stamp charges shall be borne by the contractor

Clause 59 : PRICE VARIATION CLAUSE:

If during the operative period of the contract as defined in condition (1) below, there shall be any variation in the Consumer Price Index (New Series) for Industrial workers for Thane Centre as per the Labour Gazette published by the Commissioner of Labour, Govt. of Maharashtra &/or in the Wholesale Price Index for all commodities prepared by the Office of Economic Adviser, Ministry of Industry, Govt. of India or in the price of petrol/oil & lubricants & major construction materials like bitumen, cement, steel, various types of metals pipes etc. then subject to the other conditions mentioned below, price adjustment on account of

- i. Labour component
- ii. Material component
- iii. Petrol, oil & lubricant components
- iv. Cement components
- v. HYSD & mild steel components
- vi. Cement component
- vii. CI & DI pipes component

Calculated as per the formula hereinafter appearing, shall be made. Apart from these, no other adjustment shall be made to the contract price for any reason whatsoever. Component percentage as given below is as of the total cost of work put to tender. Total of labour, material & POL components shall be 100 & other components shall be as per actuals.

- i. Labour component (K₁-40)%
- ii. Material component (K₂-55)%
- iii. Petrol, oil & lubricant components (K₃-5)%
- iv. Cement components
- v. HYSD & mild steel components
- vi. Cement component
- vii. CI & DI pipes component

Note- if Cement, steel, bitumen, CI & DI pipes are supplied on Schedule-A, than respective component shall not be considered. Also, if particular component is not relevant same shall be deleted. It will be modified if any changes in future.

1) Formula for Labour components:

$$V_1 = 0.85P \times \frac{K_1}{100} \times \frac{L_1 - L_0}{L_0}$$

Contractor

No. of correction

City Engineer

Where

V₁= Amount of price variation in Rupees to be allowed for Labour components

P= Cost of work done during the Quarter under consideration minus the cost of cement, HYSD and mild steel, Bitumen, CI & DI pipes calculated as the basic star rates as applicable for the tender, consumed during the quarter under consideration.

K₁= Percentage of LABOUR component as indicated above

L₀= Basic Consumer Price Index for ----- center shall be average consumer price index for the preceding months in which the last date prescribed for receipt of tender falls.

L₁= Average consumer price index for ----- center for the quarter for the consideration.

2) Formula for Material components:

$$V_2 = 0.85P \times \frac{K_2}{100} \times \frac{M_1 - M_0}{M_0}$$

Where

V₂= Amount of price variation in Rupees to be allowed for Material components

P= Same as work out for labour component

K₂= Percentage of Material component as indicated above

M₀= Basic Wholesale Price Index shall be average Wholesale price index for the preceding months in which the last date prescribed for receipt of tender falls.

M₁= Average wholesale price index for the quarter under consideration

3) Formula for petrol, oil & lubricant components

$$V_3 = 0.85P \times \frac{K_3}{100} \times \frac{P_1 - P_0}{P_0}$$

Where

V₃= Amount of price variation in Rupees to be allowed for POL components

P= Same as work out for labour component

K₃= Percentage of petrol, oil & lubricant components component as indicated above

P₀= Average price of HSD at -----, during the preceding months in which the last date prescribed for receipt of

tender falls.

P₁= Average price of HSD at -----during the quarter under consideration

4) Formula for Bitumen components

$$V_4 = Q_B(B_1 - B_0)$$

Where

V₄= Amount of price variation in Rupees to be allowed for Bitumen components

Q_B= Quantity of bitumen (Grade) in metric tonne used in the permanent works & approved enabling works during the quarter under consideration

B₁=Current, average ex-refinery price per metric tone of bitumen (Grade) under consideration excluding Goods and service tax during the quarter under consideration.

B₀= Basic rate of bitumen in Rupees per metric tonne as considered for working out value of P or average ex-refinery price in Rupees per metric tonne excluding good and service tax of bitumen for the grade of bitumen under consideration during prevailing preceding the month in which the last date prescribed for receipt of tender fall whichever is higher.

5) Formula for HYSD & mild steel components

$$V_5 = S_0 \times \frac{(Sl_1 - Sl_0)}{Sl_0} \times T$$

Where

V₅= Amount of price variation in Rupees to be allowed for HYSD / mild steel components

S₀ = Basic rate of HYSD / mild steel in rupees per matric tonne excluding GST as considered form working out value of T.

Sl₁= Average steel index as per RBI bulletin during the quarter under consideration

Sl₀= Average of steel index as per RBI bulletin for the preceding month in which the last date prescribed for receipt tender falls.

T= Tonnage of steel used in the permanent works for the quarter under consideration

6) Formula for cement components

$$V_6 = \left\{ \frac{C_0(C_{l1} - C_{l0})}{C_{l0}} \right\} T$$

Where

V_6 = Amount of price escalation in Rupees to be allowed for cement components

C_0 = Basic rate of cement in Rupees per metric tonne excluding GST as considered for working out value of P.

C_{l1} = Average cement index published in the RBI bulletin for the quarter under consideration

C_{l0} = Average of Cement Index published in the RBI Bulletin for the preceding the month in which the last date prescribed for receipt of tender falls.

T = Tonnage of cement use in the permanent works for the quarter under consideration.

7) Formula for CI/DI pipe Component:

$$V_7 = Q_d \times (D_1 - D_0)$$

Where

V_7 = Amount of price escalation in Rupees to be allowed for CI/DI pipe component.

D_0 = Pig iron basic price in Rupees per tonne excluding GST considered for working out value of P.

D_1 = Average pig iron price in Rupees per tonne during the quarter under consideration (Published by the Institute of Indian foundrymen)

Q_d = Tonnage of CI/DI pipes used the works during the quarter under consideration.

The following conditions shall prevail:

i) The operative period of the contract shall mean the period commencing from the date of the work order issued to the contractor & ending on the date on which the time allowed for the completion of work specified in the contract for work expires, taking in to considering the extension of time, if any, for completion of the work granted by Engineer under the relevant clauses of the Conditions of Contract in cases other than those where such extension is necessitated on account of default of the contractor. The decision of Engineer as regards the Operative period of the contract shall be final & binding on

the contractor. Where any compensation for liquidated damages is levied on the contractor on account of delay in completion or inadequate progress under the relevant contract provisions, the price adjustment amount for the balance of work from the date of levy of such compensation shall be worked out by pegging the indices L_1 , M_2 , P_1 , B_1 , Sl_4 , Cl_1 , D_1 to levels corresponding to the date from which such compensation is levied.

ii) This price variation clause shall be applicable to all contracts in B1, B2 and SBD forms but shall not apply to piece works. The price variation shall be determined during each quarter as per formula given above in this clause.

iii) Price variation under this clause shall not be payable for the extra items required to be executed during the completion of the work & also on the excess quantities of items payable under the provision of Clause 41/37/38 of the contract form B1/B2/SBD respectively. Since the rates payable for the extra items or the extra quantities under Clause 41/37/38 are to be fixed as per the current DSR or as mutually agreed to yearly revision till completion of such work. In other words, when the completion/execution of extra items as well as extra quantities under Clause 41/37/38 of the Contract Form B1/B2/SBD extends beyond the operative date of the DSR, then rates payable for the same beyond that date shall be revised with reference to the current DSR prevalent at that time on year to year basis or revised in accordance with mutual agreement thereon, as provided for in the contract, whichever is less

iv) This clause is operative both ways i.e. if the price variation as calculated above is on the plus side, payment on account of the price variation shall be allowed to the contractor & if it is on the negative side, implementing agency shall be entitled to recover the same from the contractor & the amount shall be deductible from any amounts due & payable under the contract.

v) To the extent that full compensation for any rise or fall in costs to the contractor is not entirely covered by the provisions of this or other clauses in the contract, the unit rate & price included in the contract shall be deemed to include amount to cover the contingency of such other actual rise or fall in costs.

vi) Calculation for working out escalation payment on account of material, labour & POL will be restricted to 2 digits only.

Clause 60 : The contractor shall provide and maintain *Insurance* barricades, guards, guard rails, temporary bridges and walkways, watchmen, headlights and danger signals illuminated from sunset to sunrise and all other necessary appliances and safeguards to protect the work, life, property, the public excavations, equipment and materials. Barricades shall be

substantial construction and shall be painted such as to increase their visibility at night. For any accident arising out of the neglect of above instructions, the contractor shall be bound to bear the expenses of defence of every suit, action or other legal proceedings, at law, that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay all damages and costs which may be awarded in any such suit, action or proceedings to any such person or which may with the consent of the contractor be paid in compromising any claim by any such person.

Clause 61 : The contractor shall take out necessary insurance policy /policies so as to provide adequate insurance cover for execution of the awarded work from the Director of insurance Maharashtra State Mumbai. However if contractor desire to effect insurance with local office of any insurance company same should be under the Co-insurance-come- servicing arrangement approved by the director of insurance if the policy taken out by the contractor is not Co - Insurance basis(GIF- 60% and insurance company -40%) the same will not be accepted and the amount of the premium calculated by director of insurance will be recovered directly from the amount payable to the contractors for the executed contract work.

- 1 Loss of or damage to the Civil and Mechanical and Electrical equipments supplied/installed including the materials such as pipes, valves, specials etc. brought on site

Loss of or damage to contractor's equipments including his vehicles.

Loss of or damage to property (except the works, Plant material and Equipment) in connection with the contractor, and :

Personal injury or death due to vehicles of the contractor and or due to any accident that may arise at or around the site to the Contractor personnel or to the Corporation staff or to any other person not connected with Corporation /Contractor

- 2 Policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the date of actual starting of work. All such insurance shall provide for compensation to be payable in the types of proportions of currencies required to rectify the loss or damage incurred
- 3 If the contractor did not produce any of the policies and certificates required the Engineer may effect the Insurance for which the contractor should have produced the policies certificates and recover the premium it has paid from payment otherwise due to the contractor or, if no payments due to payment of the premiums shall be of debt due.
- 4 Alternations to the terms of an insurance shall not be made without the approval of the Engineer
- 5 The minimum insurance cover for loss damages to physical property, injury and death shall be 10% of the contract cost per occurrence with number of occurrences as 3(Three). After each occurrence the contractor shall pay additional premium necessary so as to keep the insurance police valid always till the defect liability period is over
- 6 No payment will be released to the contractor until the insurance coverage with the Govt. Insurance fund, Maharashtra State is provided and unless the proof of insurance coverage is produced by the Contractor to the Engineer-in-Charge

Clause 62: During execution of work excavation is required to be carried out for various sub-works for which royalty is required is to be paid by the contractor.

During execution of work and till completion if point of royalty is raised by collector office it will be sole responsibility of the contractor to pay royalty charges/compensation if any to concern. Until the certificate from the collector office regarding royalty charges is not submitted by the contractor, final bill and security deposit for such work will not be payable to the contractor.

City Engineer/ Engineer in charge
Navi Mumbai Municipal Corporation, Navi Mumbai

GENERAL SCOPE OF WORK

NAVI MUMBAI MUNICIPAL CORPORATION, NAVI MUMBAI

WATER SUPPLY DEPARTMENT

**NAME OF WORK: 24X7 WATER SUPPLY SYSTEM FOR BELAPUR WARD
NAVI MUMBAI UNDER AMRUT 2.0 MISSION**

GENERAL SCOPE OF WORK

Design & Construction of Working survey, Transmission Main, RCC GSR & Sump, Pump House, Installation of pumping machinery, Substation room, Pure water rising main, Dismantling of ESR & GSR. Repairs of ESR & GSR, Construction of RCC ESR, Distribution network system, Road restoration, test & trial run.

SCHEDULE-A

Navi Mumbai Municipal Corporation, Navi Mumbai
Water Supply Department

NAME OF WORK : : 24X7 WATER SUPPLY SYSTEM FOR BELAPUR WARD NAVI
MUMBAI UNDER AMRUT 2.0 MISSION

MATERIAL TO BE ISSUED UNDER SCHEDULE „A“

Statement showing the material to be supplied from the store for the work contracted to be executed and preliminary and ancillary works and the rate at which they are to be charged.

<i>Sr. No.</i>	<i>Particulars of Material</i>	<i>Approx. Quantity & Unit</i>	<i>Rate at which the material will be charged for</i>	<i>Place of delivery</i>
1	2	3	4	5

Contractor

No. of correction

City Engineer

Navi Mumbai Municipal Corporation, Navi Mumbai
Water Supply Department

NAME OF WORK : : 24X7 WATER SUPPLY SYSTEM FOR BELAPUR WARD NAVI MUMBAI
 UNDER AMRUT 2.0 MISSION

CONDITIONS FOR MATERIAL SCHEDULE „A“

1. Other materials except as shown in Schedule „A“ required for the work shall be procured and supplied by the contractor at his cost. In such cases the test certificate for their quality shall have to be produced by the contractor.
2. Material shall be available for delivery on any working day from 11.00 A.M. to 05.00 P.M. with at least week's intimation in advance.
3. The contractor shall maintain proper account of consumption of all material supplied to him by the department as per Schedule „A“ in the register which may be if required, modified as prescribed by Navi Mumbai MUNICIPAL Corporation and shall submit the extract of the same monthly to the City Engineer/Engineer in charge. The City Engineer/Engineer in charge shall reserve the right to stop further issue of material to the contractor, if monthly account of the previously issued material is not submitted by the contractor. He shall be fully responsible for the consequence arising out of this.

The contractor shall be responsible for proper handling and safe custody of material issued to him by Municipal Corporation, for use on the work and shall return to Government all surplus material after completion of work, if and as ordered by the City Engineer vide Clause 12 of B.1 Form. The cost of damages or unserviceable material as would be fixed by the Engineer-in-charge shall be recovered from the contractor. The material, which is not found, accounted properly after considering reasonable percentage of wastage shall be charged at panel rates or determined by the Engineer-in-charge.

4. The contractor shall at his own cost make arrangement for storing cement brought by him by constructing a pakka shed and platform, etc. with double locking arrangements. Any damage to the cement due to inadequate provision of store theft, etc. will be to the account of the contractor.

5. If there is delay in supplying the materials due to reasons outside the control of the Department or due to the materials being out of stock, no claim for compensation will be considered on the ground of delay in the supply of materials.
6. All the materials mentioned in Schedule „A' required for the work shall be obtained from the Department's store only where otherwise provided. The material obtained from other sources shall not be allowed to be used except under written permission of the Engineer-in-charge and after producing necessary test certificate.
7. The contractor shall inspect the material thoroughly before taking delivery of the same and shall take the delivery in good and sound condition and sign the unstamped receipt in token of receipt. Damages to the material noticed afterwards will be to the account of the contractor.
8. Quantities in Schedule „A' are approximate and shall vary according to actual and bonafied use.
9. All the materials remaining unused after the completion of the work are to be returned to Municipal Corporation at their store at the cost of the contractor and the credit if due will be given as per rules enforce.
10. The contractor shall submit account of all the materials issued to him previously before demand for any fresh materials is made. Materials that cannot be accounted for shall be recovered from him at the rates decided by the City Engineer/Engineer in charge.
11. The contractor will have to provide the manufacturer test report from Government Laboratory regarding steel to be provided by the contractor.
12. If the contractor fails to return the balance materials with the firm, the same shall be recovered at two times the issue rate or at the prevailing market rate, whichever is higher.
13. C.I. flanged and S/s specials required other than that not available with the department for the work will be supplied by contractor as per necessity of the work.
14. The contractor shall be responsible for safety of materials (even if it is laid in ground) till satisfactory Hydraulic Test is completed and work is finally handed over to the NMMC.
15. If the material supplied to the contractor at the place other than mentioned in Schedule „A", the transport charges will be paid as per prevailing DSR for the shortest between stipulated place of delivery and actual place of

delivery. In addition Octroi on such a material, if paid by the contractor, same shall be reimbursed to the contractor on production of proof of payment of such charges to Municipal Corporation.

SCHEDULE-B

NAVI MUMBAI MUNICIPAL CORPORATION							
Name of Work:- 24X7 WATER SUPPLY SYSTEM FOR BELAPUR WARD NAVI MUMBAI UNDER AMRUT 2.0 MISSION							
NMMC /C.E/02/2023-24							
SCHEDULE-B							
Sl. No.	Item Description	Specification	Quantity	Estimated Rate	Units	TOTAL AMOUNT Without Taxes	TOTAL AMOUNT In Words
1	2		3	5	4	6	55
1	Item No 1:- Reconnaissance Survey of Road alignment in plain country including taking three dimensions of apexes, verification of type of land etc. longwith the alignment etc. complete (With Chaining).	As directed by Engineer Incharge	42.00	2500.00	Km	105000.00	INR One Lakh Five Thousand Only
2	Item No 2:- 1. Carrying out RCC & Hydraulic Design and Proof checking Charges from IIT Bombay. 2. Carring out Consumer survey of all properties in Belapur Node Carrying out consumer survey in order to collect identification details, socio-economic characteristics, details of consumers connection, , details of consumption of water usage, preparing database system including all the attribute tables of consumers data, matching of consumer survey data with billing	As directed by Engineer Incharge	1.00	2970730.69	job	2970730.69	INR Twenty Nine Lakh Seventy Thousand Seven Hundred & Thirty and Paise Sixty Nine Only

	data,integration of consumer survey with GIS layer, showing coverage of water supply scheme on digitised map using different annotations,attaching the attribute tables to the point feature representing consumer in appropriate GIS software etc. complete as per prescribed format, as per direction of Engineer-in-charge and detailed specification etc. complete. Consumer Survey.						
3	Item No 3:- Cutting down trees including trunks and branches with girths above and stacking the materials neatly with all leads and lifts of 1000 m. as directed and earth filling in depression/pit if any a) 30cm to 60cm.	As directed by Engineer Incharge	20.00	536.55	No	10731.00	INR Ten Thousand Seven Hundred & Thirty One Only
4	Item No 4:- Cutting down trees including trunks and branches with girths above and stacking the materials neatly with all leads and lifts of 1000 m. as directed and earth filling in depression/pit if any b) 60cm to 90 cm.	As directed by Engineer Incharge	25.00	889.35	No	22233.75	INR Twenty Two Thousand Two Hundred & Thirty Three and Paise Seventy Five Only
5	Item No 5:- Cutting down trees including trunks and branches with girths above and stacking the materials neatly with all leads and lifts of 1000 m. as directed and earth filling in depression/pit if any c) above 90 cm to 180cm.	As directed by Engineer Incharge	10.00	1833.30	No	18333.00	INR Eighteen Thousand Three Hundred & Thirty Three Only

6	Item No 6:- Clearing and grubbing road land including uprooting rank vegetation, grass, bushes, shrubs, saplings and trees girth up to 300 mm, removal of stumps of trees cut earlier and disposal of unserviceable materials and stacking of serviceable material to be used or auctioned up to a lead of 1000 metres including removal and disposal of top organic soil not exceeding 150 mm in thickness.	As directed by Engineer Incharge	22030.00	12.60	sqm	277578.00	INR Two Lakh Seventy Seven Thousand Five Hundred & Seventy Eight Only
7	Item No 7:- Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. Excavation for footing Lift 0 to 1.5 M	As directed by Engineer Incharge	12644.39	165.00	Cum	2086324.68	INR Twenty Lakh Eighty Six Thousand Three Hundred & Twenty Four and Paise Sixty Eight Only

8	Item No 8:- Excavation for foundation / pipe trenches in soft rock and old cement and lime masonry foundation asphalt road including removing the excavated material upto a distance of 50 M beyond the area and lifts as below, stacking as directed by Engineer-in-charge, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. Lift 0 to 1.5 M	As directed by Engineer Incharge	20317.37	629.20	Cum	12783689.20	INR One Crore Twenty Seven Lakh Eighty Three Thousand Six Hundred & Eighty Nine and Paise Twenty Only
9	Item No 9:- Providing dry trap/ granite/ quartzite/ gneiss, rubble stone soling in 15 cm to 20 cm thick layers including hand packing and compacting, etc. complete. (Bd-A-12/264)	As directed by Engineer Incharge	2145.98	1610.22	Cum	3455499.92	INR Thirty Four Lakh Fifty Five Thousand Four Hundred & Ninety Nine and Paise Ninety Two Only
10	Item No 10:- Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum)) Pcc for Chairs	As directed by Engineer Incharge	326.29	7489.78	Cum	2443840.32	INR Twenty Four Lakh Forty Three Thousand Eight Hundred & Forty and Paise Thirty Two Only

11	Item No 11:- Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) pcc for footing	As directed by Engineer Incharge	2476.47	7164.15	Cum	17741788.22	INR One Crore Seventy Seven Lakh Forty One Thousand Seven Hundred & Eighty Eight and Paise Twenty Two Only
12	Item No 12:- Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement) M300 Foundation	As directed by Engineer Incharge	724.74	9651.93	cum	6995139.75	INR Sixty Nine Lakh Ninety Five Thousand One Hundred & Thirty Nine and Paise Seventy Five Only

13	Item No 13:-Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)RCC Beam M300	As directed by Engineer Incharge	32.00	11074.23	cum	354375.36	INR Three Lakh Fifty Four Thousand Three Hundred & Seventy Five and Paise Thirty Six Only
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14	Item No 14:- Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement) FootingM 30	As directed by Engineer Incharge	31.35	9339.98	cum	292808.37	INR Two Lakh Ninety Two Thousand Eight Hundred & Eight and Paise Thirty Seven Only
15	Item No 15:- Providing and casting in situ Cement Concrete of trap/ granite/ quartzite/ gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineering charge including normal dewatering, centering, form work, compaction, finishing, the formed surfaces with CM 1:3 of sufficient minimum thickness if special finish is to be provided and curing, etc. complete. N(By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement) RCC M30 For Wall (Item considered for	As directed by Engineer Incharge	133.40	11828.83	cum	1577968.29	INR Fifteen Lakh Seventy Seven Thousand Nine Hundred & Sixty Eight and Paise Twenty Nine Only

	Abutment, pier cap, pier and pedestals)						
16	<p>Item No 16:- Providing and casting in situ Cement Concrete of trap/ granite / quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineerin charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with CM 1:3 of sufficient minimum thickness if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement) Column M30</p>	As directed by Engineer Incharge	2760.91	11255.73	cum	31076057.51	INR Three Crore Ten Lakh Seventy Six Thousand & Fifty Seven and Paise Fifty One Only

17	Item No 17:- Providing and casting in situ Cement Concrete of trap/ granite / quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineer in charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with CM 1:3 of sufficient minimum thickness if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement) Column M250	As directed by Engineer Incharge	13.65	10672.08	cum	145673.89	INR One Lakh Forty Five Thousand Six Hundred & Seventy Three and Paise Eighty Nine Only
18	Item No 18:- Providing and casting in situ Cement Concrete of trap/ granite / quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineer in charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with CM 1:3 of sufficient minimum thickness if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding	As directed by Engineer Incharge	23.40	10943.78	cum	256084.45	INR Two Lakh Fifty Six Thousand & Eighty Four and Paise Forty Five Only

	M.S. or Tor reinforcement) M30 Column						
19	Item No 19:-Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)Beams M250	As directed by Engineer Incharge	23.73	10491.68	cum	248967.57	INR Two Lakh Forty Eight Thousand Nine Hundred & Sixty Seven and Paise Fifty Seven Only

20	<p>Item No 20:- Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)</p> <p>Roof Slab M250</p>	As directed by Engineer Incharge	23.34	11228.68	cum	262077.39	INR Two Lakh Sixty Two Thousand & Seventy Seven and Paise Thirty Nine Only
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21	<p>Item No 21:- Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement) chajja M250</p>	As directed by Engineer Incharge	3.18	11238.58	cum	35738.68	INR Thirty Five Thousand Seven Hundred & Thirty Eight and Paise Sixty Eight Only
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22	<p>Item No 22:- Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement) M30 Beams</p>	As directed by Engineer Incharge	46.68	10762.28	cum	502383.23	INR Five Lakh Two Thousand Three Hundred & Eighty Three and Paise Twenty Three Only
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23	<p>Item No 23:- Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement) M30 Slab</p>	As directed by Engineer Incharge	45.96	11516.88	cum	529315.80	<p>INR Five Lakh Twenty Nine Thousand Three Hundred & Fifteen and Paise Eighty Only</p>
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24	<p>Item No 24:- Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement) M30 Chajjas</p>	As directed by Engineer Incharge	2.52	11481.68	cum	28933.83	INR Twenty Eight Thousand Nine Hundred & Thirty Three and Paise Eighty Three Only
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25	Item No 25:-Manufacturing, providing and 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 railway freight, insurance, unloading from railway wagon, loading into truck, transport to stores, unloading, stacking, excluding GST levied by GOI & GOM in all respect etc. complete as per IS - 3589 and IS-5504 as applicable as per specifications (No negative tolerance in thickness is permissible). 800 mm (I.D.) 8 mm thick	As directed by Engineer Incharge	8812.00	16406.00	RMT	144569672.00	INR Fourteen Crore Forty Five Lakh Sixty Nine Thousand Six Hundred & Seventy Two Only
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26	<p>Item No 26:- Providing and applying 3 LPE (3 layer polyethylene) coating of min. 3000 microns composite coating and internal Fusion Bonded Epoxy Lining as per IS 3589 Annex. C of 400 micron thickness for underground laying of MS pipe, similarly due layer polyester coating of 400 micron externally and internal fusion bonded lining as per IS 3531 for above ground laying of MS pipe. Rate shall include cost of material coating and wrapping over the pipes, handling charges, preperation of pipe surface, all labour, material, including transportation of pipes from site of works to factory and back to site of works after coating excluding GST levied by Gol and GoM in all respect etc. complete. (The rate is for inside plus outside area both included) at Factory</p>	As directed by Engineer Incharge	22592.84	1582.90	sqm	35762206.44	INR Three Crore Fifty Seven Lakh Sixty Two Thousand Two Hundred & Six and Paise Forty Four Only
27	<p>Item No 27:- Blast cleaning the surface of the old or new pipeline internally to remove all rust etc. complete, including providing copper slag/garnet, machinery, labour, cutting of pipes at required places and rewelding the same etc, complete as directed by Engineer-in-charge. (Pipes pieces if required for rewelding of old pipeline shall be paid separately.)</p>	As directed by Engineer Incharge	1109.91	158.40	sqm	175809.74	INR One Lakh Seventy Five Thousand Eight Hundred & Nine and Paise Seventy Four Only

28	Item No 28:- Blast cleaning the surface of the old or new pipeline externally to remove all rust including providing copper slag/garnet machinery etc. complete as directed by Engineer-in-charge.	As directed by Engineer Incharge	1109.91	170.50	sqm	189239.66	INR One Lakh Eighty Nine Thousand Two Hundred & Thirty Nine and Paise Sixty Six Only
29	Item No 29:- External Coating Providing and applying 100% Solids Polyurethane Coating meeting BIS16719 or Rigid, Direct to Metal, 100% Solids Polyurethane Coating meeting AWWA C-222 of minimum 1000 micron thickness on the external surface of MS Pipe after blast cleaning to SA 2½ with Anchor profile of >75 Microns using angular Steel Grit. Pipe blast cleaning and coating shall only be permitted in the pipe manufacturer's facility, preferably on rolling conveyor using fast set materials. The rates are including loading, unloading, handling and transportation of Pipe etc complete Product shall be supplied and applied as per detailed specification provided by the department.	As directed by Engineer Incharge	1109.91	728.20	sqm	808236.46	INR Eight Lakh Eight Thousand Two Hundred & Thirty Six and Paise Forty Six Only

30	<p>Item No 30:- Internal Lining (food grade Epoxy) Providing and applying two part food grade polyamide cured solvent less epoxy lining, meeting BIS 16676on the internal surface of MS Pipe afterblast cleaning to SA 2½ with Anchor Profile of >75 Microns Using angular Steel Grit.The minimum dry film thickness (DFT) of internal lining shall be 400 micron (SSPC PA2). The epoxy coating should offer highest resistance to cathodic disbondment and provide excellent adhesion to steel. The manufacturer shall have the certificate issued in support of portable water service for tests of pH, turbidity, total hardness, chloride nitrate, iron, arsenic & fluoride as per IS 10500 : 2003 and IS 16676 : 2017. Site application shall not be permitted.The rates are including loading, unloading, handling and transportation of Pipe etc complete Product shall be supplied and applied as per detailed specification provided by the department.</p>	As directed by Engineer Incharge	1109.91	456.50	sqm	506673.92	INR Five Lakh Six Thousand Six Hundred & Seventy Three and Paise Ninety Two Only
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31	Item No 31:- Providing and supplying ISI standard MS specials of required thickness with 3 coats of approved make epoxy paint (Shalimar, Ciba or Mahindra & Mahindra make) from inside and outside excluding all statutory duties & taxes such as GST levied by GOI & GOM in all respect, inspection charges, transportation to stores / site, and stacking, etc. complete Plain ended specials or plain ended branch flanged specials of all diameters.	As directed by Engineer Incharge	94435.51	95.00	kg	8971373.45	INR Eighty Nine Lakh Seventy One Thousand Three Hundred & Seventy Three and Paise Forty Five Only
32	Item No 32:-Lowering, laying in position to correct line and level including M. S. pipes with / without any outcoating on pedestals or chairs upon prepared formation. The rate to include loading, unloading, hoisting, marginal cutting wherever required, assembling and tack welding, and transportation upto 500 M. etc. completed as specified.MS Pipe Above 750 mm. Upto 1000 mm. dia	As directed by Engineer Incharge	8812.00	763.40	Rmt	6727080.80	INR Sixty Seven Lakh Twenty Seven Thousand &Eighty and Paise Eighty Only

33	Item No 33:- Lowering, laying in position to correct line and level including M. S. specials with / without any outcoating such as distance pieces, straps, bends, tapers, etc. on pedestals or chairs upon formation. The rate to include loading, unloading, hoisting, marginal cutting wherever required, assembling and tack welding, and transportation upto 500M	As directed by Engineer Incharge	441.00	1067.00	Rmt	470547.00	INR Four Lakh Seventy Thousand Five Hundred & Forty Seven Only
34	Item No 34:- Welding in all positions with required number of runs, for M.S. pipes internally and / or externally including gauging wherever necessary, fixing appurtenances and other accessories in connection with pipe laying work as per specification. Butt Joints 8 mm thick	As directed by Engineer Incharge	12387.95	1413.50	Rmt	17510367.33	INR One Crore Seventy Five Lakh Ten Thousand Three Hundred & Sixty Seven and Paise Thirty Two Only
35	Item No 35:- Lap Joint with Convex fillet welds.8 mm	As directed by Engineer Incharge	1356.40	613.80	Rmt	832558.32	INR Eight Lakh Thirty Two Thousand Five Hundred & Fifty Eight and Paise Thirty Two Only
36	Item No 36:- Gas cutting (either square cut or V cut) pipes, plates,etc. of thickness.ii) Above 5 mm. Upto 10 mm	As directed by Engineer Incharge	894.27	191.40	Rmt	171163.66	INR One Lakh Seventy One Thousand One Hundred & Sixty Three and Paise Sixty Six Only

37	<p>Item No 37:- Providing and laying Cast in situ/Ready Mix cement concrete in M20 of trap/ granite/quartzite/gneiss metal for bed blocks, foundation blocks and such other items including bailing out water, Steel centering, formwork, laying/ pumping, compacting, roughening them if special finish is to be provided, finishing uneven and honeycombed surface and curing etc. complete. The Cement Mortar 1:3 plaster is considered for rendering uneven and honeycombed surface only. Newly laid concrete shall be covered by gunny bag, plastic, tarpaulin etc. (Wooden centering will not be allowed.), with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Crushed sand VSI Grade)</p>	As directed by Engineer Incharge	209.85	9339.98	cum	1959994.80	<p>INR Nineteen Lakh Fifty Nine Thousand Nine Hundred & Ninety Four and Paise Eighty Only</p>
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38	Item No 38:- Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306) Corrosion resistant steel (Fe 500)	As directed by Engineer Incharge	301.35	114096.40	MT	34382950.14	INR Three Crore Forty Three Lakh Eighty Two Thousand Nine Hundred & Fifty and Paise Fourteen Only
39	Item No 39:- Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306)	As directed by Engineer Incharge	20.10	94188.15	MT	1893464.38	INR Eighteen Lakh Ninety Three Thousand Four Hundred & Sixty Four and Paise Thirty Eight Only

40	Item No 40:- Providing double flange sluice valve confirming for IS- 14846 including worn gear arrangements as per test pressure, stainless steel spindle, caps, including inspection charges, transportation upto departmental store, unloading, stacking excluding GST levied by GOI & GOM in all respect etc. complete. Sluice Valve PN1.6 with bypass arrangement 600mm	As directed by Engineer Incharge	6.00	202947.00	No	1217682.00	INR Twelve Lakh Seventeen Thousand Six Hundred & Eighty Two Only
41	Item No 41:-Providing double flange sluice valve confirming for IS- 14846 including worn gear arrangements as per test pressure, stainless steel spindle, caps, including inspection charges, transportation upto departmental store, unloading, stacking excluding GST levied by GOI & GOM in all respect etc. complete. Butterfly Valves - PN 16 800 mm dia pipeline	As directed by Engineer Incharge	12.00	205650.00	No	2467800.00	INR Twenty Four Lakh Sixty Seven Thousand Eight Hundred Only

42	<p>Item No 42:- Providing and supplying at site ductile iron / Spheroidal Graphite (S.G.) iron single / Double chamber tamper proof air valve without isolating sluice valve. Valves in accordance with BSEN 1074-4 of PN 10/16 rated, with body and bonnet of ductile iron confirming to EN 1563/IS 1865 Gr. 500/7 or Gr.400/15 floats, float guide, seat ring of stainless steel 1.4436/1.4306, seat ring gasket of WRAS approved EPDM rubber (suitable for drinking water), internal fasteners of stainless steel A2. Body & Bonnet coated inside & outside with electrostatically applied epoxy powder coated blue colour (suitable for drinking water) as per DIN 30677-2 & GSK guidelines with a coating thickness of min. 250 microns. Flange connections as per IS 1538 raised face & pressure testing at manufactures works shall be done as per IS 14845. including transportation charges excluding GST levied by GOI & GOM in all respect etc. complete. (For PN 10 & 16) 200 mm dia</p>	As directed by Engineer Incharge	18.00	45270.00	No	814860.00	INR Eight Lakh Fourteen Thousand Eight Hundred & Sixty Only
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43	Item No 43:- Expansion Joints Providing, fabricating and fixing expansion joints for pipelines as per the drawing. The rate to include machining the strakes and steel ring as shown in the drawing and welding on either automatic welding machine or manually, Rate includes plates and flats required for expansion joint and all other materials such as synthetic rubber, rubber ring, etc. including packing as per specifications, grease, bolts and nuts, local handling, excluding GST levied by GOI & GOM in all respect etc. complete. 800 mm dia	As directed by Engineer Incharge	8.00	157871.00	Each	1262968.00	INR Twelve Lakh Sixty Two Thousand Nine Hundred & Sixty Eight Only
44	Item No 44:- Dismantling Joint Providing, erecting and commissioning M.S. Dismantling joint as per requirement and Department's approved drawing and specifications, including machining and rubber rings and suitable for 16 kg/cm ² working pressure with required flanges of suitable size with nut bolts etc complete. The joint should have through long bolts so that during normal working pressure there should be no sliding movement of sliding flanges. L.O.F. (length over flange) should not be less than 75% of dia. 800 mm dia	As directed by Engineer Incharge	12.00	108762.00	Each	1305144.00	INR Thirteen Lakh Five Thousand One Hundred & Forty Four Only

45	Item No 45:- Lowering, laying and fixing in proper alignment and position all types of C.I/DI. air valves as directed by Engineer-in-charge including cost of conveyance from stores to site of work, cost of all material and giving satisfactory hydraulic testing, etc. complete. (for all class of valves). 200mm dia	As directed by Engineer Incharge	18.00	943.80	No	16988.40	INR Sixteen Thousand Nine Hundred & Eighty Eight and Paise Forty Only
46	Item No 46:- Lowering, laying and jointing in position following C.I.D/F Reflex valves, Butterfly valves and Sluice valves including cost of all labour jointing material, including nut bolts and giving satisfactory hydraulic testing etc. complete. (Rate for all class of valves.)600 mm	As directed by Engineer Incharge	6.00	10734.90	No	64409.40	INR Sixty Four Thousand Four Hundred & Nine and Paise Forty Only
47	Item No 47:-Lowering, laying and jointing in position following C.I.D/F Reflex valves, Butterfly valves and Sluice valves including cost of all labour jointing material, including nut bolts and giving satisfactory hydraulic testing etc. complete. (Rate for all class of valves.)800 mm	As directed by Engineer Incharge	12.00	15187.70	No	182252.40	INR One Lakh Eighty Two Thousand Two Hundred & Fifty Two and Paise Forty Only
48	Item No 48:- Brick Valve Chamber Providing and constructing B.B. masonry valve chamber with 15 cm thick 1:2:4 proportion PCC bedding, excluding excavation, B.B. masonry in CM 1:5 Proportion precast S.F.R.C. frame and cover, etc. complete as directed by Engineer-in-	As directed by Engineer Incharge	6.00	23685.20	No	142111.20	INR One Lakh Forty Two Thousand One Hundred & Eleven and Paise Twenty Only

	charge.As above of 1.2X1.2 M internal size and depth upto 1.2 M with S.F.R.C. frame and cover of size 540 mm dia. fixed in RCC slab.						
49	Item No 49:- Providing and constructing B.B. masonry valve chamber with 15 cm thick 1:3:6 proportion PCC bedding, excluding excavation, B.B. masonry in CM 1:5 proportion precast RCC frame and cover, etc. complete as directed by Engineer-in-charge. Note : Wall thickness : 0.23 M for depth of 1.2 M and 0.35 M for balance depth exceeding 1.2 M. 1.2 x 1.2 M , Depth 1.2 M.	As directed by Engineer Incharge	10.00	17911.30	No	179113.00	INR One Lakh Seventy Nine Thousand One Hundred & Thirteen Only
50	Item No 50:- Providing and constructing B.B. masonry valve chamber with 15 cm thick 1:3:6 proportion PCC bedding, excluding excavation, B.B. masonry in C.M. 1:5 Proportion, 20mm thick cement plaster in CM 1:4 proportion on both side, precast RCC frame and cover, etc. complete as directed by Engineer-in-charge(Note : Wall thickness : 0.23 M for depth of 1.2 M and 0.35 M for balance depth exceeding 1.2 M)As above of 1.5 x 1.5 M internal size and depth upto 1.5 M with precast R.C.C slab cover.	As directed by Engineer Incharge	5.00	27233.80	No	136169.00	INR One Lakh Thirty Six Thousand One Hundred & Sixty Nine Only

51	Item No 51:- Providing and fixing in position air valve shaft including providing and fixing GI Medium Class or 6 mm thick M.S. pipe shaft 2.70 M long over branch flange of air valve tee, providing PCC block of M-150 concrete, 150 mm thick around the air valve tee including encasing of vertical shaft in PCC M 150 as shown in type design together with providing and making flanged joints wherever required and fixing of air valve tee, etc. complete as per type design and as directed by Engineer - in- charge for following diameters of pipe lines (type design	As directed by Engineer Incharge	18.00	14619.00	sqm	263142.00	INR Two Lakh Sixty Three Thousand One Hundred & Forty Two Only
52	Item No 52:- Hydraulic testing of M.S. pipeline to specified pressure including cost of all materials and labour and water for testing for the length upto 1 km., using reciprocating type pumps which should be able to provide specified test pressure gauges and other necessary equipments, labour, operation charges, etc. required for testing. The rate under this item shall also include cost of retesting, if necessary. Initial 0.0 -1.0 Km Above 750 mm. upto 900 mm. dia. (I.D.) Extra over remaining length	As directed by Engineer Incharge	1.00	66199.10	km	66199.10	INR Sixty Six Thousand One Hundred & Ninety Nine and Paise Ten Only

53	Item No 53:- Hydraulic testing of M.S. pipeline to specified pressure including cost of all materials and labour and water for testing for the length upto 1 km., using reciprocating type pumps which should be able to provide specified test pressure gauges and other necessary equipments, labour, operation charges, etc. required for testing. The rate under this item shall also include cost of retesting, if necessary. Initial 1.0 to 2. Km Above 750 mm. upto 900 mm. dia. (I.D.) extra work initial KM	As directed by Engineer Incharge	7.81	66911.90	km	522715.76	INR Five Lakh Twenty Two Thousand Seven Hundred & Fifteen and Paise Seventy Six Only
54	Item No 54:- Providing structural steel work in rolled stanchions fixed with connecting plates or angle cleats as in main and cross beams, hip and jack rafters, purlins connecting to truss members and like as per detailed designs and drawings or as directed by Engineer-in-charge including cutting, fabricating, hoisting, erecting, fixing in position, making riveted / bolted / welded connections and one coat of anticorrosive paint and over it two coats of oil painting, etc. complete. (Bd-C-3/275)	As directed by Engineer Incharge	102.89	78414.60	MT	8068376.17	INR Eighty Lakh Sixty Eight Thousand Three Hundred & Seventy Six and Paise Seventeen Only

55	Item No 55:- Refilling the trenches with available excavated stuff with soft material first over pipeline and then hard material in 15 cm layers with all leads and lifts including consolidation, surcharging, etc. complete.	As directed by Engineer Incharge	53366.39	92.40	cum	4931054.47	INR Forty Nine Lakh Thirty One Thousand & Fifty Four and Paise Forty Seven Only
56	Item No 56:- Dismantling the R.C.C. Work 1:2:4 and sorting out the materials such as steel etc. as directed and stacking them within the specified lead as directed etc. complete.	As directed by Engineer Incharge	2930.68	1523.55	cum	4465037.51	INR Forty Four Lakh Sixty Five Thousand & Thirty Seven and Paise Fifty One Only
57	Item No 57:- Dismantling brick masonry in lime or cement mortar and stacking the materials as directed with all leads, lifts etc.	As directed by Engineer Incharge	120.00	351.75	cum	42210.00	INR Forty Two Thousand Two Hundred & Ten Only
58	Item No 58:- Providing detailed geological reports of proposed site by maintaining geotechnical investigation of structure stratification collecting soil, rock and ground water samples for laboratory tests to arrive the foundation design parameters . Rock properties such as type of rock, jointing fractures, etc. complete with suggestion about the site foundation and remedies.	As directed by Engineer Incharge	2.00	40656.00	Report	81312.00	INR Eighty One Thousand Three Hundred & Twelve Only

59	Item No 59:- Dewatering the excavated trenches and pools of water in the building trenches / pipeline trenches, well works by using pumps and other devices including disposing off water to safe distance as directed by Engineer-in-charge (including cost of machinery, labour, fuel), etc. complete. (Bd-A 9/261)	As directed by Engineer Incharge	6420.00	80.85	HP/Hr	519057.00	INR Five Lakh Nineteen Thousand & Fifty Six and Paise One Hundred Only
60	Item No 60:- Dewatering the excavated trenches and pools of water in the building trenches / pipeline trenches, well works by using pumps and other devices including disposing off water to safe distance as directed by Engineer-in-charge (including cost of machinery, labour, fuel), etc. complete. (Bd-A 9/261)	As directed by Engineer Incharge	105200.00	84.70	BHP/HR	8910440.00	INR Eighty Nine Lakh Ten Thousand Four Hundred & Forty Only
61	Item No 61:- Installation of product pipe by Micro Tunneling method including Concrete Structural shaft of sheet piles/RCC Retaining walls/well sinking/secant piling as per respective site requirements (upto 100 meter of instalation length ande 5m depth) all inclusive as per indSTT;102-2018;code of practice for micro tunneling for slurry based microtunneling suitable for steel/RCC Jacking pipes suiting indian condition including M.S Pipe of 1200 mm dia 10mm thick for Casing pipe and 800 mm Dia 8 mm	As directed by Engineer Incharge	262.00	242536.62	Mtr	63544594.44	INR Six Crore Thirty Five Lakh Forty Four Thousand Five Hundred & Ninety Four and Paise Forty Four Only

	thick for carrier pipe supplying ,lowering laying including MS Specials,Gas cutting,lap jointing ,welding ,3 LPE COating ,HDPE Spacer,Dewatering,Plastering,Brick masonry on closing ends and painting Complete as per specifications and Engineer in charge						
62	Item No 62:- Dismantling dead pipeline of M.S./ R.C.C./ C.I./ P.S.C. and G.I./ A.C./ P.V.C./ S.W./ H.D.P.E. pipe including cost of necessary excavation and refilling of trenches, breaking the joints, lifting the pipes and stacking to the place as directed by Engineer-in-charge with all leads and lifts including cleaning the surface, etc. complete. A For M.S. / R.C.C. / C.I. / P.S.C.	As directed by Engineer Incharge	3000.00	750.93	Rmt	2252790.00	INR Twenty Two Lakh Fifty Two Thousand Seven Hundred & Ninety Only
63	Item No 63:- Credit for Dismantled Material HG / M.S / G.I. Materials / Poles etc.	As directed by Engineer Incharge	236781.10	23.00	Kg	-5445965.30	INR Minus Fifty Four Lakh Forty Five Thousand Nine Hundred & Sixty Six and Paise Seventy Only
64	Item No 64:- Supplying & erecting jelly filled armoured telephone copper cable 10 pair with 0.5 mm dia. laid in provided trench as per specification No. WG-TW	As directed by Engineer Incharge	200.00	144.00	Rmt	28800.00	INR Twenty Eight Thousand Eight Hundred Only

65	Item No 65:- Supplying & erecting jelly filled armoured telephone copper cable 20 pair with 0.5 mm dia. laid in provided trench as per specification No. WG-TW	As directed by Engineer Incharge	200.00	204.00	Rmt	40800.00	INR Forty Thousand Eight Hundred Only
66	Item No 66:- Supplying & erecting jelly filled armoured telephone copper cable 50 pair with 0.5 mm dia. laid in provided trench as per specification No. WG-TW	As directed by Engineer Incharge	180.00	411.00	Rmt	73980.00	INR Seventy Three Thousand Nine Hundred & Eighty Only
67	Item No 67:- Supplying & erecting telephone copper cable 10 pair with 0.5 mm dia. laid in provided PVC casing capping / conduit as per specification No. WG-TW	As directed by Engineer Incharge	180.00	76.00	Rmt	13680.00	INR Thirteen Thousand Six Hundred & Eighty Only
68	Item No 68:- Supplying & erecting telephone copper cable 5 pair with 0.5 mm dia. laid in provided PVC casing capping / conduit as per specification No. WG-TW	As directed by Engineer Incharge	180.00	49.00	Rmt	8820.00	INR Eight Thousand Eight Hundred & Twenty Only
69	Item No 69:- Supplying and erecting LSZH armoured multimode optical fibre cable with 6 fibres, core dia 50/125 µm (OM3), suitable upto 10 GBPS, ethernet distance at 850 nm of wavelength, on wall/ceiling or laid in provided pipe/trench as per specification no. WG-COC/OFC LSZH	As directed by Engineer Incharge	200.00	200.00	Rmt	40000.00	INR Forty Thousand Only

70	Item No 70:- Supplying and installing armoured single mode optical fibre cable with 6 fiber, core dia 50/125µm (OS1/OS2) 10/40 GBPS speed in provided underground HDPE pipe complete.	As directed by Engineer Incharge	250.00	104.00	Rmt	26000.00	INR Twenty Six Thousand Only
71	Item No 71:-Supply & erecting of FR grade PVC armoured multi mode Optical Fibre Cable with 24 fibres with core dia 50 µm, suitable for 1 GBps Ethernet distance at 850 nm of wavelength on wall/ ceiling or laid in provided pipe / trench as per specification no. WG- COC/ OFC	As directed by Engineer Incharge	220.00	112.00	Rmt	24640.00	INR Twenty Four Thousand Six Hundred & Forty Only
72	Item No 72:- Supplying and erecting LSZH armoured multimode Optical Fibre Cable with 24 fibres, with core dia 50/125 µm (OM4) suitable for 1 gbps ethernet distance at 850 nm of wavelength, on wall/ceiling or laid in provided pipe/trench as per specification No. WG- OC/OFC	As directed by Engineer Incharge	220.00	3450.00	Rmt	759000.00	INR Seven Lakh Fifty Nine Thousand Only
73	Item No 73:- Supplying and erecting LSZH armoured multimode optical fibre cable with 12 fibres, with core dia 50/125 µm (OM4) suitable for 1 gbps ethernet distance at 850 nm of wavelength, on wall/ceiling or laid in provided pipe/trench as per specification No. WG-COC/OFC	As directed by Engineer Incharge	180.00	2024.00	Rmt	364320.00	INR Three Lakh Sixty Four Thousand Three Hundred & Twenty Only

74	Item No 74:- Supply & fixing of wall /rack type 12 port light guide interconnection unit for termination of optical fibre cable on wall /provided U rack complete as per specification no. EG- NAS / LIU	As directed by Engineer Incharge	11.00	4853.00	No	53383.00	INR Fifty Three Thousand Three Hundred & Eighty Three Only
75	Item No 75:- Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 2.5 to 16 sq. mm. cable, with necessary material as per specification no. CB-JT/LT	As directed by Engineer Incharge	45.00	2229.00	Each	100305.00	INR One Lakh Three Hundred & Five Only
76	Item No 76:- Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 2.5 to 16 sq. mm. cable, with necessary material as per specification no. CB-JT/LT	As directed by Engineer Incharge	50.00	2672.00	Each	133600.00	INR One Lakh Thirty Three Thousand Six Hundred Only
77	Item No 77:-Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 2.5 to 16 sq. mm. cable, with necessary material as per specification no. CB-JT/LT	As directed by Engineer Incharge	48.00	3511.00	Each	168528.00	INR One Lakh Sixty Eight Thousand Five Hundred & Twenty Eight Only
78	Item No 78:- Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 70 to 95 sq. mm. cable, with necessary material as per specification no. CB-JT/LT	As directed by Engineer Incharge	27.00	3645.00	Each	98415.00	INR Ninety Eight Thousand Four Hundred & Fifteen Only

79	Item No 79:- Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 120 to 185 sq. mm. cable, with necessary material as per specification no. CB-JT/LT	As directed by Engineer Incharge	25.00	5655.00	Each	141375.00	INR One Lakh Forty One Thousand Three Hundred & Seventy Five Only
80	Item No 80:- Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 240 sq. mm. cable, with necessary material as per specification no. CBJT/ LT	As directed by Engineer Incharge	20.00	6973.00	Each	139460.00	INR One Lakh Thirty Nine Thousand Four Hundred & Sixty Only
81	Item No 81:- Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 300 sq. mm. cable, with necessary material as per specification no. CBJT/ LT	As directed by Engineer Incharge	14.00	7035.00	Each	98490.00	INR Ninety Eight Thousand Four Hundred & Ninety Only
82	Item No 82:- Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 400 sq. mm. cable, with necessary material as per specification no. CBJT/ LT	As directed by Engineer Incharge	14.00	22446.00	Each	314244.00	INR Three Lakh Fourteen Thousand Two Hundred & Forty Four Only
83	Item No 83:- Providing and erecting Heat shrinkable straight through joint kit for 11 kV XLPE HT cable 3x up to 95 sq. mm. with necessary material as per specification no. CBJT/HT	As directed by Engineer Incharge	14.00	26620.00	Each	372680.00	INR Three Lakh Seventy Two Thousand Six Hundred & Eighty Only

84	Item No 84:- Providing and erecting Heat shrinkable straight through joint kit for 11 kV XLPE HT cable 3x120 to 185 sq. mm. with necessary material as per specification no. CBJT/HT	As directed by Engineer Incharge	11.00	32059.00	Each	352649.00	INR Three Lakh Fifty Two Thousand Six Hundred & Forty Nine Only
85	Item No 85:- Providing and erecting Heat shrinkable straight through joint kit for 22 kV XLPE HT cable 3x up to 95 sq. mm. with necessary material as per specification no. CBJT/HT	As directed by Engineer Incharge	10.00	38565.00	Each	385650.00	INR Three Lakh Eighty Five Thousand Six Hundred & Fifty Only
86	Item No 86:- Providing and erecting Heat shrinkable straight through joint kit for 22 kV XLPE HT cable 3x120 to 185 sq. mm. with necessary material as per specification no. CBJT/HT	As directed by Engineer Incharge	10.00	42001.00	Each	420010.00	INR Four Lakh Twenty Thousand & Ten Only
87	Item No 87:- Providing and erecting Heat shrinkable straight through joint kit for 22 kV XLPE HT cable 3x240 to 300 sq. mm. with necessary material as per specification no. CBJT/HT	As directed by Engineer Incharge	10.00	51671.00	Each	516710.00	INR Five Lakh Sixteen Thousand Seven Hundred & Ten Only
88	Item No 88:-Providing and erecting Heat shrinkable straight through joint kit for 11 kV XLPE HT cable 400 sq. mm. with necessary material as per specification no. CBJT/HT	As directed by Engineer Incharge	10.00	59115.00	Each	591150.00	INR Five Lakh Ninety One Thousand One Hundred & Fifty Only

89	<p>Item No 89:-Providing and Casting RCC bored cast in-situ Vertical as per IS 2911 (Part 1, Section 2) by boring through all kinds of soils/ Sand /Rock by rotary hydraulic rigs using temporary casing up to stable strata / bentonite mud circulation as specified, from tip to cut-off elevation of piles. Reinforced Cement Concrete work of filling the bore (after placement of reinforcement cage as per drawing) with M25 grade Ready Mix Concrete using 43 Grade Ordinary Portland Cement confirming to IS : 8112, of approved make and brand with minimum cement content of 400 kg/m³ and with water -cement ratio, including the water contained in aggregates (10mm to max 20mm size), not exceeding 0.45, with approved plasticizer as specified, including placing of concrete from tip to minimum of 600mm above the specified cut off level, breaking pile head to cutoff level and exposing pile reinforcement for embedment in pile cap, Disposing & levelling of bored/excavated material suitably at locations approved by the local authorities including all lead and lifts, all complete for piles having diameter of (Pile will be measured for payment for length between pile tip to cut-off level along the pile axis.</p>	As directed by Engineer Incharge	376.00	12260.00	Rmt	4609760.00	<p>INR Forty Six Lakh Nine Thousand Seven Hundred & Sixty Only</p>
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	Reinforcement shall be paid separately) M-40 Grade, 900 mm Dia of Pile, Concreting with approved sulphate resistant concrete						
90	Item No 90:- Providing placing and Driving in position 6 millimetre mild steel liner for R.C.C. Piles upto required depth with 12mm thick mild steel cutting edge of 0.50m length at bottom including fabricating cutting the mild steel sheet to required diameter and shape ,welding the joints and driving with the help of required machineries including all materials labours and lifts etc. complete as directed by the Engineer in charge. Spec :(As directed by Engineer in Charge for Full depth of pile	As directed by Engineer Incharge	55.87	126055.00	MT	7042692.85	INR Seventy Lakh Forty Two Thousand Six Hundred & Ninety Two and Paise Eighty Five Only
91	Item No 91:- Carrying out load test for 1.5 times the proposed safe working load on the pile in driven position above 825 mm and upto 900 mm diameter including construction of test cap, use of accessories and instruments ncluding providing graphs as per I.S. code or Std.Specifications and dismantling the test cap after testing and cleaning the site complete.	As directed by Engineer Incharge	1.00	327052.95	Nos	327052.95	INR Three Lakh Twenty Seven Thousand & Fifty Two and Paise Ninety Five Only

92	Item No 92:- Providing and laying Cast in situ/Ready Mix cement concrete M-30 of trap metal for R.C.C. pile caps as per detailed designs and drawings, including bailing out water manually, centering, formwork, laying/ pumping, compacting, finishing and curing etc. with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Crushed sand VSI Grade) complete. (Excluding steel reinforcement)	As directed by Engineer Incharge	43.00	8674.08	Cum	372985.44	INR Three Lakh Seventy Two Thousand Nine Hundred & Eighty Five and Paise Forty Four Only
93	Item No 93:- Carrying out low strain pile integrity test on following diameter and other size of pile including all arrangements for test, equipments/accessories, materials, labour, submission of test report etc but excluding the cost of installation of job pile (installation of pile shall be paid seperately as per relevent items) all complete as per specification and as directed by the engineer-in-charge. 900 mm dia pile	As directed by Engineer Incharge	24.00	4720.00	Nos	113280.00	INR One Lakh Thirteen Thousand Two Hundred & Eighty Only

94	Item No 94:- Providing structural steel work in trusses, other similar trussed purlins and members with all bracing, gusset plates, etc. as per detailed design and drawing or as directed by Engineer-in charge including cutting, fabricating, hoisting, erecting and fixing in position, making riveted / bolted / welded connections and one coat of anticorrosive paint and over it two coats of oil painting, etc. complete. (Bd-C-8/278)	As directed by Engineer Incharge	400.00	104857.50	MT	41943000.00	INR Four Crore Nineteen Lakh Forty Three Thousand Only
95	Item No 95:- Providing and fixing G.I. pipe railing having 1.0 M height consisting 50 x 50 x 6 mm thick M.S. angles as verticals at 1.5 M c/c and additional posts at every corner with 3 rows of 25 mm dia G.I. pipes of medium class variety as horizontal and painting 3 coats of oil paint over 1 coat of anticorrosive paint of approved colour and shade including cost of all labour, transporting bends to curved shape, etc. complete	As directed by Engineer Incharge	462.13	1007.60	RMT	465642.19	INR Four Lakh Sixty Five Thousand Six Hundred & Forty Two and Paise Nineteen Only

96	Item No 96:- Providing and fixing M.S. chequered plate flooring of following thickness supported on M.S. angles (25 x 25 x 5 mm size) including welding, cutting and fabricating the plates to the required square or rounding shape, making holes in the plate, including providing and applying 3 coats of anticorrosive paint, etc. complete as directed by Engineer-in-charge. 6 mm thick and 8mm thick	As directed by Engineer Incharge	300.00	4537.50	Sqm	1361250.00	INR Thirteen Lakh Sixty One Thousand Two Hundred & Fifty Only
97	Item No 97:- Providing and fixing M.S. chequered plate flooring of following thickness supported on M.S. angles (25 x 25 x 5 mm size) including welding, cutting and fabricating the plates to the required square or rounding shape, making holes in the plate, including providing and applying 3 coats of anticorrosive paint, etc. complete as directed by Engineer-in-charge.	As directed by Engineer Incharge	43.20	5622.10	Sqm	242874.72	INR Two Lakh Forty Two Thousand Eight Hundred & Seventy Four and Paise Seventy Two Only
98	Item No 98:- Providing and applying epoxy paint of approved make (Shalimar, Ciba or Mahindra & Mahindra) to concrete surface for RCC ESR or GSR or any other structure including cleaning the surface by scrapping and air blowers to the satisfaction of Engineer-in-charge, necessary scaffolding, etc. complete with all leads and lifts and giving satisfactory	As directed by Engineer Incharge	3600.00	808.50	Sqm	2910600.00	INR Twenty Nine Lakh Ten Thousand Six Hundred Only

	hydraulic test for water tightness as per I.S. codes. FOR NEW SURFACE						
99	<p>Item No 99:-Providing, constructing coffer dam in river basin / dam storages as per type design including xcavation, filling the middle portion with B.C. soil (in gunny bags if required). Providing impervious / semipervious materials on both sides of B.C. soil (in gunny bags if required) including ramming, compacting to the satisfaction of Engineer-in-charge till the completion of work including ismantling coffer dam after completion of works and disposing off the material as directed by theEngineer-in-charge.Note : Pay line maximum. Top width payable shall be 2 Mtr. and maximum payable side slopes shall be 1.5 horizontal to 1 vertical, if the constructed top width of the side slopes are less, then the measurements at actual are payable. Extra top width or flat slopes are not payable. Contractor is free to use ballies, plastic sheets, piles, pipes, CGI sheets for</p>	As directed by Engineer Incharge	10374.80	750.20	cum	7783174.96	INR Seventy Seven Lakh Eighty Three Thousand One Hundred & Seventy Four and Paise Ninety Six Only

	supporting hearting materials instead of impervious/ semi-pervious hearting materials for which no extra payments shall be payable. 30% payment shall be withheld for dismantling of coffer dam. This foot note shall appear in tender condition. (Type section is shown on last page of type design section of CSR).						
100	Item No 100:- Providing and fixing in position M.S. ladder 0.50 M wide consisting of 75 x 10 mm M.S. flats as stringers and 16 mm dia M.S. bars in double rows as steps placed at 25 cm c/c including cost of material and labour involved, welding, anchoring and applying 3 coats of anticorrosive paint, etc. complete as directed by Engineer-in-charge.	As directed by Engineer Incharge	202.00	1642.30	Rmt	331744.60	INR Three Lakh Thirty One Thousand Seven Hundred & Forty Four and Paise Sixty Only

101	<p>Item No 101:- Designing (aesthetically), and constructing RCC ground service reservoirs / RCC sumps in M-300 mix. of required capacity including excavation in all types of strata, foundation concrete, container walls, bottom slab top RCC roof slab / or dome, 20 mm thick cement plaster with water proofing compound in CM1:3 proportion. to inside face of the container, including epoxy paint from inside including refilling and disposing of surplus stuff within lead of 50 M, all labour and material charges, for laying and jointing of pipe assembly for inlet, outlet washout, over flow and bye-pass arrangement consisting of C.I./ M.S.D/F. pipes, specials and valves of given diameters, providing and fixing accessories such as Stainless Steel ladder inside and outside, C.I. Manhole frame and cover, water top slab, B.B. masonry chamber for all valves, ventilating shafts, including giving satisfactory hydraulic test and water tightness test as per IS code and providing three coats of Acrylic emulsion with Silicon additives Paint to all exposed surface of structure including roof surface etc. complete as per design data, criteria, obligatory requirements and detailed specifications. Antitermite treatment</p>	As directed by Engineer Incharge	1.00	7166938.00	job	7166938.00	INR Seventy One Lakh Sixty Six Thousand Nine Hundred & Thirty Eight Only
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<p>shall be given for under ground portion of structure</p> <p>Note :</p> <ol style="list-style-type: none"> 1. The designing shall be in accordance with various relevant I.S. specification (I.S. 456/2000 (Latest edition) , I.S. 875 - 1987, I.S.3370-1965 or revised.) 2. Only M.S. bars grade I confirming to I.S. 432 part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S.1139 shall be used grade II M.S. bars shall not be used. 3. Entire structure shall be constructed in M300 only. 4. The scope of pipe assembly work shall be upto 5 metre beyond outside face of the wall, cost of pipes valves and specials is not included in the rate but labour cost for laying and jointing is included. 5. The G.S.R. / Sump above 15 lakh litres capacity shall be in two compartment. 6. The job includes designing the structure for uplift pressure and dewatering if required using entire execution and disposal of surplus excavated stuff within lead of 50 metres as directed by Engineer-in-charge. If up lifts considered in design then these rate shall be increased by 7.5%. 						
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<p>7. G.S.R. outlets shall be with bell mouth of approved pattern in bottom slab and cost of designing bell mouth is included in the rate. Sump well includes cost of suction pit required at bottom.</p> <p>8. For pipe diameters upto 300 mm only CI pipes and CI specials shall be used. For pipe diameters above 300mm, M.S. pipes and specials minimum 10 mm thick shall be used with proper anticorrosive epoxy treatment from inside and outside.</p> <p>9. Cost of pump house is not included in these rates.</p> <p>10. Above rates are applicable for seismic zones-2,3 and 4.</p> <p>11. 75% part rate shall be payable for reinforcement, concrete and plastering items of all types of G.S.R.s. and sumps till satisfactory hydraulic testing for water tightness test is given and till that work shall be treated as incomplete.</p> <p>12. 10% shall be added for sump if overhead pump house is proposed</p> <p>Note : Condition from Sr. No. 1 to 11 shall form a part and parcel of tender and must be included in the Draft tender papers for work of R.C.C. GSRs and sump. Sump of Cap 10,00,000 litres</p>						
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102	<p>Item No 102:- Designing (aesthetically), and constructing RCC ground service reservoirs / RCC sumps in M-300 mix. of required capacity including excavation in all types of strata, foundation concrete, container walls, bottom slab top RCC roof slab / or dome, 20 mm thick cement plaster with water proofing compound in CM1:3 proportion. to inside face of the container, including epoxy paint from inside including refilling and disposing of surplus stuff within lead of 50 M, all labour and material charges, for laying and jointing of pipe assembly for inlet, outlet washout, over flow and bye-pass arrangement consisting of C.I./ M.S.D/F. pipes, specials and valves of given diameters, providing and fixing accessories such as Stainless Steel ladder inside and outside, C.I. Manhole frame and cover, water top slab, B.B. masonry chamber for all valves, ventilating shafts, including giving satisfactory hydraulic test and water tightness test as per IS code and providing three coats of Acrylic emulsion with Silicon additives Paint to all exposed surface of structure including roof surface etc. complete as per design data, criteria, obligatory requirements and detailed specifications. Antitermite treatment</p>	As directed by Engineer Incharge	1.00	3751966.00	job	3751966.00	INR Thirty Seven Lakh Fifty One Thousand Nine Hundred & Sixty Six Only
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<p>shall be given for under ground portion of structure</p> <p>Note :</p> <ol style="list-style-type: none"> 1. The designing shall be in accordance with various relevant I.S. specification (I.S. 456/2000 (Latest edition) , I.S. 875 - 1987, I.S.3370-1965 or revised.) 2. Only M.S. bars grade I confirming to I.S. 432 part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S.1139 shall be used grade II M.S. bars shall not be used. 3. Entire structure shall be constructed in M300 only. 4. The scope of pipe assembly work shall be upto 5 metre beyond outside face of the wall, cost of pipes valves and specials is not included in the rate but labour cost for laying and jointing is included. 5. The G.S.R. / Sump above 15 lakh litres capacity shall be in two compartment. 6. The job includes designing the structure for uplift pressure and dewatering if required using entire execution and disposal of surplus excavated stuff within lead of 50 metres as directed by Engineer-in-charge. If up lifts considered in design then these rate shall be increased by 7.5%. 						
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<p>7. G.S.R. outlets shall be with bell mouth of approved pattern in bottom slab and cost of designing bell mouth is included in the rate. Sump well includes cost of suction pit required at bottom.</p> <p>8. For pipe diameters upto 300 mm only CI pipes and CI specials shall be used. For pipe diameters above 300mm, M.S. pipes and specials minimum 10 mm thick shall be used with proper anticorrosive epoxy treatment from inside and outside.</p> <p>9. Cost of pump house is not included in these rates.</p> <p>10. Above rates are applicable for seismic zones-2,3 and 4.</p> <p>11. 75% part rate shall be payable for reinforcement, concrete and plastering items of all types of G.S.R.s. and sumps till satisfactory hydraulic testing for water tightness test is given and till that work shall be treated as incomplete.</p> <p>12. 10% shall be added for sump if overhead pump house is proposed</p> <p>Note : Condition from Sr. No. 1 to 11 shall form a part and parcel of tender and must be included in the Draft tender papers for work of R.C.C. GSRs and sump. Pro. Sump_ 0.50 ML</p>						
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103	<p>Item No 103:- Designing (aesthetically), and constructing RCC ground service reservoirs / RCC sumps in M-300 mix. of required capacity including excavation in all types of strata, foundation concrete, container walls, bottom slab top RCC roof slab / or dome, 20 mm thick cement plaster with water proofing compound in CM1:3 proportion. to inside face of the container, including epoxy paint from inside including refilling and disposing of surplus stuff within lead of 50 M, all labour and material charges, for laying and jointing of pipe assembly for inlet, outlet washout, over flow and bye-pass arrangement consisting of C.I./ M.S.D/F. pipes, specials and valves of given diameters, providing and fixing accessories such as Stainless Steel ladder inside and outside, C.I. Manhole frame and cover, water top slab, B.B. masonry chamber for all valves, ventilating shafts, including giving satisfactory hydraulic test and water tightness test as per IS code and providing three coats of Acrylic emulsion with Silicon additives Paint to all exposed surface of structure including roof surface etc. complete as per design data, criteria, obligatory requirements and detailed specifications. Antitermite treatment</p>	As directed by Engineer Incharge	1.00	4382214.00	job	4382214.00	INR Forty Three Lakh Eighty Two Thousand Two Hundred & Fourteen Only
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<p>shall be given for under ground portion of structure</p> <p>Note :</p> <ol style="list-style-type: none"> 1. The designing shall be in accordance with various relevant I.S. specification (I.S. 456/2000 (Latest edition) , I.S. 875 - 1987, I.S.3370-1965 or revised.) 2. Only M.S. bars grade I confirming to I.S. 432 part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S.1139 shall be used grade II M.S. bars shall not be used. 3. Entire structure shall be constructed in M300 only. 4. The scope of pipe assembly work shall be upto 5 metre beyond outside face of the wall, cost of pipes valves and specials is not included in the rate but labour cost for laying and jointing is included. 5. The G.S.R. / Sump above 15 lakh litres capacity shall be in two compartment. 6. The job includes designing the structure for uplift pressure and dewatering if required using entire execution and disposal of surplus excavated stuff within lead of 50 metres as directed by Engineer-in-charge. If up lifts considered in design then these rate shall be increased by 7.5%. 						
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	<p>7. G.S.R. outlets shall be with bell mouth of approved pattern in bottom slab and cost of designing bell mouth is included in the rate. Sump well includes cost of suction pit required at bottom.</p> <p>8. For pipe diameters upto 300 mm only CI pipes and CI specials shall be used. For pipe diameters above 300mm, M.S. pipes and specials minimum 10 mm thick shall be used with proper anticorrosive epoxy treatment from inside and outside.</p> <p>9. Cost of pump house is not included in these rates. RCC GSR capacity is of 5.00 lakh liter.</p>						
104	<p>Item No 104:- Designing (aesthetically), and constructing RCC ground service reservoirs / RCC sumps in M-300 mix. of required capacity including excavation in all types of strata, foundation concrete, container walls, bottom slab top RCC roof slab / or dome, 20 mm thick cement plaster with water proofing compound in CM1:3 proportion. to inside face of the container, including epoxy paint from inside including refilling and disposing of surplus stuff within lead of 50 M, all labour and material charges, for laying and jointing of pipe assembly for inlet, outlet washout, over flow and bye-pass arrangement consisting of C.I./ M.S.D/F. pipes, specials and valves</p>	As directed by Engineer Incharge	1.00	10248618.00	job	10248618.00	INR One Crore Two Lakh Forty Eight Thousand Six Hundred & Eighteen Only

<p>of given diameters, providing and fixing accessories such as Stainless Steel ladder inside and outside, C.I. Manhole frame and cover, water top slab, B.B.masonry chamber for all valves, ventilating shafts, including giving satisfactory hydraulic test and water tightness test as per IS code and providing three coats of Acrylic emulsion with Silicon additives Paint to all exposed surface of structure including roof surface etc. complete as per design data, criteria, obligatory requirements and detailed specifications. Antitermite treatment shall be given for under ground portion of structure</p> <p>Note :</p> <ol style="list-style-type: none"> 1. The designing shall be in accordance with various relevant I.S. specification (I.S. 456/2000 (Latest edition) , I.S. 875 - 1987, I.S.3370-1965 or revised.) 2. Only M.S. bars grade I conforming to I.S. 432 part-I or high yield strength deformed bars conforming to I.S. 1786 or I.S.1139 shall be used grade II M.S. bars shall not be used. 3. Entire structure shall be constructed in M300 only. 4. The scope of pipe assembly work shall be upto 5 metre beyond outside face of the wall, cost of pipes valves and 						
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<p>specials is not included in the rate but labour cost for laying and jointing is included.</p> <p>5. The G.S.R. / Sump above 15 lakh litres capacity shall be in two compartment.</p> <p>6. The job includes designing the structure for uplift pressure and dewatering if required using entire execution and disposal of surplus excavated stuff within lead of 50 metres as directed by Engineer-in-charge. If up lifts considered in design then these rate shall be increased by 7.5%.</p> <p>7. G.S.R. outlets shall be with bell mouth of approved pattern in bottom slab and cost of designing bell mouth is included in the rate. Sump well includes cost of suction pit required at bottom.</p> <p>8. For pipe diameters upto 300 mm only CI pipes and CI specials shall be used. For pipe diameters above 300mm, M.S. pipes and specials minimum 10 mm thick shall be used with proper anticorrosive epoxy treatment from inside and outside.</p> <p>9. Cost of pump house is not included in these rates.</p> <p>10. Above rates are applicable for seismic zones-2,3 and 4.</p> <p>11. 75% part rate shall be payable for reinforcement, concrete and plastering items of all types of</p>						
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	G.S.R.s. and sumps till satisfactory hydraulic testing for water tightness test is given and till that work shall be treated as incomplete. 12. 10% shall be added for sump if overhead pump house is proposed Note : Condition from Sr. No. 1 to 11 shall form a part and parcel of tender and must be included in the Draft tender papers for work of R.C.C. GSRs and sump Pro GSR_ 1.75 ML						
105	Item No 105:- Providing and supplying ISI standard welded DI double flanged pipe including all taxes (central & local) railway freight, insurance, unloading from railway wagon, loading into truck transport to store / site, unloading, stacking etc. complete as directed 150mm dia D.I-K7.pipe-(Inlet, Overflow, Outlet, Washout)	As directed by Engineer Incharge	223.00	3718.00	Rmt	829114.00	INR Eight Lakh Twenty Nine Thousand One Hundred & Fourteen Only
106	Item No 106:- Providing and supplying ISI standard welded DI double flanged pipe including all taxes (central & local) railway freight, insurance, unloading from railway wagon, loading into truck transport to store / site, unloading, stacking etc. complete as directed 200mm dia D.I-K7 .pipe- (Inlet, Overflow, Outlet Washout)	As directed by Engineer Incharge	64.00	4757.00	Rmt	304448.00	INR Three Lakh Four Thousand Four Hundred & Forty Eight Only

107	Item No 107:-Providing and supplying ISI standard welded DI double flanged pipe including all taxes (central & local) railway freight, insurance, unloading from railway wagon, loading into truck transport to store / site, unloading, stacking etc. complete as directed 300mm dia D.I-K7 .pipe- (Inlet, Overflow, Outlet, Washout)	As directed by Engineer Incharge	356.00	8125.00	Rmt	2892500.00	INR Twenty Eight Lakh Ninety Two Thousand Five Hundred Only
108	Item No 108:- Providing and supplying ISI standard welded DI double flanged pipe including all taxes (central & local) railway freight, insurance, unloading from railway wagon, loading into truck transport to store / site, unloading, stacking etc. complete as directed 350mm dia D.I-K7 .pipe- (Inlet, Overflow, Outlet, Washout)	As directed by Engineer Incharge	185.00	10583.00	Rmt	1957855.00	INR Nineteen Lakh Fifty Seven Thousand Eight Hundred & Fifty Five Only
109	Item No 109:- Providing and supplying ISI standard welded DI double flanged pipe including all taxes (central & local) railway freight, insurance, unloading from railway wagon, loading into truck transport to store / site, unloading, stacking etc. complete as directed 400mm dia D.I-K7 .pipe- (Inlet, Overflow, Outlet, Washout)	As directed by Engineer Incharge	71.00	12811.00	Rmt	909581.00	INR Nine Lakh Nine Thousand Five Hundred & Eighty One Only

110	Item No 110:-Providing and supplying ISI standard D. I.specials & fitting with sealing rubber gasket of S.B.R, complete with cast iron follower gland and M. S. nut bolts coated or otherwise protected from rusting and suitable for D.I.pipes including cost of labour ,materials, and transportation to stores / site, loading and unloading excluding GST levied by GOI & GOM in all respect, complete as per IS-9523. For all types of specials, bends tees etc 80 mm to 300 mm dia.	As directed by Engineer Incharge	35613.65	153.00	Kg	5448888.14	INR Fifty Four Lakh Forty Eight Thousand Eight Hundred & Eighty Eight and Paise Fourteen Only
111	Item No 111:-Providing and supplying ISI standard D. I.specials & fitting with sealing rubber gasket of S.B.R, complete with cast iron follower gland and M. S. nut bolts coated or otherwise protected from rusting and suitable for D.I.pipes including cost of labour ,materials, and transportation to stores / site, loading and unloading excluding GST levied by GOI & GOM in all respect, complete as per IS-9523. For all types of specials, bends tees etc 350 mm & above dia.	As directed by Engineer Incharge	16252.32	186.00	Kg	3022931.52	INR Thirty Lakh Twenty Two Thousand Nine Hundred & Thirty One and Paise Fifty Two Only

112	Item No 112:- Providing and supplying double flange sluice valves confirming for IS 14846 including warn gear arrangement as per test pressure stainless steel spindle caps including inspection charges transportation upto departmental store,loading unloading,stacking excluding GST levied by GOI and GOM in all respect etc complete. Sluice Valves P.N.-1.0 with bypass 150 mm dia	As directed by Engineer Incharge	12.00	10795.00	Nos	129540.00	INR One Lakh Twenty Nine Thousand Five Hundred & Forty Only
113	Item No 113:- Providing and supplying double flange sluice valves confirming for IS 14846 including warn gear arrangement as per test pressure stainless steel spindle caps including inspection charges transportation upto departmental store,loading unloading,stacking excluding GST levied by GOI and GOM in all respect etc complete. Sluice Valves P.N.-1.0 with bypass 200 mm dia	As directed by Engineer Incharge	6.00	18615.00	Nos	111690.00	INR One Lakh Eleven Thousand Six Hundred & Ninety Only

114	Item No 114:- Providing and supplying double flange sluice valves confirming for IS 14846 including warn gear arrangement as per test pressure stainless steel spindle caps including inspection charges transportation upto departmental store,loading unloading,stacking excluding GST levied by GOI and GOM in all respect etc complete. Sluice Valves P.N.-1.0 with bypass 300 mm dia	As directed by Engineer Incharge	15.00	36503.00	Nos	547545.00	INR Five Lakh Forty Seven Thousand Five Hundred & Forty Five Only
115	Item No 115:- Providing and supplying double flange sluice valves confirming for IS 14846 including warn gear arrangement as per test pressure stainless steel spindle caps including inspection charges transportation upto departmental store,loading unloading,stacking excluding GST levied by GOI and GOM in all respect etc complete. Sluice Valves P.N.-1.0 with bypass 350 mm dia	As directed by Engineer Incharge	6.00	55645.00	Nos	333870.00	INR Three Lakh Thirty Three Thousand Eight Hundred & Seventy Only

116	Item No 116:- Providing and supplying double flange sluice valves confirming for IS 14846 including warn gear arrangement as per test pressure stainless steel spindle caps including inspection charges transportation upto departmental store,loading unloading,stacking excluding GST levied by GOI and GOM in all respect etc complete. Sluice Valves P.N.-1.0 with bypass 400 mm dia	As directed by Engineer Incharge	4.00	70740.00	Nos	282960.00	INR Two Lakh Eighty Two Thousand Nine Hundred & Sixty Only
117	Item No 117:- Providing Second class Burnt Brick masonry with conventional / IS type bricks in cement mortar 1:6 in superstructure, including bailing out water manually, striking joints on unexposed faces, racking out joints, scaffolding etc. complete.	As directed by Engineer Incharge	168.30	8891.68	Cum	1496469.74	INR Fourteen Lakh Ninety Six Thousand Four Hundred & Sixty Nine and Paise Seventy Four Only
118	Item No 118:- Providing internal cement plaster 12mm thick in a single coat in cement mortar 1:4 without neeru finish to concrete or brick surface in all positions including racking out joints, scaffolding and curing complete.	As directed by Engineer Incharge	1006.44	303.41	Sqm	305363.96	INR Three Lakh Five Thousand Three Hundred & Sixty Three and Paise Ninety Six Only
119	Item No 119:-Providing neeru finish to plaster surface in all positions including scaffolding and curing complete.	As directed by Engineer Incharge	1006.44	68.25	Sqm	68689.53	INR Sixty Eight Thousand Six Hundred & Eighty Nine and Paise Fifty Three Only

120	Item No 120:- Providing sand face plaster externally in two coats using approved screened sand in all positions, including providing base coat of 15mm thick in cement mortar 1:4 mixing approved water proofing compound at the rate of 1 kg./ 50 kg. of cement and curing the same for not less than two days and keeping the surface of base coat rough to receive the sand faced treatment 8mm thick in cement mortar 1:4 and finishing the surface by taking out grains and curing for 14 days including preparing the surface, watering and scaffolding etc. complete.	As directed by Engineer Incharge	2255.17	696.27	Sqm	1570205.13	INR Fifteen Lakh Seventy Thousand Two Hundred & Five and Paise Thirteen Only
121	Item No 121:- Providing and applying two coats of textured synthetic paint of approved shade and quality and one coat of primer before pplying textured paint including scaffolding if necessary preparing surface by thoroughly cleaning oil, grease, dirt and other materials as required, etc. complete. As per inside plaster	As directed by Engineer Incharge	1006.44	171.15	Sqm	172252.21	INR One Lakh Seventy Two Thousand Two Hundred & Fifty Two and Paise Twenty One Only

122	<p>Item No 122:- Providing and applying two coats of exterior weather shield paint of approved manufacture and of approved colour to the plastered surfaces including cleaning ,preparing the plaster surface ,applying primer coat ,scaffolding if necessary, and watering the surface for two days etc complete. NOTE: For Item One Number 15 to 18 prior approval of Superintending Engineer will be necessary As per outside plaster</p>	As directed by Engineer Incharge	2255.67	309.75	Sqm	698693.78	INR Six Lakh Ninety Eight Thousand Six Hundred & Ninety Three and Paise Seventy Eight Only
123	<p>Item No 123:- Providing and fixing rolling shutter fabricated from steel laths of minimum thickness 0.9 mm with lock plate of 3.15 mm thickness reinforced with 35 x 35 x 5 mm angle section fitted with sliding bolts and handles for both sides, deep M.S. channel section of depth and thickness not less than 65 mm and 3.15 mm respectively with hold fast arrangements, M.S. Bracket plate 300 x 300 x 3.15 mm minimum size and shape with square bar, suspension shaft of minimum 32 mm diameter, hood cover of M.S. sheet not less than 0.9 mm thickness and of any size at top and safety devices including mechanical gear operation arrangement consisting of worm gear wheels and worms of high grade cast iron or mild steel and one</p>	As directed by Engineer Incharge	123.00	5573.40	Sqm	685528.20	INR Six Lakh Eighty Five Thousand Five Hundred & Twenty Eight and Paise Twenty Only

	coat of red lead primer etc. complete. (I.S. 62481979) (With mechanical gear) Rolling Shutter						
124	Item No 124:- Providing and laying machine cut machine Polished Kota stone flooring 25 mm to 30 mm thick and required width in plain/diamond pattern on bed of 1:6 C.M. including cement float, filling joints with neat cement slurry, curing, polishing and cleaning etc. complete. Flooring	As directed by Engineer Incharge	228.00	1309.35	Sqm	298531.80	INR Two Lakh Ninety Eight Thousand Five Hundred & Thirty One and Paise Eighty Only
125	Item No 125:- Providing and fixing in position. (as per I.S.1868 / 1982) Aluminium sliding window of two tracks with rectangular pipe having overall dimension 63.50 x 38.10 x 1.02 mm at weight 0.547 kg/Rmt. and window frame bottom track section 61.85 x 31.75 x 1.20 mm at weight 0.695 kg/Rmt. Top and side track section 61.85 x 31.75 x 1.30 mm at weight 0.659 kg/Rmt. The shutter should be of bearing bottom 40 x 18 x 1.25 mm at weight 0.417 kg/Rmt. Inter locking section 40 x 18 x 1.10 mm at weight 0.469 kg/Rmt. And handle section 40 x 18 x 1.25 mm at weight 0.417 kg/Rmt. and top section 40 x 18 x 1.25 mm at weight 0.417 kg/Rmt. As per detailed drawings and as directed by Engineer in charge with all necessary Aluminium sections	As directed by Engineer Incharge	54.00	5752.95	Sqm	310659.30	INR Three Lakh Ten Thousand Six Hundred & Fifty Nine and Paise Thirty Only

	fixtures and fastenings such as roller bearing in nylon casting and self locking catch fitted in vertical section of shutter including 5 mm thick plain glass with all required screws and nuts etc, complete. With colour Anodising with box. Windows & ventilator						
126	Item No 126:- Providing and fixing green marble of 18 to 20 mm thick for door frame/ dado/ window boxing etc. On C.M. 1:6 including filling joints with polymer base filler nosing / moulding the sharp edges wherever necessary, curing, etc. complete.	As directed by Engineer Incharge	162.00	2485.35	Sqm	402626.70	INR Four Lakh Two Thousand Six Hundred & Twenty Six and Paise Seventy Only
127	Item No 127:- Providing cement based water proofing treatment to terraces (Indian water proofing or alike) with brick bats laid in required slope to drain the water for any span after cleaning the base surface. Applying a coat of cement slurry admixed with approved water proofing compound and laying the brick bats on bottom layer in C.M.1:5 admixed with approved water proofing compound filling up to half depth of brick bats, curing this layer for 3 days, applying cement slurry over this layer joints of brick bats with C.M.1:3 admixed with approved water proofing compound and finally top finishing with average 20 mm. thick layers of same mortar added with jute fiber at 1 Kg per bag	As directed by Engineer Incharge	326.64	1290.21	Sqm	421434.19	INR Four Lakh Twenty One Thousand Four Hundred & Thirty Four and Paise Nineteen Only

	including finishing the surface smooth with cement slurry admixed with approved water proofing compound. Marking finished surface with false squares of 300mm x 300 mm. making the junctions at the parapet rounded and tapered top for required height, with drip mould at the junction of plaster and parapet and curing and covering 10 years Guarantee against leak proofness on Court fee stamp paper of Rs. 500/- including ponding test etc. complete.						
128	<p>Item No 128:- Excavation for foundation / pipe trenches in hard murum and boulders, W.B.M. road including removing the excavated material upto a distance of 50 M beyond the area and lifts as below, stacking and spreading as directed by Engineer-in-charge, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd A-3/259) Excavation for footing</p>	As directed by Engineer Incharge	6307.26	211.20	cum	1332093.31	INR Thirteen Lakh Thirty Two Thousand & Ninety Three and Paise Thirty One Only

129	Item No 129:-Excavation for foundation / pipe trenches in hard murum ncluding removing the excavated material upto a distance of 50 M and lifts as below, stacking and spreading as directed by Engineer-in-charge, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd A-2/259)	As directed by Engineer Incharge	704.60	187.00	cum	131760.20	INR One Lakh Thirty One Thousand Seven Hundred & Sixty and Paise Twenty Only
130	Item No 130:- Excavation for foundation / pipe trenches in hard rock and concrete road by chiselling, wedging, line drilling by mechanical means or by all means other than blasting including trimming and levelling the bed, removing the excavated material upto a distance of 50 metres beyond the area and lifts as below, stacking as directed by Engineer-in-charge, normal dewatering, excluding backfilling, etc. complete by all means. (Bd-A-6/259 Excavation 1.5 to 3.0 m depth	As directed by Engineer Incharge	537.96	1146.20	cum	616609.75	INR Six Lakh Sixteen Thousand Six Hundred & Nine and Paise Seventy Five Only
131	Item No 131:- Providing dry/ trap/ granite/ quartzite/ gneiss rubble stone soling 15 cm to 20 cm thick including hand packing and compacting etc. complete.	As directed by Engineer Incharge	28.23	1343.51	cum	37927.29	INR Thirty Seven Thousand Nine Hundred & Twenty Seven and Paise Twenty Nine Only

132	Item No 132:- Providing and fixing mild steel grill work for windows, ventilators etc. 20 Kilogram/ One Square Metre as per drawing including fixtures, necessary welding and painting with one coats of anticorrosive paint and two coats of oil painting complete	As directed by Engineer Incharge	32.40	2201.85	sqm	71339.94	INR Seventy One Thousand Three Hundred & Thirty Nine and Paise Ninety Four Only
133	Item No 133:- Providing and fixing single or double leaf panelled door shutter excluding frame with glazed openable fanlight shutter 35 mm thick as per detailed drawing consisting panelled vertical styles 100 mm x 35 mm and lock and bottom rail 200 mm x 35 mm and panels 12 mm thick both side commercial ply faced particle board including stainless steel fixtures and fastening and T.W. beading at junctions of panel inserts and as instructed by the Engineer in charge including 3 coats of oil painting etc. complete.	As directed by Engineer Incharge	7.56	7702.80	sqm	58233.17	INR Fifty Eight Thousand Two Hundred & Thirty Three and Paise Seventeen Only
134	Item No 134:- Providing and fixing frame with / without ventilator of size as specified with Country non teak wood for doors and windows including chamfering, rounding, rebating, iron holdfast of size 300mm x 40mm x 5mm with oil painting, etc. complete.	As directed by Engineer Incharge	0.16	112467.60	cum	18037.55	INR Eighteen Thousand & Thirty Seven and Paise Fifty Five Only

135	Item No 135:- Providing structural steel work in rolled sections like joists, channels, angles, tees, etc. as per detailed designs and drawings including fixing in position without connecting plates, braces, etc. and one coat of anticorrosive paint and over it two coats of oil painting of approved quality and shade, etc. complete. (Bd-C-2/275)	As directed by Engineer Incharge	6.00	82079.80	MT	492478.80	INR Four Lakh Ninety Two Thousand Four Hundred & Seventy Eight and Paise Eighty Only
136	Item No 136:- Providing D.I. pipes (push on joints pressure pipes of D. I. of following class and diameters confirming to the I. S. specification inclusive cost of jointing materials (Rubber gasket of EPDM Quality) excluding GST levied by GOI & GOM in in all respect including Third party inspection charges of TPI Agency approved by MJP/NMMC including Transit insurance, Railway Freight, Unloading from railway wagon, Loading into Truck, Transportation to departmental store. unloading, stacking etc. completed as directed by Engineer in charge (IS 1536/2001 for pipes and IS 158/ 1969 and IS 12820/1989 or latest edition/ revision with amendments for Rubber Gaskets" (IS:8329-2000 Latest Version)DI K9 DI K-9 Pipe a)300mm dia	As directed by Engineer Incharge	2310.00	4349.00	Rmt	10046190.00	INR One Crore Forty Six Thousand One Hundred & Ninety Only

137	<p>Item No 137:- Providing D.I. pipes (push on joints pressure pipes of D. I. of following class and diameters confirming to the I. S. specification inclusive cost of jointing materials (Rubber gasket of EPDM Quality) excluding GST levied by GOI & GOM in all respect including Third party inspection charges of TPI Agency approved by MJP/NMMC including Transit insurance, Railway Freight, Unloading from railway wagon, Loading into Truck, Transportation to departmental store. unloading, stacking etc. completed as directed by Engineer in charge (IS 1536/2001 for pipes and IS 158/ 1969 and IS 12820/1989 or latest edition/ revision with amendments for Rubber Gaskets" (IS:8329-2000 Latest Version)DI K9 DI K-9 Pipe)350mm dia</p>	As directed by Engineer Incharge	420.00	5359.00	Rmt	2250780.00	INR Twenty Two Lakh Fifty Thousand Seven Hundred & Eighty Only
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138	Item No 138:-Providing D.I. pipes (push on joints pressure pipes of D. I. of following class and diameters confirming to the I. S. specification inclusive cost o fjointing materials (R.ubber gasket of EPDM Quality) excluding GST levied by GOI & GOM in in all respect including Third party inspection charges of TPI Agency approved by MJP/NMMC including Transit insurance, Railway Freight, Unloading from railway wagon, Loading into Truck, Transportation to departmental store. unloading, stacking etc. completed as directed by Engineer in charge (IS 1536/2001 for pipes and IS 158/ 1969 and IS 12820/1989 or latest edition/ revision with amendments for Rubber Gaskets" (IS:8329-2000 Latest Version)DI K9DI K-9 Pipec)450mm dia	As directed by Engineer Incharge	700.00	7817.00	Rmt	5471900.00	INR Fifty Four Lakh Seventy One Thousand Nine Hundred Only
139	Item No 139:- Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete Sluice valve PN 1.6 300mm dia	As directed by Engineer Incharge	6.00	45613.00	Nos	273678.00	INR Two Lakh Seventy Three Thousand Six Hundred & Seventy Eight Only

140	<p>Item No 140:- Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete</p> <p>Sluice valve PN 1.6 b)350mm dia</p>	As directed by Engineer Incharge	3.00	69454.00	Nos	208362.00	INR Two Lakh Eight Thousand Three Hundred & Sixty Two Only
141	<p>Item No 141:- Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete</p> <p>Sluice valve PN 1.6 c)450mm dia</p>	As directed by Engineer Incharge	1.00	108957.00	Nos	108957.00	INR One Lakh Eight Thousand Nine Hundred & Fifty Seven Only

142	Item No 142:- Air Valves PN 1.6 Providing and supplying double ball flanged Air Valves as per IS 14845 and IS standard specifications double orifice type combined with screw down isolating sluice valve, small orifice elastic ball resting on a gun metal orifice nipple, large orifice vulcanite ball seating on moulded seat ring, inlet face and drilled, including all taxes (central and local), insurance, third party inspection charges, loading, unloading, transportation up to departmental stores / site, etc. complete b) 80 mm dia. Air Valve.	As directed by Engineer Incharge	4.00	10858.00	Nos	43432.00	INR Forty Three Thousand Four Hundred & Thirty Two Only
143	Item No 143:- Lowering laying and jointing with SBR ruber gaskets D.I. pipes of K 9classes with DI / MS specials of following diameter in proper position, grade ard alignment as directed by Engineer-in charge including conveyance of material from structures to site of work, including cost ofjointing materials and rubber rings labour etc. ccomplete. Note : Only SBR Rubber gaskets to be used as per IS-5382 and IS-12820. DI K-9 Pipes a)300mm dia	As directed by Engineer Incharge	2310.00	202.40	Rmt	467544.00	INR Four Lakh Sixty Seven Thousand Five Hundred & Forty Four Only

144	<p>Item No 144:- Lowering laying and jointing with SBR ruber gaskets D.I. pipes of K 9classes with DI / MS specials of following diameter in proper position, grade ard alignment as directed by Engineer-in charge including conveyance of material from structures to site of work, including cost ofjointing materials and rubber rings labour etc. ccomplete. Note : Only SBR Rubber gaskets to be used as per IS-5382 and IS-12820. DI K-9 Pipes b)350mm dia</p>	As directed by Engineer Incharge	420.00	248.60	Rmt	104412.00	INR One Lakh Four Thousand Four Hundred & Twelve Only
145	<p>Item No 145:- Lowering laying and jointing with SBR ruber gaskets D.I. pipes of K 9classes with DI / MS specials of following diameter in proper position, grade ard alignment as directed by Engineer-in charge including conveyance of material from structures to site of work, including cost ofjointing materials and rubber rings labour etc. ccomplete. Note : Only SBR Rubber gaskets to be used as per IS-5382 and IS-12820. DI K-9 Pipes c)450mm dia</p>	As directed by Engineer Incharge	700.00	322.30	Rmt	225610.00	INR Two Lakh Twenty Five Thousand Six Hundred & Ten Only

146	Item No 146:-Lowering, laying and jointing in position following C.I.D/F Reflux valves, Butterfly valves and Sluice valves including cost of all labour jointing material, including nut bolts and giving satisfactory hydraulic testing etc. complete. (Rate for all class of valves.Sluice valve/ Butterfly valves without bypass arrangement - PN-1.6300mm dia	As directed by Engineer Incharge	19.00	5520.90	Nos	104897.10	INR One Lakh Four Thousand Eight Hundred & Ninety Seven and Paise Ten Only
147	Item No 147:- Lowering, laying and jointing in position following C.I.D/F Reflux valves, Butterfly valves and Sluice valves including cost of all labour jointing material, including nut bolts and giving satisfactory hydraulic testing etc. complete. (Rate for all class of valves. Sluice valve/ Butterfly valves without bypass arrangement - PN-1.6 b)350mm dia	As directed by Engineer Incharge	13.00	6803.50	Nos	88445.50	INR Eighty Eight Thousand Four Hundred & Forty Five and Paise Fifty Only
148	Item No 148:- Lowering, laying and jointing in position following C.I.D/F Reflux valves, Butterfly valves and Sluice valves including cost of all labour jointing material, including nut bolts and giving satisfactory hydraulic testing etc. complete. (Rate for all class of valves. Sluice valve/ Butterfly valves without bypass arrangement - PN-1.6 c)450mm dia	As directed by Engineer Incharge	4.00	9766.90	Nos	39067.60	INR Thirty Nine Thousand & Sixty Seven and Paise Sixty Only

149	<p>Item No 149:- Cutting and champhering of pipes of following diameters including cost of all materials and labour involved, etc. complete as directed by Engineer-in-charge (for all class of pipes).</p> <p>DI K-9 Pipe)300mm dia</p>	As directed by Engineer Incharge	39.00	189.20	Nos	7378.80	INR Seven Thousand Three Hundred & Seventy Eight and Paise Eighty Only
150	<p>Item No 150:- Cutting and champhering of pipes of following diameters including cost of all materials and labour involved, etc. complete as directed by Engineer-in-charge (for all class of pipes).</p> <p>DI K-9 Pipe b)350mm dia</p>	As directed by Engineer Incharge	7.00	194.70	Nos	1362.90	INR One Thousand Three Hundred & Sixty Two and Paise Ninety Only
151	<p>Item No 151:- Providing and fixing in position air valve shaft including providing and fixing GI Medium Class or 6 mm thick M.S. pipe shaft 2.70 M long over branch flange of air valve tee, providing PCC block of M-150 concrete, 150 mm thick around the air valve tee including encasing of vertical shaft in PCC M 150 as shown in type design together with providing and making flanged joints wherever required and fixing of air valve tee, etc. complete as per type design and as directed by Engineer - in- charge for following diameters of pipe lines. Upto 150 mm dia. pipe line</p>	As directed by Engineer Incharge	4.00	6135.80	Nos	24543.20	INR Twenty Four Thousand Five Hundred & Forty Three and Paise Twenty Only

152	<p>Item No 152:- Hydraulic testing of C.I./D.I. pipe line to specified pressure including cost of all materials and labour and water for testing for specified length including cutting, placing end cap making arrangement for filling safe water using reciprocating type pumps which should be able to provide specified test pressure gauges and other necessary equipments, labour, operation charges, etc. required for testing. The rate under this item shall also include cost of retesting, if necessary and reinstating to original position using water supplied by the contractor. DI K9 Without rubber rings 300mm dia</p>	As directed by Engineer Incharge	8.31	19673.50	km	163427.76	INR One Lakh Sixty Three Thousand Four Hundred & Twenty Seven and Paise Seventy Six Only
153	<p>Item No 153:- Hydraulic testing of C.I./D.I. pipe line to specified pressure including cost of all materials and labour and water for testing for specified length including cutting, placing end cap making arrangement for filling safe water using reciprocating type pumps which should be able to provide specified test pressure gauges and other necessary equipments, labour, operation charges, etc. required for testing. The rate under this item shall also include cost of retesting, if necessary and reinstating to original position using water supplied by the</p>	As directed by Engineer Incharge	4.70	24450.80	km	114943.21	INR One Lakh Fourteen Thousand Nine Hundred & Forty Three and Paise Twenty One Only

	contractor.DI K9 Without rubber rings350mm dia						
154	Item No 154:- Hydraulic testing of C.I./D.I. pipe line to specified pressure including cost of all materials and labour and water for testing for specified length including cutting, placing end cap making arrangement for filling safe water using reciprocating type pumps which should be able to provide specified test pressure gauges and other necessary equipments, labour, operation charges, etc. required for testing. The rate under this item shall also include cost of retesting, if necessary and reinstating to original position using water supplied by the contractor.DI K9 Without rubber rings450mm dia	As directed by Engineer Incharge	1.72	29368.90	km	50514.51	INR Fifty Thousand Five Hundred & Fourteen and Paise Fifty One Only
155	Item No 155:- Filling in plinth and floors murum bedding in trenches with approved murum from excavated materials from foundation in 15 cm 20 cm layers including watering and compaction complete.	As directed by Engineer Incharge	6468.50	92.40	cum	597689.40	INR Five Lakh Ninety Seven Thousand Six Hundred & Eighty Nine and Paise Forty Only
156	Item No 156:- Disposing of surplus materials up to 5 Km etc. complete.	As directed by Engineer Incharge	944.08	360.05	cum	339916.95	INR Three Lakh Thirty Nine Thousand Nine Hundred & Sixteen and Paise Ninety Five Only

157	Item No 157:- Transportation - Disposal of excavated material including loading and unloading, lead up to 10 km including royalty charges etc. Complete	As directed by Engineer Incharge	9816.89	507.82	cum	4985213.08	INR Forty Nine Lakh Eighty Five Thousand Two Hundred & Thirteen and Paise Eight Only
158	Item No 158:- Providing and laying in situ Cement concrete of trap/granite/ quartzite/ gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, 'plywood form work, bully/ steel propups, compaction, finishing and curing, etc, complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L & T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (excluding M.S. or Tor reinforcement)	As directed by Engineer Incharge	13.50	9047.38	cum	122139.56	INR One Lakh Twenty Two Thousand One Hundred & Thirty Nine and Paise Fifty Six Only
159	Item No 159:- Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation in M-200 like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M- 250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is	As directed by Engineer Incharge	593.37	8377.48	cum	4970945.31	INR Forty Nine Lakh Seventy Thousand Nine Hundred & Forty Five and Paise Thirty One Only

	permitted.) (Excluding M.S. or Tor reinforcement) M-200						
160	Item No 160:- Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306) Tor steel	As directed by Engineer Incharge	2.42	106926.60	MT	258762.37	INR Two Lakh Fifty Eight Thousand Seven Hundred & Sixty Two and Paise Thirty Seven Only
161	Item No 161:- Dismantling of ESRs of various capacities and heights using crane (10 MT capacity) and handling over M.S./ C.I./ G.I. pipes, valves, bends, etc. to the Department. However taking steel reinforcement by the dismantling agency including removing dismantled materials from site and disposing them at suitable place as directed, etc.complete. 3.75Lakh Lit Capacity of E.S.R. and staging 17.00 M height. i) Conjusted Area	As directed by Engineer Incharge	375000.00	2.92	Lit	1095000.00	INR Ten Lakh Ninety Five Thousand Only

162	Item No 162:- Dismantling of ESRs of various capacities and heights using crane (10 MT capacity) and handling over M.S./ C.I./ G.I. pipes, valves, bends, etc. to the Department. However taking steel reinforcement by the dismantling agency including removing dismantled materials from site and disposing them at suitable place as directed, etc.complete, 11.5Lakh Lit Capacity of E.S.R. and staging 24.00 M height. i) Conjusted Area	As directed by Engineer Incharge	1150000.00	3.73	Lit	4290650.00	INR Forty Two Lakh Ninety Thousand Six Hundred & Fifty Only
163	Item No 163:- Dismantling of ESRs of various capacities and heights using crane (10 MT capacity) and handling over M.S./ C.I./ G.I. pipes, valves, bends, etc. to the Department. However taking steel reinforcement by the dismantling agency including removing dismantled materials from site and disposing them at suitable place as directed, etc.complete 17.5Lakh Lit Capacity of E.S.R. and staging 20.00 M height. i) Conjusted Area	As directed by Engineer Incharge	3500000.00	3.26	Lit	11424000.00	INR One Crore Fourteen Lakh Twenty Four Thousand Only

164	Item No 164:- Dismantling of ESRs of various capacities and heights using crane (10 MT capacity) and handling over M.S./ C.I./ G.I. pipes, valves, bends, etc. to the Department. However taking steel reinforcement by the dismantling agency including removing dismantled materials from site and disposing them at suitable place as directed, etc.complete15.0Lakh Lit Capacity of E.S.R. and staging 30.00 M height. i) Conjusted Area	As directed by Engineer Incharge	1500000.00	3.73	Lit	5596800.00	INR Fifty Five Lakh Ninety Six Thousand Eight Hundred Only
165	Item No 165:- Chipping of all loose and Spalling of concrete to bottom of slab, beams etc.(wherever required), cleaning of reinforcement, carrying out thorough sand blasting, application of anti-corrosive zinc rich epoxy primer to exposed reinforcement including cost of material, labour, equipment, tools, scaffolding etc. complete.	As directed by Engineer Incharge	1150.31	540.75	sqm	622030.13	INR Six Lakh Twenty Two Thousand &Thirty and Paise Thirteen Only
166	Item No 166:- Providing & applying structural grade epoxy approved bond coat prior to application of any type of mortar confirming to IS codes or equivalent to ensure bond between old concrete & new concrete by brush application etc complete	As directed by Engineer Incharge	1150.31	774.90	sqm	891375.22	INR Eight Lakh Ninety One Thousand Three Hundred & Seventy Five and Paise Twenty Two Only

167	Item No 167:- Structural Repairs to damaged concrete surface with polymer concrete /mortar with AC ACRYLATE-REPAIR and AC-BOND-AID as detailed in the method statement including material, labour, etc., all complete as directed by engineer. (Repairs to deck slab, piers, abutment, girders and other locations up to 40 mm thickness)	As directed by Engineer Incharge	1150.31	4324.95	sqm	4975033.23	INR Forty Nine Lakh Seventy Five Thousand & Thirty Three and Paise Twenty Three Only
168	Item No 168:- Providing and applying water proofing treatment using acrylic polymer modified cement based water proofing coating with fibre glass mesh mixing at the rate of powder to liquid (2:1) by weight covering 9 to 10 Square Metre /Kilogram with two coat using approved chemicals for masonry and concrete surface by brush covering 7 years guarantee on Stamp Papers etc. complete	As directed by Engineer Incharge	1072.03	645.75	Sqm.	692263.37	INR Six Lakh Ninety Two Thousand Two Hundred & Sixty Three and Paise Thirty Seven Only
169	Item No 169:- Providing pressure grouting at a pressure of 5.6 kg/sqcm in required row / zigzag fashion as specified at 1.5 M interval as per site conditions to stop leakages through water retaining structures to the entire satisfaction of the Engineer-in-charge including material compound, hardening materials, compressor equipment including scaffolding, smooth finishing, etc.	As directed by Engineer Incharge	95.00	1125.30	Bags	106903.50	INR One Lakh Six Thousand Nine Hundred & Three and Paise Fifty Only

	complete. i) For Concrete surface						
170	Item No 170:- Providing and applying epoxy paint of approved make (Shalimar, Ciba or Mahindra & Mahindra) to concrete surface for RCC ESR or GSR or any other structure including cleaning the surface by scrapping and air blowers to the satisfaction of engineer-in-charge, necessary scaffolding, etc. complete with all leads and lifts and giving satisfactory hydraulic test for water tightness as per I.S. codes.	As directed by Engineer Incharge	3114.80	911.90	sqm	2840386.12	INR Twenty Eight Lakh Forty Thousand Three Hundred & Eighty Six and Paise Twelve Only
171	Item No 171:- Providing and installing mercury water level indicator for RCC ESR and wash water tank site as per instructions of Engineer-in-charge at ground level of the tank or nearing pump house or room for RCC ESR having 15 mtrs.stage height and 5 mtrs. water storage height with indication of water height in storage tank in metre and 1/10th of meter including providing and installing 15 mm dia class 'B' G.I. piping with necessary accessories	As directed by Engineer Incharge	2.00	22952.60	No	45905.20	INR Forty Five Thousand Nine Hundred & Five and Paise Twenty Only

	from bottom of the tank upto the instrument as per instructions of Engineer-in-charge.						
172	Item No 172:- Providing, hoisting and fixing in position C. I. manohole, frame and cover of best quality and of required size and shape with locking arrangements including applying 2 coats of anti-corrosive paint, etc. complete.	As directed by Engineer Incharge	5.00	3187.80	No	15939.00	INR Fifteen Thousand Nine Hundred & Thirty Nine Only
173	Item No 173:- Painting letters upto 20cm height complete brushes, coirbrushers, dusting, cleaning, including cost of paint etc. complete.	As directed by Engineer Incharge	1000.00	30.45	one No	30450.00	INR Thirty Thousand Four Hundred & Fifty Only
174	Item No 174:- Removing the existing cement plaster of any thickness without causing dust nuisance and stacking the debris upto a distance of 50metres or spreading in the compound and cleaning the site etc.complete.	As directed by Engineer Incharge	1419.51	54.60	sqm	77505.25	INR Seventy Seven Thousand Five Hundred & Five and Paise Twenty Five Only

175	<p>Item No 175:- Providing and applying 30 mm thick self curing Ceramic Polymer Microconcrete of approved make having Compressive strength above M30, non shrink, impermeable , filling mortar to load carrying R.C.C member in two layers on cleaned concrete surface , including honey comb area (using manual/mechanical means). Mixing mortar of Nicosil C80 and fresh 53 grade cement with required water cement ratio for desired consistency and applying and finishing by manual travelling , curing after curing initial setting time etc, as per manufacturers specification etc. complete as per specification and as directed by engineer-in- charge. Work shall be executed by certified applicator only and work shall be guaranteed for 5 years and guarantee shall be provided on Rs. 500 /- stamp paper. (Bond coat mentioned below is to be done before coating)</p> <p>Note:- 1) Condition from Sr.No.1 to 11 shall form a part and parcel of the tender papers and shall be included in the DTP for works of R.C.C.E.S.R.</p> <p>Note:- 2) Condition from Sr.No.12 to 17 are for estimation purpose only and shall not be appear in the tender.</p>	As directed by Engineer Incharge	273.85	2550.45	Sqm	698435.63	INR Six Lakh Ninety Eight Thousand Four Hundred & Thirty Five and Paise Sixty Three Only
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176	<p>Item No 176:- Designing (aesthetically), and constructing RCC elevated service reservoirs of following capacity with RCC staging consisting of columns, internal and external bracings spaced vertically not more than 4.5 meters centre to centre for E.S.R. having capacity 500 m³ & not more than 6 m c/c for E.S.R. having capacity above 500 m³ including excavation in all types of strata, foundation concret, cement plaster with water proofing compound to the inside face of the container including refilling disposing of the surplus stuff within a lead of 50 meters, all labour and material charges including lowering, laying, erecting, hoisting and jointing of pipe assembly of inlet, outlet, washout, overflow and bypass arrangements as per departmental design. providing and fixing accessories such as Stainless steel ladder inside and M.S. ladder with G.I. railing outside, C. I. manhole frame and covers water level indicators, lightening conductor, G. I. pipe railing around walk way and top slab, providing spiral staire case from ground level to roof level, M.S.Grill gate of 2 Mtrs height with locking arrangement, B.B. masonry chambers for all valves, ventilating shafts, providing and applying three</p>	As directed by Engineer Incharge	1.00	10776531.00	No	10776531.00	INR One Crore Seven Lakh Seventy Six Thousand Five Hundred & Thirty One Only
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	<p>coats of acrylic emulsion with silicon additives paint to the structure including roof slab and epoxy paint to internal surface & anti-termite treatment for underground parts of the structures and giving satisfactory water tightness test as per I.S. code, The job to include painting the name of the scheme and other details on the reservoir as per the directions of Engineer-in-charge. Notes: 1. The design of the structure be in accordance with relevent (I.S.3370 - 1965 or revised) 2. The design shall satisfy the stipulation as per IS 1893-1984 and I.S. 13920/1993 for seismic focrcce and I.S.- 11682/1985 for R.C.C. staging of overhead tanks. 3. For design having more than 6 columns, Providing of internal bracing is obligatory,. External bracking is also obligatory. 4.. The entire structure shall be in M 300 mix only. 5. Plain round mild steel bars grade - I confirming to I.S,432 Part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S. 1139 shall be used, grade-II mild steel bars will not be allowed. 6. Irrespective of the type of foundation proposed in the design, one set of bracing be provided at the gound level. 7. These rates include providing, M.S. ladder for E.S.R's upto 2 lakhs liters capacity and providing sprial staircase for E.S.R.</p>						
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<p>above 2 lakhs liters capacity. 8. Staggering shall have to be designed with stresses of M-250 for ESR. However all RCC construction should be done in M-300 9. These rates are including the cost of uplift pressure if any and entire dewatering during execution. In case of water logging area where water is struck at shallow depth extra provision of dewatering shall be made as per site condition. 10. All condition given in the Member Secretary's Circular No.MJP/TS-I/350/1668 dt. 2.8.97 and MJP/S-I/350/2127 dt. 13.7.99 shall be strictly followed and additional cost, if any due to these conditions is included in the rates mentioned below. 11.. 75% part rate shall be payable for reinforced concrete and plastering items of containers of E.S.R. till satisfactory hydraulic testing for water tightness is given ; and till that work shall be treated as incomplete. 12. The rates indicated in the table are excluding the cost of pipes, specials and valves required for inlet, outlet washout overflow and by-pass arrangement. The scope of work, however includes cost of erecting, laying and jointing of pipes and valves including cost of jointing materials upto 5M beyond outer face of outermost column. 13. For ESR upto 500cum capacity</p>						
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	<p>C.I.D. double flanged pipes upto 300mm dia shall be provided and C.I.Specials shall be used.For ESR above 500 cum capacity C.I./M.S. pipes assembly with minimum 8mm thick ness up to 500mm dia. And minimum 10mm thickness above 500mm dia can be used with proper anti-corrosive epoxy teratment from inside and outside. 14. Below mentioned rates are for foundation, with individuals footing with bearing capacity of 30 tonnes per square metre. For raft foundations, these rates shall be increased by 7.5% where safe bearing capacity (SBC) is 5 M.T. per Sq.m and by 5% where SBC is more than 5 MT/Sqm. and upto 10MT/Sq.m. This percentage of 5% or 7,5% is applicable for estimation of amount of L.S. items ESR for Extra item due to change from individual footing foundation to raft actual increase in concrete and steel quantities be paid as per relevent DSR Item. 15. The rates shall be increase by 30% for brearing piles upto depth of 10m and for further increased in depth by 5M each it shall be increased by another 10% These rates are applicable where raft is not reasible for pile foundation sulfate resistant cement shall only be used. Single pile for the column is not permitted Group of piles shall be designed with pile cap</p>						
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	<p>for each column of ESR. 16. These rates are applicable for staging height of 12 M These rates shall be increased or decreased for per metre variation in the staging height as below 12 to 16 M staging 2% per metre 20 M and above - 4% per metre For 20 m staging height Percentage calculation will be like below</p> <p>12 to 16m = 4 x 2 = 8% 16 to 20m = 4 x 3 = 12% 20m = 2 x 1 = 2% Total = 22%</p> <p>17. Following rates are for seismic zone-III for Zone-IV these rates shall be increased by 5% and for Zone-II, these rates shall be decreased by 5% concerned Executive Engineer shall confirm the seismic zone for the scheme from seismic zones plan before estimation and adopt appropriate rates as per actual seismic zones(Seismic maps attached in this C.S.R.) 1.Nerul Sec 22 ESR (WD 14)_ 950 KL</p>						
177	<p>Item No 177:- Designing (aesthetically), and constructing RCC elevated service reservoirs of following capacity with RCC staging consisting of columns, internal and external bracings spaced vertically not more than 4.5 meters centre to centre for E.S.R.</p>	As directed by Engineer Incharge	1.00	15628455.00	No	15628455.00	INR One Crore Fifty Six Lakh Twenty Eight Thousand Four Hundred & Fifty Five Only

<p>having capacity 500 m³ & not more than 6 m c/c for E.S.R. having capacity above 500 m³ including excavation in all types of strata, foundation concret, cement plaster with water proofing compound to the inside face of the container including refilling disposing of the surplus stuff within a lead of 50 meters, all labour and material charges including lowering, laying, erecting, hoisting and jointing of pipe assembly of inlet, outlet, washout, overflow and bypass arrangements as per departmental design. providing and fixing accessories such as Stainless steel ladder inside and M.S. ladder with G.I. railing outside, C. I. manhole frame and covers water level indicators, lightening conductor, G. I. pipe railing around walk way and top slab, providing spiral staircase case from ground level to roof level, M.S. Grill gate of 2 Mtrs height with locking arrangement, B.B. masonry chambers for all valves, ventilating shafts, providing and applying three coats of acrylic emulsion with silicon additives paint to the structure including roof slab and epoxy paint to internal surface & anti-termite treatment for underground parts of the structures and giving satisfactory water tightness test as per I.S. code, The job to include painting the name</p>						
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<p>of the scheme and other details on the reservoir as per the directions of Engineer-in-charge. Notes: 1. The design of the structure be in accordance with relevent (I.S.3370 - 1965 or revised) 2. The design shall satisfy the stipulation as per IS 1893-1984 and I.S. 13920/1993 for seismic focrcce and I.S.- 11682/1985 for R.C.C. staging of overhead tanks. 3. For design having more than 6 columns, Providing of internal bracing is obligatory,. External bracking is also obligatory. 4.. The entire structure shall be in M 300 mix only. 5. Plain round mild steel bars grade - I confirming to I.S,432 Part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S. 1139 shall be used, grade-II mild steel bars will not be allowed. 6. Irrespective of the type of foundation proposed in the design, one set of bracing be provided at the gound level. 7. These rates include providing, M.S. ladder for E.S.R's upto 2 lakhs liters capacity and providing sprial staircase for E.S.R. above 2 lakhs liters capacity. 8. Stagging shall have to be designed with stresses of M-250 for ESR. However all RCC construction should be done in M-300 9. These rates are including the cost of uplift pressure if any and entire dewatering during execution. In case</p>						
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<p>of water logging area where water is struck at shallow depth extra provision of dewatering shall be made as per site condition. 10. All condition given in the Member Secretary"s Circular No.MJP/TS-I/350/1668 dt. 2.8.97 and MJP/S-I/350/2127 dt. 13.7.99 shall be strictly followed and additional cost, if any due to these conditions is included in the rates mentioned below. 11.. 75% part rate shall be payable for reinforced coconrete and plastering items of containers of E.S.R. till satisfactory hydraulic testing for water tightness is given ; and till that work shall be treated as incomplete. 12. The rates indicated in the table are excluding the cost of pipes, specials and valves required for inlet, outlet washout overflow and by-pass arrangement. The scope of work, however includes cost of erecting, laying and jointing of pipes and valvews including cost of jointing materials upto 5M beyond outer face of outermost column. 13. For ESR upto 500cum capacity C.I.D. double flanged pipes upto 300mm dia shall be provided and C.I.Specials shall be used.For ESR above 500 cum capacity C.I./M.S. pipes assembly with minimum 8mm thick ness up to 500mm dia. And minimum 10mm thickness above 500mm dia can be used with proper</p>						
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<p>anti-corrosive epoxy treatment from inside and outside. 14. Below mentioned rates are for foundation, with individual footing with bearing capacity of 30 tonnes per square metre. For raft foundations, these rates shall be increased by 7.5% where safe bearing capacity (SBC) is 5 M.T. per Sq.m and by 5% where SBC is more than 5 MT/Sqm. and upto 10MT/Sq.m. This percentage of 5% or 7.5% is applicable for estimation of amount of L.S. items ESR for Extra item due to change from individual footing foundation to raft actual increase in concrete and steel quantities be paid as per relevant DSR Item. 15. The rates shall be increase by 30% for bearing piles upto depth of 10m and for further increased in depth by 5M each it shall be increased by another 10% These rates are applicable where raft is not feasible for pile foundation sulfate resistant cement shall only be used. Single pile for the column is not permitted Group of piles shall be designed with pile cap for each column of ESR. 16. These rates are applicable for staging height of 12 M These rates shall be increased or decreased for per metre variation in the staging height as below 12 to 16 M staging 2% per metre 20 M and above - 4% per metre</p>						
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<p>For 20 m staging height Percentage calculation will be like below 12 to 16m = 4 x 2 = 8% 16 to 20m = 4 x 3 = 12% 20m = 2 x 1 = 2% Total = 22%</p> <p>17. Following rates are for seismic zone-III for Zone-IV these rates shall be increased by 5% and for Zone-II, these rates shall be decreased by 5% concerned Executive Engineer shall confirm the seismic zone for the scheme from seismic zones plan before estimation and adopt appropriate rates as per actual seismic zones(Seismic maps attached in this C.S.R.) 2.Mango Garden (WD 7)_ 1150 KL</p>						
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178	<p>Item No 178:-Designing (aesthetically), and constructing RCC elevated service reservoirs of following capacity with RCC staging consisting of columns, internal and external bracings spaced vertically not more than 4.5 meters centre to centre for E.S.R. having capacity 500 m³ & not more than 6 m c/c for E.S.R.having capacity above 500 m³ including excavation in all types of strata, foundation concret, cement plaster with water proofing compound to the inside face of the container including refilling disposing of the surplus stuff within a lead of 50 meters, all labour and material charges including lowering, laying, erecting, hoisting and jointing of pipe assembly of inlet, outlet, washout, overflow and bypass arrangements as per departmental design. providing and fixing accessories such as Stainless steel ladder inside and M.S. ladder with G.I. railing outside, C. I. manhole frame and covers water level indicators, lightening conductor, G. I. pipe railing around walk way and top slab, providing spiral staire case from ground level to roof level, M.S.Grill gate of 2 Mtrs height with locking arrangement, B.B. masonry chambers for all valves, ventilating shafts, providing and applying three coats of acrylic emulsion with silicon</p>	As directed by Engineer Incharge	1.00	16009971.00	No	16009971.00	INR One Crore Sixty Lakh Nine Thousand Nine Hundred & Seventy One Only
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<p>additives paint to the structure including roof slab and epoxy paint to internal surface & anti-termite treatment for underground parts of the structures and giving satisfactory water tightness test as per I.S. code, The job to include painting the name of the scheme and other details on the reservoir as per the directions of Engineer-in-charge. Notes: 1. The design of the structure be in accordance with relevent (I.S.3370 - 1965 or revised) 2. The design shall satisfy the stipulation as per IS 1893-1984 and I.S. 13920/1993 for seismic focrcce and I.S.- 11682/1985 for R.C.C. staging of overhead tanks. 3. For design having more than 6 columns, Providing of internal bracing is obligatory,. External bracking is also obligatory. 4.. The entire structure shall be in M 300 mix only. 5. Plain round mild steel bars grade - I confirming to I.S,432 Part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S. 1139 shall be used, grade-II mild steel bars will not be allowed. 6. Irrespective of the type of foundation proposed in the design, one set of bracing be provided at the gound level. 7. These rates include providing, M.S. ladder for E.S.R's upto 2 lakhs liters capacity and providing sprial staircase for E.S.R. above 2 lakhs liters capacity. 8.</p>						
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<p>Stagging shall have to be designed with stresses of M-250 for ESR. However all RCC construction should be done in M-300 9. These rates are including the cost of uplift pressure if any and entire dewatering during execution. In case of water logging area where water is struck at shallow depth extra provision of dewatering shall be made as per site condition. 10. All condition given in the Member Secretary"s Circular No.MJP/TS-I/350/1668 dt. 2.8.97 and MJP/S-I/350/2127 dt. 13.7.99 shall be strictly followed and additional cost, if any due to these conditions is included in the rates mentioned below. 11.. 75% part rate shall be payable for reinforced coconrete and plastering items of containers of E.S.R. till satisfactory hydraulic testing for water tightness is given ; and till that work shall be treated as incomplete. 12. The rates indicated in the table are excluding the cost of pipes, specials and valves required for inlet, outlet washout overflow and by-pass arrangement. The scope of work, however includes cost of erecting, laying and jointing of pipes and valvews including cost of jointing materials upto 5M beyond outer face of outermost column. 13. For ESR upto 500cum capacity C.I.D. double flanged pipes upto</p>						
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<p>300mm dia shall be provided and C.I.Specials shall be used.For ESR above 500 cum capacity C.I./M.S. pipes assembly with minimum 8mm thick ness up to 500mm dia. And minimum 10mm thickness above 500mm dia can be used with proper anti-corrosive epoxy teratment from inside and outside. 14. Below mentioned rates are for foundation, with individuals footing with bearing capacity of 30 tonnes per square metre. For raft foundations, these rates shall be increased by 7.5% where safe bearing capacity (SBC) is 5 M.T. per Sq.m and by 5% where SBC is more than 5 MT/Sqm. and upto 10MT/Sq.m. This percentage of 5% or 7,5% is applicable for estimation of amount of L.S. items ESR for Extra item due to change from individual footing foundation to raft actual increase in concrete and steel quantities be paid as per relevent DSR Item. 15. The rates shall be increase by 30% for brearing piles upto depth of 10m and for further increased in depth by 5M each it shall be increased by another 10% These rates are applicable where raft is not reasible for pile foundation sulfate resistant cement shall only be used. Single pile for the column is not permitted Group of piles shall be designed with pile cap for each column of ESR. 16. These</p>						
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<p>rates are applicable for staging height of 12 M These rates shall be increased or decreased for per metre variation in the staging height as below 12 to 16 M staging 2% per metre 20 M and above - 4% per metre For 20 m staging height Percentage calculation will be like below 12 to 16m = $4 \times 2 = 8\%$ 16 to 20m = $4 \times 3 = 12\%$ 20m = $2 \times 1 = 2\%$ Total = 22%</p> <p>17. Following rates are for seismic zone-III for Zone-IV these rates shall be increased by 5% and for Zone-II, these rates shall be decreased by 5% concerned Executive Engineer shall confirm the seismic zone for the scheme from seismic zones plan before estimation and adopt appropriate rates as per actual seismic zones (Seismic maps attached in this C.S.R.) 3. Diwale Gaon (WD 5B)-1350KL</p>						
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179	<p>Item No 179:- Designing (aesthetically), and constructing RCC elevated service reservoirs of following capacity with RCC staging consisting of columns, internal and external bracings spaced vertically not more than 4.5 meters centre to centre for E.S.R. having capacity 500 m³ & not more than 6 m c/c for E.S.R. having capacity above 500 m³ including excavation in all types of strata, foundation concret, cement plaster with water proofing compound to the inside face of the container including refilling disposing of the surplus stuff within a lead of 50 meters, all labour and material charges including lowering, laying, erecting, hoisting and jointing of pipe assembly of inlet, outlet, washout, overflow and bypass arrangements as per departmental design. providing and fixing accessories such as Stainless steel ladder inside and M.S. ladder with G.I. railing outside, C. I. manhole frame and covers water level indicators, lightening conductor, G. I. pipe railing around walk way and top slab, providing spiral staire case from ground level to roof level, M.S.Grill gate of 2 Mtrs height with locking arrangement, B.B. masonry chambers for all valves, ventilating shafts, providing and applying three</p>	As directed by Engineer Incharge	1.00	12601090.00	No	12601090.00	INR One Crore Twenty Six Lakh One Thousand & Ninety Only
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<p>coats of acrylic emulsion with silicon additives paint to the structure including roof slab and epoxy paint to internal surface & anti-termite treatment for underground parts of the structures and giving satisfactory water tightness test as per I.S. code, The job to include painting the name of the scheme and other details on the reservoir as per the directions of Engineer-in-charge. Notes: 1. The design of the structure be in accordance with relevent (I.S.3370 - 1965 or revised) 2. The design shall satisfy the stipulation as per IS 1893-1984 and I.S. 13920/1993 for seismic focrcce and I.S.- 11682/1985 for R.C.C. staging of overhead tanks. 3. For design having more than 6 columns, Providing of internal bracing is obligatory,. External bracking is also obligatory. 4.. The entire structure shall be in M 300 mix only. 5. Plain round mild steel bars grade - I confirming to I.S,432 Part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S. 1139 shall be used, grade-II mild steel bars will not be allowed. 6. Irrespective of the type of foundation proposed in the design, one set of bracing be provided at the gound level. 7. These rates include providing, M.S. ladder for E.S.R's upto 2 lakhs liters capacity and providing sprial staircase for E.S.R.</p>						
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<p>above 2 lakhs liters capacity. 8. Staggering shall have to be designed with stresses of M-250 for ESR. However all RCC construction should be done in M-300 9. These rates are including the cost of uplift pressure if any and entire dewatering during execution. In case of water logging area where water is struck at shallow depth extra provision of dewatering shall be made as per site condition. 10. All condition given in the Member Secretary's Circular No.MJP/TS-I/350/1668 dt. 2.8.97 and MJP/S-I/350/2127 dt. 13.7.99 shall be strictly followed and additional cost, if any due to these conditions is included in the rates mentioned below. 11.. 75% part rate shall be payable for reinforced concrete and plastering items of containers of E.S.R. till satisfactory hydraulic testing for water tightness is given ; and till that work shall be treated as incomplete. 12. The rates indicated in the table are excluding the cost of pipes, specials and valves required for inlet, outlet washout overflow and by-pass arrangement. The scope of work, however includes cost of erecting, laying and jointing of pipes and valves including cost of jointing materials upto 5M beyond outer face of outermost column. 13. For ESR upto 500cum capacity</p>						
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<p>C.I.D. double flanged pipes upto 300mm dia shall be provided and C.I.Specials shall be used.For ESR above 500 cum capacity C.I./M.S. pipes assembly with minimum 8mm thick ness up to 500mm dia. And minimum 10mm thickness above 500mm dia can be used with proper anti-corrosive epoxy teratment from inside and outside. 14. Below mentioned rates are for foundation, with individuals footing with bearing capacity of 30 tonnes per square metre. For raft foundations, these rates shall be increased by 7.5% where safe bearing capacity (SBC) is 5 M.T. per Sq.m and by 5% where SBC is more than 5 MT/Sqm. and upto 10MT/Sq.m. This percentage of 5% or 7,5% is applicable for estimation of amount of L.S. items ESR for Extra item due to change from individual footing foundation to raft actual increase in concrete and steel quantities be paid as per relevent DSR Item. 15. The rates shall be increase by 30% for brearing piles upto depth of 10m and for further increased in depth by 5M each it shall be increased by another 10% These rates are applicable where raft is not reasible for pile foundation sulfate resistant cement shall only be used. Single pile for the column is not permitted Group of piles shall be designed with pile cap</p>						
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<p>for each column of ESR. 16. These rates are applicable for staging height of 12 M These rates shall be increased or decreased for per metre variation in the staging height as below 12 to 16 M staging 2% per metre 20 M and above - 4% per metre For 20 m staging height Percentage calculation will be like below</p> <p>12 to 16m = 4 x 2 = 8% 16 to 20m = 4 x 3 = 12% 20m = 2 x 1 = 2% Total = 22%</p> <p>17. Following rates are for seismic zone-III for Zone-IV these rates shall be increased by 5% and for Zone-II, these rates shall be decreased by 5% concerned Executive Engineer shall confirm the seismic zone for the scheme from seismic zones plan before estimation and adopt appropriate rates as per actual seismic zones(Seismic maps attached in this C.S.R.)</p> <p>4.Parsik hill ESR Sec 27 (WD 4)_ 1150 KL</p>						
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180	<p>Item No 180:- Designing (aesthetically), and constructing RCC elevated service reservoirs of following capacity with RCC staging consisting of columns, internal and external bracings spaced vertically not more than 4.5 meters centre to centre for E.S.R. having capacity 500 m³ & not more than 6 m c/c for E.S.R. having capacity above 500 m³ including excavation in all types of strata, foundation concret, cement plaster with water proofing compound to the inside face of the container including refilling disposing of the surplus stuff within a lead of 50 meters, all labour and material charges including lowering, laying, erecting, hoisting and jointing of pipe assembly of inlet, outlet, washout, overflow and bypass arrangements as per departmental design. providing and fixing accessories such as Stainless steel ladder inside and M.S. ladder with G.I. railing outside, C. I. manhole frame and covers water level indicators, lightening conductor, G. I. pipe railing around walk way and top slab, providing spiral staire case from ground level to roof level, M.S.Grill gate of 2 Mtrs height with locking arrangement, B.B. masonry chambers for all valves, ventilating shafts, providing and applying three</p>	As directed by Engineer Incharge	2.00	23472083.00	No	46944166.00	INR Four Crore Sixty Nine Lakh Forty Four Thousand One Hundred & Sixty Six Only
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	<p>coats of acrylic emulsion with silicon additives paint to the structure including roof slab and epoxy paint to internal surface & anti-termite treatment for underground parts of the structures and giving satisfactory water tightness test as per I.S. code, The job to include painting the name of the scheme and other details on the reservoir as per the directions of Engineer-in-charge. Notes: 1. The design of the structure be in accordance with relevent (I.S.3370 - 1965 or revised) 2. The design shall satisfy the stipulation as per IS 1893-1984 and I.S. 13920/1993 for seismic focrcce and I.S.- 11682/1985 for R.C.C. staging of overhead tanks. 3. For design having more than 6 columns, Providing of internal bracing is obligatory,. External bracking is also obligatory. 4.. The entire structure shall be in M 300 mix only. 5. Plain round mild steel bars grade - I confirming to I.S,432 Part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S. 1139 shall be used, grade-II mild steel bars will not be allowed. 6. Irrespective of the type of foundation proposed in the design, one set of bracing be provided at the gound level. 7. These rates include providing, M.S. ladder for E.S.R's upto 2 lakhs liters capacity and providing sprial staircase for E.S.R.</p>						
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<p>above 2 lakhs liters capacity. 8. Staggering shall have to be designed with stresses of M-250 for ESR. However all RCC construction should be done in M-300 9. These rates are including the cost of uplift pressure if any and entire dewatering during execution. In case of water logging area where water is struck at shallow depth extra provision of dewatering shall be made as per site condition. 10. All condition given in the Member Secretary's Circular No.MJP/TS-I/350/1668 dt. 2.8.97 and MJP/S-I/350/2127 dt. 13.7.99 shall be strictly followed and additional cost, if any due to these conditions is included in the rates mentioned below. 11.. 75% part rate shall be payable for reinforced concrete and plastering items of containers of E.S.R. till satisfactory hydraulic testing for water tightness is given ; and till that work shall be treated as incomplete. 12. The rates indicated in the table are excluding the cost of pipes, specials and valves required for inlet, outlet washout overflow and by-pass arrangement. The scope of work, however includes cost of erecting, laying and jointing of pipes and valves including cost of jointing materials upto 5M beyond outer face of outermost column. 13. For ESR upto 500cum capacity</p>						
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	<p>C.I.D. double flanged pipes upto 300mm dia shall be provided and C.I.Specials shall be used.For ESR above 500 cum capacity C.I./M.S. pipes assembly with minimum 8mm thick ness up to 500mm dia. And minimum 10mm thickness above 500mm dia can be used with proper anti-corrosive epoxy teratment from inside and outside. 14. Below mentioned rates are for foundation, with individuals footing with bearing capacity of 30 tonnes per square metre. For raft foundations, these rates shall be increased by 7.5% where safe bearing capacity (SBC) is 5 M.T. per Sq.m and by 5% where SBC is more than 5 MT/Sqm. and upto 10MT/Sq.m. This percentage of 5% or 7,5% is applicable for estimation of amount of L.S. items ESR for Extra item due to change from individual footing foundation to raft actual increase in concrete and steel quantities be paid as per relevent DSR Item. 15. The rates shall be increase by 30% for brearing piles upto depth of 10m and for further increased in depth by 5M each it shall be increased by another 10% These rates are applicable where raft is not reasible for pile foundation sulfate resistant cement shall only be used. Single pile for the column is not permitted Group of piles shall be designed with pile cap</p>						
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<p>for each column of ESR. 16. These rates are applicable for staging height of 12 M These rates shall be increased or decreased for per metre variation in the staging height as below 12 to 16 M staging 2% per metre 20 M and above - 4% per metre For 20 m staging height Percentage calculation will be like below</p> <p>12 to 16m = 4 x 2 = 8% 16 to 20m = 4 x 3 = 12% 20m = 2 x 1 = 2% Total = 22%</p> <p>17. Following rates are for seismic zone-III for Zone-IV these rates shall be increased by 5% and for Zone-II, these rates shall be decreased by 5% concerned Executive Engineer shall confirm the seismic zone for the scheme from seismic zones plan before estimation and adopt appropriate rates as per actual seismic zones(Seismic maps attached in this C.S.R.)</p> <p>6.Sec-21 Nerul (WD-10)_ 1400 KL</p>						
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181	<p>Item No 181:- Designing (aesthetically), and constructing RCC elevated service reservoirs of following capacity with RCC staging consisting of columns, internal and external bracings spaced vertically not more than 4.5 meters centre to centre for E.S.R. having capacity 500 m³ & not more than 6 m c/c for E.S.R. having capacity above 500 m³ including excavation in all types of strata, foundation concret, cement plaster with water proofing compound to the inside face of the container including refilling disposing of the surplus stuff within a lead of 50 meters, all labour and material charges including lowering, laying, erecting, hoisting and jointing of pipe assembly of inlet, outlet, washout, overflow and bypass arrangements as per departmental design. providing and fixing accessories such as Stainless steel ladder inside and M.S. ladder with G.I. railing outside, C. I. manhole frame and covers water level indicators, lightening conductor, G. I. pipe railing around walk way and top slab, providing spiral staire case from ground level to roof level, M.S.Grill gate of 2 Mtrs height with locking arrangement, B.B. masonry chambers for all valves, ventilating shafts, providing and applying three</p>	As directed by Engineer Incharge	1.00	14571701.00	No	14571701.00	INR One Crore Forty Five Lakh Seventy One Thousand Seven Hundred & One Only
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<p>coats of acrylic emulsion with silicon additives paint to the structure including roof slab and epoxy paint to internal surface & anti-termite treatment for underground parts of the structures and giving satisfactory water tightness test as per I.S. code, The job to include painting the name of the scheme and other details on the reservoir as per the directions of Engineer-in-charge. Notes: 1. The design of the structure be in accordance with relevent (I.S.3370 - 1965 or revised) 2. The design shall satisfy the stipulation as per IS 1893-1984 and I.S. 13920/1993 for seismic focrcce and I.S.- 11682/1985 for R.C.C. staging of overhead tanks. 3. For design having more than 6 columns, Providing of internal bracing is obligatory,. External bracking is also obligatory. 4.. The entire structure shall be in M 300 mix only. 5. Plain round mild steel bars grade - I confirming to I.S,432 Part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S. 1139 shall be used, grade-II mild steel bars will not be allowed. 6. Irrespective of the type of foundation proposed in the design, one set of bracing be provided at the gound level. 7. These rates include providing, M.S. ladder for E.S.R's upto 2 lakhs liters capacity and providing sprial staircase for E.S.R.</p>						
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<p>above 2 lakhs liters capacity. 8. Staggering shall have to be designed with stresses of M-250 for ESR. However all RCC construction should be done in M-300 9. These rates are including the cost of uplift pressure if any and entire dewatering during execution. In case of water logging area where water is struck at shallow depth extra provision of dewatering shall be made as per site condition. 10. All condition given in the Member Secretary's Circular No.MJP/TS-I/350/1668 dt. 2.8.97 and MJP/S-I/350/2127 dt. 13.7.99 shall be strictly followed and additional cost, if any due to these conditions is included in the rates mentioned below. 11.. 75% part rate shall be payable for reinforced concrete and plastering items of containers of E.S.R. till satisfactory hydraulic testing for water tightness is given ; and till that work shall be treated as incomplete. 12. The rates indicated in the table are excluding the cost of pipes, specials and valves required for inlet, outlet washout overflow and by-pass arrangement. The scope of work, however includes cost of erecting, laying and jointing of pipes and valves including cost of jointing materials upto 5M beyond outer face of outermost column. 13. For ESR upto 500cum capacity</p>						
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	<p>C.I.D. double flanged pipes upto 300mm dia shall be provided and C.I.Specials shall be used.For ESR above 500 cum capacity C.I./M.S. pipes assembly with minimum 8mm thick ness up to 500mm dia. And minimum 10mm thickness above 500mm dia can be used with proper anti-corrosive epoxy teratment from inside and outside. 14. Below mentioned rates are for foundation, with individuals footing with bearing capacity of 30 tonnes per square metre. For raft foundations, these rates shall be increased by 7.5% where safe bearing capacity (SBC) is 5 M.T. per Sq.m and by 5% where SBC is more than 5 MT/Sqm. and upto 10MT/Sq.m. This percentage of 5% or 7,5% is applicable for estimation of amount of L.S. items ESR for Extra item due to change from individual footing foundation to raft actual increase in concrete and steel quantities be paid as per relevent DSR Item. 15. The rates shall be increase by 30% for brearing piles upto depth of 10m and for further increased in depth by 5M each it shall be increased by another 10% These rates are applicable where raft is not reasible for pile foundation sulfate resistant cement shall only be used. Single pile for the column is not permitted Group of piles shall be designed with pile cap</p>						
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<p>for each column of ESR. 16. These rates are applicable for staging height of 12 M These rates shall be increased or decreased for per metre variation in the staging height as below 12 to 16 M staging 2% per metre 20 M and above - 4% per metre For 20 m staging height Percentage calculation will be like below</p> <p>12 to 16m = 4 x 2 = 8% 16 to 20m = 4 x 3 = 12% 20m = 2 x 1 = 2% Total = 22%</p> <p>17. Following rates are for seismic zone-III for Zone-IV these rates shall be increased by 5% and for Zone-II, these rates shall be decreased by 5% concerned Executive Engineer shall confirm the seismic zone for the scheme from seismic zones plan before estimation and adopt appropriate rates as per actual seismic zones(Seismic maps attached in this C.S.R.)</p> <p>6.Sec-21 Nerul (WD-10)_ 1400 KL</p>						
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182	<p>Item No 182:- Designing (aesthetically), and constructing RCC elevated service reservoirs of following capacity with RCC staging consisting of columns, internal and external bracings spaced vertically not more than 4.5 meters centre to centre for E.S.R. having capacity 500 m³ & not more than 6 m c/c for E.S.R. having capacity above 500 m³ including excavation in all types of strata, foundation concret, cement plaster with water proofing compound to the inside face of the container including refilling disposing of the surplus stuff within a lead of 50 meters, all labour and material charges including lowering, laying, erecting, hoisting and jointing of pipe assembly of inlet, outlet, washout, overflow and bypass arrangements as per departmental design. providing and fixing accessories such as Stainless steel ladder inside and M.S. ladder with G.I. railing outside, C. I. manhole frame and covers water level indicators, lightening conductor, G. I. pipe railing around walk way and top slab, providing spiral staire case from ground level to roof level, M.S.Grill gate of 2 Mtrs height with locking arrangement, B.B. masonry chambers for all valves, ventilating shafts, providing and applying three</p>	As directed by Engineer Incharge	1.00	26227569.00	No	26227569.00	INR Two Crore Sixty Two Lakh Twenty Seven Thousand Five Hundred & Sixty Nine Only
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	<p>coats of acrylic emulsion with silicon additives paint to the structure including roof slab and epoxy paint to internal surface & anti-termite treatment for underground parts of the structures and giving satisfactory water tightness test as per I.S. code, The job to include painting the name of the scheme and other details on the reservoir as per the directions of Engineer-in-charge. Notes: 1. The design of the structure be in accordance with relevent (I.S.3370 - 1965 or revised) 2. The design shall satisfy the stipulation as per IS 1893-1984 and I.S. 13920/1993 for seismic focrcce and I.S.- 11682/1985 for R.C.C. staging of overhead tanks. 3. For design having more than 6 columns, Providing of internal bracing is obligatory,. External bracking is also obligatory. 4.. The entire structure shall be in M 300 mix only. 5. Plain round mild steel bars grade - I confirming to I.S,432 Part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S. 1139 shall be used, grade-II mild steel bars will not be allowed. 6. Irrespective of the type of foundation proposed in the design, one set of bracing be provided at the gound level. 7. These rates include providing, M.S. ladder for E.S.R's upto 2 lakhs liters capacity and providing sprial staircase for E.S.R.</p>						
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<p>above 2 lakhs liters capacity. 8. Staggering shall have to be designed with stresses of M-250 for ESR. However all RCC construction should be done in M-300 9. These rates are including the cost of uplift pressure if any and entire dewatering during execution. In case of water logging area where water is struck at shallow depth extra provision of dewatering shall be made as per site condition. 10. All condition given in the Member Secretary's Circular No.MJP/TS-I/350/1668 dt. 2.8.97 and MJP/S-I/350/2127 dt. 13.7.99 shall be strictly followed and additional cost, if any due to these conditions is included in the rates mentioned below. 11.. 75% part rate shall be payable for reinforced concrete and plastering items of containers of E.S.R. till satisfactory hydraulic testing for water tightness is given ; and till that work shall be treated as incomplete. 12. The rates indicated in the table are excluding the cost of pipes, specials and valves required for inlet, outlet washout overflow and by-pass arrangement. The scope of work, however includes cost of erecting, laying and jointing of pipes and valves including cost of jointing materials upto 5M beyond outer face of outermost column. 13. For ESR upto 500cum capacity</p>						
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<p>C.I.D. double flanged pipes upto 300mm dia shall be provided and C.I.Specials shall be used.For ESR above 500 cum capacity C.I./M.S. pipes assembly with minimum 8mm thick ness up to 500mm dia. And minimum 10mm thickness above 500mm dia can be used with proper anti-corrosive epoxy teratment from inside and outside. 14. Below mentioned rates are for foundation, with individuals footing with bearing capacity of 30 tonnes per square metre. For raft foundations, these rates shall be increased by 7.5% where safe bearing capacity (SBC) is 5 M.T. per Sq.m and by 5% where SBC is more than 5 MT/Sqm. and upto 10MT/Sq.m. This percentage of 5% or 7,5% is applicable for estimation of amount of L.S. items ESR for Extra item due to change from individual footing foundation to raft actual increase in concrete and steel quantities be paid as per relevent DSR Item. 15. The rates shall be increase by 30% for brearing piles upto depth of 10m and for further increased in depth by 5M each it shall be increased by another 10% These rates are applicable where raft is not reasible for pile foundation sulfate resistant cement shall only be used. Single pile for the column is not permitted Group of piles shall be designed with pile cap</p>						
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	<p>for each column of ESR. 16. These rates are applicable for staging height of 12 M These rates shall be increased or decreased for per metre variation in the staging height as below 12 to 16 M staging 2% per metre 20 M and above - 4% per metre For 20 m staging height Percentage calculation will be like below</p> <p>12 to 16m = 4 x 2 = 8% 16 to 20m = 4 x 3 = 12% 20m = 2 x 1 = 2% Total = 22%</p> <p>17. Following rates are for seismic zone-III for Zone-IV these rates shall be increased by 5% and for Zone-II, these rates shall be decreased by 5% concerned Executive Engineer shall confirm the seismic zone for the scheme from seismic zones plan before estimation and adopt appropriate rates as per actual seismic zones(Seismic maps attached in this C.S.R.)</p> <p>7.(WD-11,12,13)_ 3000 KL</p>						
183	<p>Item No 183:- Designing (aesthetically), and constructing RCC elevated service reservoirs of following capacity with RCC staging consisting of columns, internal and external bracings spaced vertically not more than 4.5 meters centre to centre for E.S.R. having capacity 500 m3 & not more</p>	As directed by Engineer Incharge	1.00	16992649.00	No	16992649.00	INR One Crore Sixty Nine Lakh Ninety Two Thousand Six Hundred & Forty Nine Only

<p>than 6 m c/c for E.S.R.having capacity above 500 m³ including excavation in all types of strata, foundation concret, cement plaster with water proofing compound to the inside face of the container including refilling disposing of the surplus stuff within a lead of 50 meters, all labour and material charges including lowering, laying, erecting, hoisting and jointing of pipe assembly of inlet, outlet, washout, overflow and bypass arrangements as per departmental design. providing and fixing accessories such as Stainless steel ladder inside and M.S. ladder with G.I. railing outside, C. I. manhole frame and covers water level indicators, lightening conductor, G. I. pipe railing around walk way and top slab, providing spiral staire case from ground level to roof level, M.S.Grill gate of 2 Mtrs height with locking arrangement, B.B. masonry chambers for all valves, ventilating shafts, providing and applying three coats of acrylic emulsion with silicon additives paint to the structure including roof slab and epoxy paint to internal surface & anti-termite treatment for underground parts of the structures and giving satisfactory water tightness test as per I.S. code, The job to include painting the name of the scheme and other details on</p>						
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<p>the reservoir as per the directions of Engineer-in-charge. Notes: 1. The design of the structure be in accordance with relevent (I.S.3370 - 1965 or revised) 2. The design shall satisfy the stipulation as per IS 1893-1984 and I.S. 13920/1993 for seismic focrcce and I.S.- 11682/1985 for R.C.C. staging of overhead tanks. 3. For design having more than 6 columns, Providing of internal bracing is obligatory,. External bracking is also obligatory. 4.. The entire structure shall be in M 300 mix only. 5. Plain round mild steel bars grade - I confirming to I.S,432 Part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S. 1139 shall be used, grade-II mild steel bars will not be allowed. 6. Irrespective of the type of foundation proposed in the design, one set of bracing be provided at the gound level. 7. These rates include providing, M.S. ladder for E.S.R's upto 2 lakhs liters capacity and providing sprial staircase for E.S.R. above 2 lakhs liters capacity. 8. Stagging shall have to be designed with stresses of M-250 for ESR. However all RCC construction should be done in M-300 9. These rates are including the cost of uplift pressure if any and entire dewatering during execution. In case of water logging area where water is</p>						
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<p>struck at shallow depth extra provision of dewatering shall be made as per site condition. 10. All condition given in the Member Secretary's Circular No.MJP/TS-I/350/1668 dt. 2.8.97 and MJP/S-I/350/2127 dt. 13.7.99 shall be strictly followed and additional cost, if any due to these conditions is included in the rates mentioned below. 11.. 75% part rate shall be payable for reinforced concrete and plastering items of containers of E.S.R. till satisfactory hydraulic testing for water tightness is given ; and till that work shall be treated as incomplete. 12. The rates indicated in the table are excluding the cost of pipes, specials and valves required for inlet, outlet washout overflow and by-pass arrangement. The scope of work, however includes cost of erecting, laying and jointing of pipes and valves including cost of jointing materials upto 5M beyond outer face of outermost column. 13. For ESR upto 500cum capacity C.I.D. double flanged pipes upto 300mm dia shall be provided and C.I.Specials shall be used.For ESR above 500 cum capacity C.I./M.S. pipes assembly with minimum 8mm thickness up to 500mm dia. And minimum 10mm thickness above 500mm dia can be used with proper anti-corrosive epoxy treatment from</p>						
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<p>inside and outside. 14. Below mentioned rates are for foundation, with individuals footing with bearing capacity of 30 tonnes per square metre. For raft foundations, these rates shall be increased by 7.5% where safe bearing capacity (SBC) is 5 M.T. per Sq.m and by 5% where SBC is more than 5 MT/Sqm. and upto 10MT/Sq.m. This percentage of 5% or 7,5% is applicable for estimation of amount of L.S. items ESR for Extra item due to change from individual footing foundation to raft actual increase in concrete and steel quantities be paid as per relevent DSR Item. 15. The rates shall be increase by 30% for brearing piles upto depth of 10m and for further increased in depth by 5M each it shall be increased by another 10% These rates are applicable where raft is not reasible for pile foundation sulfate resistant cement shall only be used. Single pile for the column is not permitted Group of piles shall be designed with pile cap for each column of ESR. 16. These rates are applicable for staging height of 12 M These rates shall be increased or decreased for per metre variation in the staging height as below 12 to 16 M staging 2% per metre 20 M and abovd - 4% per metre For 20 m stagging height</p>						
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	<p>Percentage calculation will be like below</p> <p>12 to 16m = 4 x 2 = 8%</p> <p>16 to 20m = 4 x 3 = 12%</p> <p>20m = 2 x 1 = 2%</p> <p>Total = 22%</p> <p>17. Following rates are for seismic zone-III for Zone-IV these rates shall be increased by 5% and for Zone-II, these rates shall be decreased by 5% concerned Executive Engineer shall confirm the seismic zone for the scheme from seismic zones plan before estimation and adopt appropriate rates as per actual seismic zones(Seismic maps attached in this C.S.R.)</p> <p>8.Karave Gaon (WD 18)_ 1400 KL</p>						
184	<p>Item No 184:- Providing and supplying ISI standard welded DI double flanged pipe excluding GST levied by GOI & GOM in all respect, railway freight, insurance, unloading from railway wagon, loading into truck transport to store/ site, unloading, stacking etc. complete as directed by Engineer-in-charge. (for 2.75 m bare pipe)</p> <p>250mm dia D.I-K7 .pipe- (Inlet, Overflow, Outlet, By pass, Washout)</p>	As directed by Engineer Incharge	163.00	6457.00	Rmt.	1052491.00	INR Ten Lakh Fifty Two Thousand Four Hundred & Ninety One Only

185	Item No 185:-Providing and supplying ISI standard welded DI double flanged pipe excluding GST levied by GOI & GOM in all respect, railway freight, insurance, unloading from railway wagon, loading into truck transport to store/ site, unloading, stacking etc. complete as directed by Engineer-in-charge. (for 2.75 m bare pipe)500mm dia D.I-K7 .pipe- (Inlet, Overflow, Outlet, By pass, Washout)	As directed by Engineer Incharge	44.00	17794.00	Rmt.	782936.00	INR Seven Lakh Eighty Two Thousand Nine Hundred & Thirty Six Only
186	Item No 186:- Providing and supplying ISI standard welded DI double flanged pipe excluding GST levied by GOI & GOM in all respect, railway freight, insurance, unloading from railway wagon, loading into truck transport to store/ site, unloading, stacking etc. complete as directed by Engineer-in-charge. (for 2.75 m bare pipe) 600mm dia D.I-K7 .pipe- (Inlet, Overflow, Outlet, By pass, Washout)	As directed by Engineer Incharge	65.00	23427.00	Rmt.	1522755.00	INR Fifteen Lakh Twenty Two Thousand Seven Hundred & Fifty Five Only

187	Item No 187:- Providing and supplying ISI standard welded DI double flanged pipe excluding GST levied by GOI & GOM in all respect, railway freight, insurance, unloading from railway wagon, loading into truck transport to store/ site, unloading, stacking etc. complete as directed by Engineer-in-charge. (for 2.75 m bare pipe) 700mm dia D.I-K7 .pipe- (Inlet, Overflow, Outlet, By pass, Washout)	As directed by Engineer Incharge	46.00	31525.00	Rmt.	1450150.00	INR Fourteen Lakh Fifty Thousand One Hundred & Fifty Only
188	Item No 188:- Providing and supplying double flange sluice valves confirming for IS 14846 including warn gear arrangement as per test pressure stainless steel spindle caps including inspection charges transportation upto departmental store,loading unloading,stacking excluding GST levied by GOI and GOM in all respect etc complete. 250 mm dia	As directed by Engineer Incharge	6.00	28761.00	No.	172566.00	INR One Lakh Seventy Two Thousand Five Hundred & Sixty Six Only
189	Item No 189:- Providing and supplying double flange sluice valves confirming for IS 14846 including warn gear arrangement as per test pressure stainless steel spindle caps including inspection charges transportation upto departmental store,loading unloading,stacking excluding GST levied by GOI and GOM in all respect etc complete.	As directed by Engineer Incharge	2.00	109614.00	No.	219228.00	INR Two Lakh Nineteen Thousand Two Hundred & Twenty Eight Only

	500 mm dia						
190	Item No 190:- Providing and supplying double flange sluice valves confirming for IS 14846 including warn gear arrangement as per test pressure stainless steel spindle caps including inspection charges transportation upto departmental store,loading unloading,stacking excluding GST levied by GOI and GOM in all respect etc complete. 600 mm dia	As directed by Engineer Incharge	3.00	162395.00	No.	487185.00	INR Four Lakh Eighty Seven Thousand One Hundred & Eighty Five Only
191	Item No 191:- Providing and supplying double flange sluice valves confirming for IS 14846 including warn gear arrangement as per test pressure stainless steel spindle caps including inspection charges transportation upto departmental store,loading unloading,stacking excluding GST levied by GOI and GOM in all respect etc complete. 700 mm dia	As directed by Engineer Incharge	1.00	306488.00	No.	306488.00	INR Three Lakh Six Thousand Four Hundred & Eighty Eight Only

192	Item No 192:- DI K-7 Pipe Providing D.I. K- 7 pipes of following grades with internal cement mortar lining and including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores/site, unloading, stacking, etc. complete. (IS:8329- 2000 Latest Version) . 100 mm dia	As directed by Engineer Incharge	2365.00	1209.00	Rmt.	2859285.00	INR Twenty Eight Lakh Fifty Nine Thousand Two Hundred & Eighty Five Only
193	Item No 193:-Providing D.I. K- 7 pipes of following grades with internal cement mortar lining and including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores/site, unloading, stacking, etc. complete. (IS:8329-2000 Latest Version) . 150 mm dia	As directed by Engineer Incharge	6592.00	1686.00	Rmt.	11114112.00	INR One Crore Eleven Lakh Fourteen Thousand One Hundred & Twelve Only
194	Item No 194:- Providing D.I. K- 7 pipes of following grades with internal cement mortar lining and including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores/site, unloading, stacking, etc. complete. (IS:8329- 2000 Latest Version) . 200 mm dia	As directed by Engineer Incharge	16412.00	2236.00	Rmt.	36697232.00	INR Three Crore Sixty Six Lakh Ninety Seven Thousand Two Hundred & Thirty Two Only

195	Item No 195:- Providing D.I. K- 7 pipes of following grades with internal cement mortar lining and including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores/site, unloading, stacking, etc. complete. (IS:8329-2000 Latest Version) .) 250 mm dia	As directed by Engineer Incharge	7444.00	2906.00	Rmt.	21632264.00	INR Two Crore Sixteen Lakh Thirty Two Thousand Two Hundred & Sixty Four Only
196	Item No 196:- Providing D.I. K- 7 pipes of following grades with internal cement mortar lining and including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores/site, unloading, stacking, etc. complete. (IS:8329-2000 Latest Version) . 300 mm dia	As directed by Engineer Incharge	5997.00	3571.00	Rmt.	21415287.00	INR Two Crore Fourteen Lakh Fifteen Thousand Two Hundred & Eighty Seven Only
197	Item No 197:- Providing D.I. K- 7 pipes of following grades with internal cement mortar lining and including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores/site, unloading, stacking, etc. complete. (IS:8329-2000 Latest Version) . 350 mm dia	As directed by Engineer Incharge	4281.00	4465.00	Rmt.	19114665.00	INR One Crore Ninety One Lakh Fourteen Thousand Six Hundred & Sixty Five Only

198	Item No 198:- Providing D.I. K- 7 pipes of following grades with internal cement mortar lining and including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores/site, unloading, stacking, etc. complete. (IS:8329-2000 Latest Version) . 400 mm dia	As directed by Engineer Incharge	2005.00	5328.00	Rmt.	10682640.00	INR One Crore Six Lakh Eighty Two Thousand Six Hundred & Forty Only
199	Item No 199:-Providing D.I. K- 7 pipes of following grades with internal cement mortar lining and including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores/site, unloading, stacking, etc. complete. (IS:8329-2000 Latest Version) . 450 mm dia	As directed by Engineer Incharge	1020.00	6346.00	Rmt.	6472920.00	INR Sixty Four Lakh Seventy Two Thousand Nine Hundred & Twenty Only
200	Item No 200:- Providing D.I. K- 7 pipes of following grades with internal cement mortar lining and including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores/site, unloading, stacking, etc. complete. (IS:8329-2000 Latest Version) . 500 mm dia	As directed by Engineer Incharge	557.00	7392.00	Rmt.	4117344.00	INR Forty One Lakh Seventeen Thousand Three Hundred & Forty Four Only

201	Item No 201:- Providing D.I. K- 7 pipes of following grades with internal cement mortar lining and including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores/site, unloading, stacking, etc. complete. (IS:8329-2000 Latest Version) . 600 mm dia	As directed by Engineer Incharge	584.00	9765.00	Rmt.	5702760.00	INR Fifty Seven Lakh Two Thousand Seven Hundred & Sixty Only
202	Item No 202:-Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete i) Sluice Valves PN 1.0 Without bypass a) 100 mm dia	As directed by Engineer Incharge	6.00	6835.00	No	41010.00	INR Forty One Thousand &Ten Only
203	Item No 203:- Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete	As directed by Engineer Incharge	14.00	10251.00	No	143514.00	INR One Lakh Forty Three Thousand Five Hundred & Fourteen Only

	i) Sluice Valves PN 1.0 Without bypass b) 150 mm dia						
204	Item No 204:- Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete i) Sluice Valves PN 1.0 Without bypass c) 200 mm dia	As directed by Engineer Incharge	38.00	18581.00	No	706078.00	INR Seven Lakh Six Thousand & Seventy Eight Only
205	Item No 205:- Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete	As directed by Engineer Incharge	18.00	28727.00	No	517086.00	INR Five Lakh Seventeen Thousand & Eighty Six Only

	i) Sluice Valves PN 1.0 Without bypass d) 250 mm dia						
206	Item No 206:- Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete i) Sluice Valves PN 1.0 Without bypass e) 300 mm dia	As directed by Engineer Incharge	13.00	36471.00	No	474123.00	INR Four Lakh Seventy Four Thousand One Hundred & Twenty Three Only
207	Item No 207:- Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete	As directed by Engineer Incharge	10.00	53651.00	No	536510.00	INR Five Lakh Thirty Six Thousand Five Hundred & Ten Only

	i) Sluice Valves PN 1.0 Without bypass f) 350 mm dia						
208	<p>Item No 208:- Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete</p> <p>i) Sluice Valves PN 1.0 Without bypass g) 400 mm dia</p>	As directed by Engineer Incharge	5.00	70635.00	No	353175.00	INR Three Lakh Fifty Three Thousand One Hundred & Seventy Five Only

209	<p>Item No 209:- Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete i) Sluice Valves PN 1.0 Without bypass h) 450 mm dia</p>	As directed by Engineer Incharge	3.00	75940.00	No	227820.00	INR Two Lakh Twenty Seven Thousand Eight Hundred & Twenty Only
210	<p>Item No 210:- Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete i) Sluice Valves PN 1.0 Without bypass i) 500 mm dia</p>	As directed by Engineer Incharge	2.00	109450.00	No	218900.00	INR Two Lakh Eighteen Thousand Nine Hundred Only

211	<p>Item No 211:- Providing and supplying Double flanged sluice valve confirming for IS 2906/14846/ including worn gear arrangements as per test pressure stainless steel spindle, caps following dia. including all taxes (Central and Local freight, inspection charges, unloading from railway wagon, loading into truck, transportation up to departmental stores, unloading, stacking, etc. complete</p> <p>i) Sluice Valves PN 1.0 Without bypass</p> <p>j) 600 mm dia</p>	As directed by Engineer Incharge	2.00	162155.00	No	324310.00	INR Three Lakh Twenty Four Thousand Three Hundred & Ten Only
212	<p>Item No 212:- Air Valves PN 1.0 Providing and supplying double ball flanged Air Valves as per IS 14845 and MJP's standard specifications double orifice type combined with screw down isolating sluice valve, small orifice elastic ball resting on a gun metal orifice nipple, large orifice vulcanite ball seating on moulded seat ring, inlet face and drilled, including all taxes (central and local), insurance, third party inspection charges, loading, unloading, transportation up to departmental stores / site, etc. complete</p> <p>Double Ball Air Valve 50 mm dia.</p>	As directed by Engineer Incharge	30.00	5850.00	No.	175500.00	INR One Lakh Seventy Five Thousand Five Hundred Only

213	Item No 213:-Air Valves PN 1.0 Providing and supplying double ball flanged Air Valves as per IS 14845 and MJP's standard specifications double orifice type combined with screw down isolating sluice valve, small orifice elastic ball resting on a gun metal orifice nipple, large orifice vulcanite ball seating on moulded seat ring, inlet face and drilled, including all taxes (central and local), insurance, third party inspection charges, loading, unloading, transportation up to departmental stores / site, etc. completeDouble Ball Air Valve65 mm dia	As directed by Engineer Incharge	8.00	6826.00	No.	54608.00	INR Fifty Four Thousand Six Hundred & Eight Only
214	Item No 214:- Air Valves PN 1.0 Providing and supplying double ball flanged Air Valves as per IS 14845 and MJP's standard specifications double orifice type combined with screw down isolating sluice valve, small orifice elastic ball resting on a gun metal orifice nipple, large orifice vulcanite ball seating on moulded seat ring, inlet face and drilled, including all taxes (central and local), insurance, third party inspection charges, loading, unloading, transportation up to departmental stores / site, etc. complete Double Ball Air Valve 80 mm dia	As directed by Engineer Incharge	2.00	7796.00	No.	15592.00	INR Fifteen Thousand Five Hundred & Ninety Two Only

215	<p>Item No 215:- Air Valves PN 1.0 Providing and supplying double ball flanged Air Valves as per IS 14845 and MJP's standard specifications double orifice type combined with screw down isolating sluice valve, small orifice elastic ball resting on a gun metal orifice nipple, large orifice vulcanite ball seating on moulded seat ring, inlet face and drilled, including all taxes (central and local), insurance, third party inspection charges, loading, unloading, transportation up to departmental stores / site, etc. complete Double Ball Air Valve 100 mm dia</p>	As directed by Engineer Incharge	2.00	9859.00	No.	19718.00	INR Nineteen Thousand Seven Hundred & Eighteen Only
216	<p>Item No 216:- Excavation for foundation/ pipe trenches in hard rock and concrete road by chiselling , wedging line drilling by mechanical means or by all means other than blasing uding removing the excation material up to a distance of 50 meter and lift as below, stacking and spreading as directed, normal dewatering,prepairing the bed for foundation and excluding backfilling, etc complete. For 0.0 to 1.5 m depth</p>	As directed by Engineer Incharge	27795.34	1118.70	cum	31094646.86	INR Three Crore Ten Lakh Ninety Four Thousand Six Hundred & Forty Six and Paise Eighty Six Only

217	<p>Item No 217:- Providing and casting insitu C.C. of M25 grade trap/ granite/ quartzite/ gneiss metal of approved quality for RCC work as per detailed drawing and designs or as directed by Engineer in charge including normal dewatering centering plywood form work bully/ steel prop-ups, compaction finishing the formed surface with CM 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing etc. complete(by weigh batching and mix design for M-250 and M-300 only. use L&T, A.C.C. Ambuja, Birla Gold, Manik Gad, Rajashree, etc. cement is permitted (Excluding M.S. of Tor reinforcement) M-250 for Thrust Block</p>	As directed by Engineer Incharge	2.28	9047.38	cum	20628.03	INR Twenty Thousand Six Hundred & Twenty Eight and Paise Three Only
218	<p>Item No 218:- Lowering, laying and jointing with SBR rubber gaskets D.I. S/S pipes of various classes with CI/MS specials of following diameters in proper position, grade and alignment as directed by Engineer-in-charge including conveyance of material from stores to site of work , including cost of jointing materials and without rubber rings, labour, giving hydraulic testing, trial run etc. complete. 100 mm dia</p>	As directed by Engineer Incharge	2365.00	70.40	Rmt.	166496.00	INR One Lakh Sixty Six Thousand Four Hundred & Ninety Six Only

219	Item No 219:- Lowering, laying and jointing with SBR rubber gaskets D.I. S/S pipes of various classes with CI/MS specials of following diameters in proper position, grade and alignment as directed by Engineer-in-charge including conveyance of material from stores to site of work , including cost of jointing materials and without rubber rings, labour, giving hydraulic testing, trial run etc. complete.150 mm dia	As directed by Engineer Incharge	6592.00	94.60	Rmt.	623603.20	INR Six Lakh Twenty Three Thousand Six Hundred & Three and Paise Twenty Only
220	Item No 220:- Lowering, laying and jointing with SBR rubber gaskets D.I. S/S pipes of various classes with CI/MS specials of following diameters in proper position, grade and alignment as directed by Engineer-in-charge including conveyance of material from stores to site of work , including cost of jointing materials and without rubber rings, labour, giving hydraulic testing, trial run etc. complete.200 mm dia	As directed by Engineer Incharge	16412.00	124.30	Rmt.	2040011.60	INR Twenty Lakh Forty Thousand &Eleven and Paise Sixty Only

221	Item No 221:- Lowering, laying and jointing with SBR rubber gaskets D.I. S/S pipes of various classes with CI/MS specials of following diameters in proper position, grade and alignment as directed by Engineer-in-charge including conveyance of material from stores to site of work , including cost of jointing materials and without rubber rings, labour, giving hydraulic testing, trial run etc. complete.250 mm dia	As directed by Engineer Incharge	7444.00	163.90	Rmt.	1220071.60	INR Twelve Lakh Twenty Thousand & Seventy One and Paise Sixty Only
222	Item No 222:- Lowering, laying and jointing with SBR rubber gaskets D.I. S/S pipes of various classes with CI/MS specials of following diameters in proper position, grade and alignment as directed by Engineer-in-charge including conveyance of material from stores to site of work , including cost of jointing materials and without rubber rings, labour, giving hydraulic testing, trial run etc. complete.300 mm dia	As directed by Engineer Incharge	5997.00	177.10	Rmt.	1062068.70	INR Ten Lakh Sixty Two Thousand & Sixty Eight and Paise Seventy Only
223	Item No 223:- Lowering, laying and jointing with SBR rubber gaskets D.I. S/S pipes of various classes with CI/MS specials of following diameters in proper position, grade and alignment as directed by Engineer-in-charge including conveyance of material from stores to site of work , including cost of jointing materials and	As directed by Engineer Incharge	4281.00	220.00	Rmt.	941820.00	INR Nine Lakh Forty One Thousand Eight Hundred & Twenty Only

	without rubber rings, labour, giving hydraulic testing, trial run etc. complete.350 mm dia						
224	Item No 224:-Lowering, laying and jointing with SBR rubber gaskets D.I. S/S pipes of various classes with CI/MS specials of following diameters in proper position, grade and alignment as directed by Engineer-in-charge including conveyance of material from stores to site of work , including cost of jointing materials and without rubber rings, labour, giving hydraulic testing, trial run etc. complete.400 mm dia	As directed by Engineer Incharge	2005.00	265.10	Rmt.	531525.50	INR Five Lakh Thirty One Thousand Five Hundred & Twenty Five and Paise Fifty Only
225	Item No 225:- Lowering, laying and jointing with SBR rubber gaskets D.I. S/S pipes of various classes with CI/MS specials of following diameters in proper position, grade and alignment as directed by Engineer-in-charge including conveyance of material from stores to site of work , including cost of jointing materials and without rubber rings, labour, giving hydraulic testing, trial run etc. complete.450 mm dia	As directed by Engineer Incharge	1020.00	253.05	Rmt.	258111.00	INR Two Lakh Fifty Eight Thousand One Hundred & Eleven Only
226	Item No 226:- Lowering, laying and jointing with SBR rubber gaskets D.I. S/S pipes of various classes with CI/MS specials of following diameters in proper position, grade and alignment as directed by Engineer-in-charge	As directed by Engineer Incharge	557.00	305.80	Rmt.	170330.60	INR One Lakh Seventy Thousand Three Hundred & Thirty and Paise Sixty Only

	including conveyance of material from stores to site of work , including cost of jointing materials and without rubber rings, labour, giving hydraulic testing, trial run etc. complete. 500 mm dia						
227	Item No 227:- Lowering, laying and jointing with SBR rubber gaskets D.I. S/S pipes of various classes with CI/MS specials of following diameters in proper position, grade and alignment as directed by Engineer-in-charge including conveyance of material from stores to site of work , including cost of jointing materials and without rubber rings, labour, giving hydraulic testing, trial run etc. complete. 600 mm dia	As directed by Engineer Incharge	584.00	401.50	Rmt.	234476.00	INR Two Lakh Thirty Four Thousand Four Hundred & Seventy Six Only
228	Item No 228:- Hydraulic testing of C.I./D.I. pipe line to specified pressure including cost of all material and labour and water for testing for specified length including cutting, placing end cap making arrangement for filling safe water using reciprocating type pumps which should be able to provide specified test pressure gauges and other necessary equipments, labour, operation charges, etc. required for testing. The rate under this item shall also include cost of retesting, if necessary and reinstating to original position using water supplied by the	As directed by Engineer Incharge	2.37	7868.30	km	18608.53	INR Eighteen Thousand Six Hundred & Eight and Paise Fifty Three Only

	contractor. 100 mm dia						
229	<p>Item No 229:- Hydraulic testing of C.I./D.I. pipe line to specified pressure including cost of all material and labour and water for testing for specified length including cutting, placing end cap making arrangement for filling safe water using reciprocating type pumps which should be able to provide specified test pressure gauges and other necessary equipments, labour, operation charges, etc.required for testing. The rate under this item shall also include cost of retesting, if necessary and reinstating to original position using water supplied by the contractor. 150 mm dia</p>	As directed by Engineer Incharge	6.59	10398.30	km	68545.59	INR Sixty Eight Thousand Five Hundred & Forty Five and Paise Fifty Nine Only

230	<p>Item No 230:- Hydraulic testing of C.I./D.I. pipe line to specified pressure including cost of all material and labour and water for testing for specified length including cutting, placing end cap making arrangement for filling safe water using reciprocating type pumps which should be able to provide specified test pressure gauges and other necessary equipments, labour, operation charges, etc.required for testing. The rate under this item shall also include cost of retesting, if necessary and reinstating to original position using water supplied by the contractor. 200 mm dia</p>	As directed by Engineer Incharge	16.41	13911.70	km	228318.82	INR Two Lakh Twenty Eight Thousand Three Hundred & Eighteen and Paise Eighty Two Only
231	<p>Item No 231:- Hydraulic testing of C.I./D.I. pipe line to specified pressure including cost of all material and labour and water for testing for specified length including cutting, placing end cap making arrangement for filling safe water using reciprocating type pumps which should be able to provide specified test pressure gauges and other necessary equipments, labour, operation charges, etc.required for testing. The rate under this item shall also include cost of retesting, if necessary and reinstating to original position using water supplied by the contractor. 250 mm dia</p>	As directed by Engineer Incharge	7.44	18126.90	km	134936.64	INR One Lakh Thirty Four Thousand Nine Hundred & Thirty Six and Paise Sixty Four Only

232	<p>Item No 232:- Hydraulic testing of C.I./D.I. pipe line to specified pressure including cost of all material and labour and water for testing for specified length including cutting, placing end cap making arrangement for filling safe water using reciprocating type pumps which should be able to provide specified test pressure gauges and other necessary equipments, labour, operation charges, etc.required for testing. The rate under this item shall also include cost of retesting, if necessary and reinstating to original position using water supplied by the contractor. 400 mm dia</p>	As directed by Engineer Incharge	2.01	29368.90	km	58884.64	INR Fifty Eight Thousand Eight Hundred & Eighty Four and Paise Sixty Four Only
233	<p>Item No 233:- Hydraulic testing of C.I./D.I. pipe line to specified pressure including cost of all material and labour and water for testing for specified length including cutting, placing end cap making arrangement for filling safe water using reciprocating type pumps which should be able to provide specified test pressure gauges and other necessary equipments, labour, operation charges, etc.required for testing. The rate under this item shall also include cost of retesting, if necessary and reinstating to original position using water supplied by the contractor. 500 mm dia</p>	As directed by Engineer Incharge	0.56	34005.40	km	18941.01	INR Eighteen Thousand Nine Hundred & Forty One and Paise One Only

234	<p>Item No 234:- Hydraulic testing of C.I./D.I. pipe line to specified pressure including cost of all material and labour and water for testing for specified length including cutting, placing end cap making arrangement for filling safe water using reciprocating type pumps which should be able to provide specified test pressure gauges and other necessary equipments, labour, operation charges, etc.required for testing. The rate under this item shall also include cost of retesting, if necessary and reinstating to original position using water supplied by the contractor. 600 mm dia</p>	As directed by Engineer Incharge	0.58	44685.30	km	26096.22	INR Twenty Six Thousand & Ninety Six and Paise Twenty Two Only
235	<p>Item No 235:- Valve chamber with precast steel fibre reinforced concrete frame and covers (S.F.R.C. frame and covers) Providing and constructing B.B. masonry valve chamber with 15 cm thick 1:3:6 proportion PCC bedding, excluding excavation, B.B. masonry in CM 1:5 proportion precast S.F.R.C. frame and cover, etc. complete as directed by Engineer-in-charge. As above of 90*90 cm internal size and depth up to 1.2 m with CI/MS frame and cover - For sluice /Scour Valve</p>	As directed by Engineer Incharge	83.00	19144.40	No	1588985.20	INR Fifteen Lakh Eighty Eight Thousand Nine Hundred & Eighty Five and Paise Twenty Only

236	Item No 236:- Valve chamber with precast steel fibre reinforced concrete frame and covers (S.F.R.C. frame and covers) Providing and constructing B.B. masonry valve chamber with 15 cm thick 1:3:6 proportion PCC bedding, excluding excavation, B.B. masonry in CM 1:5 proportion precast S.F.R.C. frame and cover, etc. complete as directed by Engineer-in-charge. As above of 1.2*1.2 cm internal size and depth up to 1.5 m with CI/MS frame and cover - For sluice /Scour Valve	As directed by Engineer Incharge	22.00	26699.20	No	587382.40	INR Five Lakh Eighty Seven Thousand Three Hundred & Eighty Two and Paise Forty Only
237	Item No 237:- Lowering laying and jointing in position D.I. D/F sluice valves and scour valves of following diameter including cost of conveyance from stores to site of works, labour, jointing material, hydraulic testing, etc. complete.(for all types of valves) Sluice Valves 100 mm dia	As directed by Engineer Incharge	6.00	2499.20	No	14995.20	INR Fourteen Thousand Nine Hundred & Ninety Five and Paise Twenty Only
238	Item No 238:-Lowering laying and jointing in position D.I. D/F sluice valves and scour valves of following diameter including cost of conveyance from stores to site of works, labour, jointing material, hydraulic testing, etc. complete.(for all types of valves) i) Sluice Valves150 mm dia	As directed by Engineer Incharge	14.00	3927.00	No	54978.00	INR Fifty Four Thousand Nine Hundred & Seventy Eight Only

239	Item No 239:- Lowering laying and jointing in position D.I. D/F sluice valves and scour valves of following diameter including cost of conveyance from stores to site of works, labour, jointing material, hydraulic testing, etc. complete.(for all types of valves) i) Sluice Valves 200 mm dia	As directed by Engineer Incharge	34.00	4085.40	No	138903.60	INR One Lakh Thirty Eight Thousand Nine Hundred & Three and Paise Sixty Only
240	Item No 240:- Lowering laying and jointing in position D.I. D/F sluice valves and scour valves of following diameter including cost of conveyance from stores to site of works, labour, jointing material, hydraulic testing, etc. complete.(for all types of valves) i) Sluice Valves 250 mm dia	As directed by Engineer Incharge	16.00	5322.90	No	85166.40	INR Eighty Five Thousand One Hundred & Sixty Six and Paise Forty Only
241	Item No 241:- Lowering laying and jointing in position D.I. D/F sluice valves and scour valves of following diameter including cost of conveyance from stores to site of works, labour, jointing material, hydraulic testing, etc. complete.(for all types of valves) i) Sluice Valves 400 mm dia	As directed by Engineer Incharge	5.00	8208.20	No	41041.00	INR Forty One Thousand & Forty One Only
242	Item No 242:- Lowering laying and jointing in position D.I. D/F sluice valves and scour valves of following diameter including cost of conveyance from stores to site of works, labour, jointing material, hydraulic testing, etc. complete.(for all types of valves) i) Sluice Valves 500 mm dia	As directed by Engineer Incharge	2.00	10113.40	No	20226.80	INR Twenty Thousand Two Hundred & Twenty Six and Paise Eighty Only

243	Item No 243:- Lowering laying and jointing in position D.I. D/F sluice valves and scour valves of following diameter including cost of conveyance from stores to site of works, labour, jointing material, hydraulic testing, etc. complete.(for all types of valves) i) Sluice Valves 600 mm dia	As directed by Engineer Incharge	2.00	10246.95	No	20493.90	INR Twenty Thousand Four Hundred & Ninety Three and Paise Ninety Only
244	Item No 244:- Lowering laying and fixing in proper alignment and position all types of CI Air valves as directed by Engineer in charge including cost of conveyance from store to site of work cost of all material and giving satisfactory hydraulic testing, etc. complete. Air Valve Double ball (PN-1) 50 mm dia.	As directed by Engineer Incharge	30.00	366.30	No	10989.00	INR Ten Thousand Nine Hundred & Eighty Nine Only
245	Item No 245:- Lowering laying and fixing in proper alignment and position all types of CI Air valves as directed by Engineer in charge including cost of conveyance from store to site of work cost of all material and giving satisfactory hydraulic testing, etc. complete. Air Valve Double ball (PN-1) 65 mm dia	As directed by Engineer Incharge	8.00	422.40	No	3379.20	INR Three Thousand Three Hundred & Seventy Nine and Paise Twenty Only

246	Item No 246:- Lowering laying and fixing in proper alignment and position all types of CI Air valves as directed by Engineer in charge including cost of conveyance from store to site of work cost of all material and giving satisfactory hydraulic testing, etc. complete. Air Valve Double ball (PN-1)80 mm dia	As directed by Engineer Incharge	2.00	503.80	No	1007.60	INR One Thousand &Seven and Paise Sixty Only
247	Item No 247:- Lowering laying and fixing in proper alignment and position all types of CI Air valves as directed by Engineer in charge including cost of conveyance from store to site of work cost of all material and giving satisfactory hydraulic testing, etc. complete. Air Valve Double ball (PN-1)100 mm dia	As directed by Engineer Incharge	2.00	532.40	No	1064.80	INR One Thousand &Sixty Four and Paise Eighty Only
248	Item No 248:- Reconnection of existing damaged connection including dye drill including all labour, GI pipes 1 M. length specials like elbow, union, coupler The rate to include labour, required excavation, fitting, refilling. Closing the water supply in that area, dewatering and restarting the water supply, transportation etc. complete. as directed by Engineer in charge. 15 mm Dia.	As directed by Engineer Incharge	225.00	950.00	No	213750.00	INR Two Lakh Thirteen Thousand Seven Hundred & Fifty Only

249	Item No 249:- Reconnection of existing damaged connection including dye drill including all labour, GI pipes 1 M. length specials like elbow, union, coupler The rate to include labour, required excavation, fitting, refilling. Closing the water supply in that area, dewatering and restarting the water supply, transportation etc. complete. as directed by Engineer in charge. 20 mm Dia.	As directed by Engineer Incharge	20.00	1038.00	No	20760.00	INR Twenty Thousand Seven Hundred & Sixty Only
250	Item No 250:- Reconnection of existing damaged connection including dye drill including all labour, GI pipes 1 M. length specials like elbow, union, coupler The rate to include labour, required excavation, fitting, refilling. Closing the water supply in that area, dewatering and restarting the water supply, transportation etc. complete. as directed by Engineer in charge. 25 mm Dia.	As directed by Engineer Incharge	5.00	1277.00	No	6385.00	INR Six Thousand Three Hundred & Eighty Five Only
251	Item No 251:-Providing and making GI pipe consumer service connection on GI Distribution main by drilling hole with suitable means cluding all labour ,GI Pipe of required length with or without Road crossing asdescribed below, including cost of specials like Saddle/Clamp Saddle of suitable material, and diameter suitable for	As directed by Engineer Incharge	2240.00	4107.40	No	9200576.00	INR Ninety Two Lakh Five Hundred & Seventy Six Only

	Distribution ain,15mm/20mm/25mm respective Dia. Heavy duty Brass/olyprophylyne (Twin Jacketed) Ferrule, Male and Female read adapter Elbow, Bends, couplers ,Tees, Clamps of suitable material and sundry materials as per requirment,including providing and fixing medium duty 15.mm brass bib tap, GI casing pipe of m 32mm/40mm/50mm respective dia of required length for Road crossing, including requird labour for excavation in all types of strata up to the depth of 0.75m or as per site requirement,all types of plumbing fitting,refilling , Closing the water supply in that area, dewatering, hydraulic testing and restarting the water supply transportation of material etc. complete as directed by Engineer in charge. Total Consumer connection considered for transfer For connection on DI Pipes (With Road crossing) 15 mm Dia.						
252	Item No 252:- Providing and making GI pipe consumer service connection on GI Distribution main by drilling hole with suitable means cluding all labour ,GI Pipe of required length with or without Road crossing asdescribed below, including cost of specials like Saddle/Clamp Saddle of suitable material, and diameter suitable for Distribution ain,15mm/20mm/25mm	As directed by Engineer Incharge	420.00	5064.40	No	2127048.00	INR Twenty One Lakh Twenty Seven Thousand &Forty Eight Only

	respective Dia. Heavy duty Brass/olypropylyne (Twin Jacketed) Ferrule, Male and Female read adapter Elbow, Bends, couplers ,Tees, Clamps of suitable material and sundry materials as per requirment,including providing and fixing medium duty 15.mm brass bib tap, GI casing pipe of m 32mm/40mm/50mm respective dia of required length for Road crossing, including requird labour for excavation in all types of strata up to the depth of 0.75m or as per site requirement,all types of plumbing fitting,refilling , Closing the water supply in that area, dewatering, hydraulic testing and restarting the water supply transportation of material etc. complete as directed by Engineer in charge. For connection on DI Pipes (With Road crossing) Total Consumer connection considered for transfer 20 mm Dia.						
253	Item No 253- Providing and making GI pipe consumer service connection on GI Distribution main by drilling hole with suitable means cluding all labour ,GI Pipe of required length with or without Road crossing asdescribed below, including cost of specials like Saddle/Clamp Saddle of suitable material, and diameter suitable for Distribution ain,15mm/20mm/25mm	As directed by Engineer Incharge	140.00	6776.00	No	948640.00	INR Nine Lakh Forty Eight Thousand Six Hundred & Forty Only

	respective Dia. Heavy duty Brass/olypropylyne (Twin Jacketed) Ferrule, Male and Female read adapter Elbow, Bends, couplers ,Tees, Clamps of suitable material and sundry materials as per requirment,including providing and fixing medium duty 15.mm brass bib tap, GI casing pipe of m 32mm/40mm/50mm respective dia of required length for Road crossing, including requird labour for excavation in all types of strata up to the depth of 0.75m or as per site requirement,all types of plumbing fitting,refilling , Closing the water supply in that area, dewatering, hydraulic testing and restarting the water supply transportation of material etc. complete as directed by Engineer in charge. For connection on DI Pipes (With Road crossing) Total Consumer connection considered for transfer 25 mm Dia.						
254	Item No 254:- Providing and making GI pipe consumer service connection on GI Distribution main by drilling hole with suitable means cluding all labour ,GI Pipe of required length with or without Road crossing asdescribed below, including cost of specials like Saddle/Clamp Saddle of suitable material, and diameter suitable for Distribution ain,15mm/20mm/25mm	As directed by Engineer Incharge	560.00	2801.70	No	1568952.00	INR Fifteen Lakh Sixty Eight Thousand Nine Hundred & Fifty Two Only

	respective Dia. Heavy duty Brass/olypropylyne (Twin Jacketed) Ferrule, Male and Female read adapter Elbow, Bends, couplers ,Tees, Clamps of suitable material and sundry materials as per requirment,including providing and fixing medium duty 15.mm brass bib tap, GI casing pipe of m 32mm/40mm/50mm respective dia of required length for Road crossing, including requird labour for excavation in all types of strata up to the depth of 0.75m or as per site requirement,all types of plumbing fitting,refilling , Closing the water supply in that area, dewatering, hydraulic testing and restarting the water supply transportation of material etc. complete as directed by Engineer in charge. Total Consumer connection considered for transfer For connection on DI Pipes (Without Road crossing) 15 mm Dia.						
255	Item No 255:- Providing and making GI pipe consumer service connection on GI Distribution main by drilling hole with suitable means cluding all labour ,GI Pipe of required length with or without Road crossing asdescribed below, including cost of specials like Saddle/Clamp Saddle of suitable material, and diameter suitable for	As directed by Engineer Incharge	105.00	3501.30	No	367636.50	INR Three Lakh Sixty Seven Thousand Six Hundred & Thirty Six and Paise Fifty Only

<p>Distribution ain,15mm/20mm/25mm respective Dia. Heavy duty Brass/olyprophylyne (Twin Jacketed) Ferrule, Male and Female read adapter Elbow, Bends, couplers ,Tees, Clamps of suitable material and sundry materials as per requirment,including providing and fixing medium duty 15.mm brass bib tap, GI casing pipe of m 32mm/40mm/50mm respective dia of required length for Road crossing, including requird labour for excavation in all types of strata up to the depth of 0.75m or as per site requirement,all types of plumbing fitting,refilling , Closing the water supply in that area, dewatering, hydraulic testing and restarting the water supply transportation of material etc. complete as directed by Engineer in charge. Total Consumer connection considered for transfer For connection on DI Pipes (Without Road crossing) 20 mm Dia.</p>						
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256	<p>Item No 256:- Providing and making GI pipe consumer service connection on GI Distribution main by drilling hole with suitable means cluding all labour ,GI Pipe of required length with or without Road crossing asdescribed below, including cost of specials like Saddle/Clamp Saddle of suitable material, and diameter suitable for Distribution ain,15mm/20mm/25mm respective Dia. Heavy duty Brass/olyprophylyne (Twin Jacketed) Ferrule, Male and Female read adapter Elbow, Bends, couplers ,Tees, Clamps of suitable material and sundry materials as per requirment,including providing and fixing medium duty 15.mm brass bib tap, GI casing pipe of m 32mm/40mm/50mm respective dia of required length for Road crossing, including requird labour for excavation in all types of strata up to the depth of 0.75m or as per site requirement,all types of plumbing fitting,refilling , Closing the water supply in that area, dewatering, hydraulic testing and restarting the water supply transportation of material etc. complete as directed by Engineer in charge. Total Consumer connection considered for transfer For connection on DI Pipes (Without Road crossing)25 mm Dia.</p>	As directed by Engineer Incharge	35.00	5094.10	No	178293.50	INR One Lakh Seventy Eight Thousand Two Hundred & Ninety Three and Paise Fifty Only
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257	Item No 257:- Providing and laying in trenches following dia. medium grade having embossed as ISI Mark galvanised iron pipes of following weights necessary fitting remaking good the demolished portion with filling trenches and with primer of anti-corrosive oil paint, 2 coats Including removing existing pipe line if necessary and conveying and stacking the same in NMMC chowky or as directed etc. complete. 15 mm of 1.25 Kg/m	As directed by Engineer Incharge	2126.25	469.35	Rmt	997955.44	INR Nine Lakh Ninety Seven Thousand Nine Hundred & Fifty Five and Paise Forty Four Only
258	Item No 258:- Providing and laying in trenches following dia. medium grade having embossed as ISI Mark galvanised iron pipes of following weights necessary fitting remaking good the demolished portion with filling trenches and with primer of anti-corrosive oil paint, 2 coats Including removing existing pipe line if necessary and conveying and stacking the same in NMMC chowky or as directed etc. complete.) 20 mm of 1.63 Kg/m	As directed by Engineer Incharge	141.75	511.35	Rmt	72483.86	INR Seventy Two Thousand Four Hundred & Eighty Three and Paise Eighty Six Only

259	Item No 259:- Providing and laying in trenches following dia. medium grade having embossed as ISI Mark galvanised iron pipes of following weights necessary fitting remaking good the demolished portion with filling trenches and with primer of anti-corrosive oil paint, 2 coats Including removing existing pipe line if necessary and conveying and stacking the same in NMMC chowky or as directed etc. complete. 25 mm of 2.49 kg/m	As directed by Engineer Incharge	94.50	552.30	Rmt	52192.35	INR Fifty Two Thousand One Hundred & Ninety Two and Paise Thirty Five Only
260	Item No 260:-Decorative Stamped Concrete flooring (100mm thick M25 grade RMC concrete)1. Cleaning of existing floor & Surface preparation For casting concrete.2. Supply & laying 100 mm thick M25 grade concrete. 3. Fixing of M.S. Channel form for shuttering of concrete.4. Vibrate and level the poured concrete by double beam vibrator. 5. Float the surface with power dowel machine & different type floaters. 6. Supply & apply colour floor hardner, application for realcase agent.7. Stamping finished concrete surface with stamping tools. 8. Cleaning the stamping surface with water jet. 9. Groove cutting & filling with Polysulphate size 5 mm wide & 25 mm deep spacing 4m X 4m.10. Application of 2 coats of sealant for finishing.	As directed by Engineer Incharge	17012.52	1585.19	sqm	26968076.58	INR Two Crore Sixty Nine Lakh Sixty Eight Thousand & Seventy Six and Paise Fifty Eight Only

261	Item No 261:- Providing and constructing Brick Masonry Inspection Chamber 60cm x 45cm With R.C.C. raft in B.C. soil area including cost of reinforcement, 1:2:4 cement concrete channels half round G.S.W. pipes, Brick Masonry, plastering from inside and airtight 75 mm thick R.C.C. cover medium duty 100 Kilogram etc. complete.	As directed by Engineer Incharge	33.00	10450.65	No	344871.45	INR Three Lakh Forty Four Thousand Eight Hundred & Seventy One and Paise Forty Five Only
262	Item No 262:- Providing and constructing Brick Masonry Inspection Chamber 90cm x 45cm With R.C.C. raft in B.C. soil area including cost of reinforcement, 1:2:4 cement concrete channels half round G.S.W. pipes, Brick Masonry, plastering from inside and airtight with 75 mm thick R.C.C. cover medium duty 140Kilogrametc. complete.	As directed by Engineer Incharge	20.00	12736.50	No	254730.00	INR Two Lakh Fifty Four Thousand Seven Hundred & Thirty Only
263	Item No 263:- Cutting transverse contraction joints 3 to 4 mm wide and depth 60mm in concrete slab using concrete cutting machine with diamond studded saw within 48 hours of casting of bay / slab etc. complete including subsequent widening of the groove 8 to 10 mm. wide at top having depth of 15 mm. as directed by Engineer incharge.	As directed by Engineer Incharge	4000.00	79.80	Rmt	319200.00	INR Three Lakh Nineteen Thousand Two Hundred Only

264	Item No 264:- Providing and erecting Heat shrinkable indoor termination kit for 11 kV (E) XLPE HT cable 3x up to 95 sq. mm. with necessary material as per specification no. CB-JT/HT	As directed by Engineer Incharge	2.00	8659.00	No	17318.00	INR Seventeen Thousand Three Hundred & Eighteen Only
265	Item No 265:- Providing and erecting Heat shrinkable indoor termination kit for 11 kV (E) XLPE HT cable 3x120 to 185 sq. mm. with necessary material as per specification no. CB-JT/HT	As directed by Engineer Incharge	2.00	10474.00	No	20948.00	INR Twenty Thousand Nine Hundred & Forty Eight Only
266	Item No 266:- Providing and erecting Heat shrinkable indoor termination kit for 11 kV (E) XLPE HT cable 3x240 to 300 sq. mm. with necessary material as per specification no. CB-JT/HT	As directed by Engineer Incharge	2.00	11278.00	No	22556.00	INR Twenty Two Thousand Five Hundred & Fifty Six Only
267	Item No 267:- Providing and erecting Heat shrinkable indoor termination kit for 11 kV (UE)/22 kV (E) XLPE HT cable 3x up to 95 sq. mm. with necessary material as per specification no. CB-JT/HT	As directed by Engineer Incharge	18.00	10989.00	No	197802.00	INR One Lakh Ninety Seven Thousand Eight Hundred & Two Only
268	Item No 268:- Providing and erecting Heat shrinkable indoor termination kit for 11 kV (UE)/ 22 kV (E) XLPE HT cable 3x120 to 185 sq. mm. with necessary material as per specification no. CB JT/HT	As directed by Engineer Incharge	1.00	13414.00	No	13414.00	INR Thirteen Thousand Four Hundred & Fourteen Only

269	Item No 269:- Providing soling using 80 mm size trap metal in 15 cm. layer including filling voids with Crushed sand/grit, ramming, watering etc. complete. For soling below road and above pipe	As directed by Engineer Incharge	2126.57	1526.70	cum	3246626.79	INR Thirty Two Lakh Forty Six Thousand Six Hundred & Twenty Six and Paise Seventy Nine Only
270	Item No 270:-Providing, supplying installation testing and commissioning of flow meters with grounding ring, counter flanges, gasket, nut bolts, gland, GPRS module and battery, Sim card installation and charges for 3 years, Flow transmitters, items to include the Deployment of SIWA Leak Plus advanced version (cloud based) software with two years fee for cloud maintenance and license. Deployment of SIWA Leak Plus advanced version (cloud based) with 1st year fee for cloud maintenance (as per offer BOM, scope and Statement of Compliance)	As directed by Engineer Incharge	1.00	8649000.00	job	8649000.00	INR Eighty Six Lakh Forty Nine Thousand Only
271	Item No 271:- Providing, supplying installation testing and commissioning of flow meters with grounding ring, counter flanges, gasket, nut bolts, gland, GPRS module and battery, Sim card installation and charges for 3 years, Flow transmitters, items to include the Deployment of SIWA Leak Plus advanced version (cloud based) software with two years fee for	As directed by Engineer Incharge	1.00	1300000.00	job	1300000.00	INR Thirteen Lakh Only

	cloud maintenance and license. Annual fee for cloud maintenance and License (for another 4 years after 1st year)						
272	Item No 272:- Providing, supplying installation testing and commissioning of flow meters with grounding ring, counter flanges, gasket, nut bolts, gland, GPRS module and battery, Sim card installation and charges for 3 years, Flow transmitters, items to include the Deployment of SIWA Leak Plus advanced version (cloud based) software with two years fee for cloud maintenance and license. a) Deployment of SIWA Leak Plus advanced version (cloud based) with 1st year fee for cloud maintenance (as per offer BOM, scope and Statement of Compliance) Market Rate + Import Duty + Transportation Charges + Witness by MJP + TPI 700 mm dia.	As directed by Engineer Incharge	3.00	908768.00	No	2726304.00	INR Twenty Seven Lakh Twenty Six Thousand Three Hundred & Four Only
273	Item No 273:- Providing, supplying installation testing and commissioning of flow meters with grounding ring, counter flanges, gasket, nut bolts, gland, GPRS module and battery, Sim card	As directed by Engineer Incharge	3.00	771733.00	No	2315199.00	INR Twenty Three Lakh Fifteen Thousand One Hundred & Ninety Nine Only

	installation and charges for 3 years, Flow transmitters, items to include the Deployment of SIWA Leak Plus advanced version (cloud based) software with two years fee for cloud maintenance and license. a) Deployment of SIWA Leak Plus advanced version (cloud based) with 1st year fee for cloud maintenance (as per offer BOM, scope and Statement of Compliance) Market Rate + Import Duty + Transportation Charges + Witness by MJP + TPI 600 mm dia.						
274	Item No 274:- Providing, supplying installation testing and commissioning of flow meters with grounding ring, counter flanges, gasket, nut bolts, gland, GPRS module and battery, Sim card installation and charges for 3 years, Flow transmitters, items to include the Deployment of SIWA Leak Plus advanced version (cloud based) software with two years fee for cloud maintenance and license. a) Deployment of SIWA Leak Plus advanced version (cloud based) with 1st year fee for cloud maintenance (as per offer BOM, scope and Statement of Compliance) Market Rate + Import Duty + Transportation Charges + Witness by MJP + TPI 500 mm dia.	As directed by Engineer Incharge	3.00	688542.00	No	2065626.00	INR Twenty Lakh Sixty Five Thousand Six Hundred & Twenty Six Only

275	<p>Item No 275:- Providing, supplying installation testing and commissioning of flow meters with grounding ring, counter flanges, gasket, nut bolts, gland, GPRS module and battery, Sim card installation and charges for 3 years, Flow transmitters, items to include the Deployment of SIWA Leak Plus advanced version (cloud based) software with two years fee for cloud maintenance and license. a) Deployment of SIWA Leak Plus advanced version (cloud based) with 1st year fee for cloud maintenance (as per offer BOM, scope and Statement of Compliance) Market Rate + Import Duty + Transportation Charges + Witness by MJP + TPI 450 mm dia.</p>	As directed by Engineer Incharge	4.00	599311.00	No	2397244.00	INR Twenty Three Lakh Ninety Seven Thousand Two Hundred & Forty Four Only
276	<p>Item No 276:- Providing, supplying installation testing and commissioning of flow meters with grounding ring, counter flanges, gasket, nut bolts, gland, GPRS module and battery, Sim card installation and charges for 3 years, Flow transmitters, items to include the Deployment of SIWA Leak Plus advanced version (cloud based) software with two years fee for cloud maintenance and license. a) Deployment of SIWA Leak Plus advanced version (cloud based) with 1st year fee for cloud maintenance (as per offer BOM, scope and</p>	As directed by Engineer Incharge	6.00	540607.00	No	3243642.00	INR Thirty Two Lakh Forty Three Thousand Six Hundred & Forty Two Only

	Statement of Compliance) Market Rate + Import Duty + Transportation Charges + Witness by MJP + TPI 400 mm dia.						
277	Item No 277:- Providing, supplying installation testing and commissioning of flow meters with grounding ring, counter flanges, gasket, nut bolts, gland, GPRS module and battery, Sim card installation and charges for 3 years, Flow transmitters, items to include the Deployment of SIWA Leak Plus advanced version (cloud based) software with two years fee for cloud maintenance and license. a) Deployment of SIWA Leak Plus advanced version (cloud based) with 1st year fee for cloud maintenance (as per offer BOM, scope and Statement of Compliance) Market Rate + Import Duty + Transportation Charges + Witness by MJP + TPI 350 mm dia.	As directed by Engineer Incharge	6.00	463689.00	No	2782134.00	INR Twenty Seven Lakh Eighty Two Thousand One Hundred & Thirty Four Only
278	Item No 278:- Providing, supplying installation testing and commissioning of flow meters with grounding ring, counter flanges, gasket, nut bolts, gland, GPRS module and battery, Sim card installation and charges for 3 years,	As directed by Engineer Incharge	12.00	355629.00	No	4267548.00	INR Forty Two Lakh Sixty Seven Thousand Five Hundred & Forty Eight Only

	Flow transmitters, items to include the Deployment of SIWA Leak Plus advanced version (cloud based) software with two years fee for cloud maintenance and license. a) Deployment of SIWA Leak Plus advanced version (cloud based) with 1st year fee for cloud maintenance (as per offer BOM, scope and Statement of Compliance) Market Rate + Import Duty + Transportation Charges + Witness by MJP + TPI 300 mm dia.						
279	Item No 279:- Providing, supplying installation testing and commissioning of flow meters with grounding ring, counter flanges, gasket, nut bolts, gland, GPRS module and battery, Sim card installation and charges for 3 years, Flow transmitters, items to include the Deployment of SIWA Leak Plus advanced version (cloud based) software with two years fee for cloud maintenance and license. a) Deployment of SIWA Leak Plus advanced version (cloud based) with 1st year fee for cloud maintenance (as per offer BOM, scope and Statement of Compliance) Market Rate + Import Duty + Transportation Charges + Witness by MJP + TPI 250 mm dia.	As directed by Engineer Incharge	7.00	302053.00	No	2114371.00	INR Twenty One Lakh Fourteen Thousand Three Hundred & Seventy One Only

280	<p>Item No 280:- Providing, supplying installation testing and commissioning of flow meters with grounding ring, counter flanges, gasket, nut bolts, gland, GPRS module and battery, Sim card installation and charges for 3 years, Flow transmitters, items to include the Deployment of SIWA Leak Plus advanced version (cloud based) software with two years fee for cloud maintenance and license.</p> <p>a) Deployment of SIWA Leak Plus advanced version (cloud based) with 1st year fee for cloud maintenance (as per offer BOM, scope and Statement of Compliance) Market Rate + Import Duty + Transportation Charges + Witness by MJP + TPI 200 mm dia.</p>	As directed by Engineer Incharge	1.00	278611.00	No	278611.00	INR Two Lakh Seventy Eight Thousand Six Hundred & Eleven Only
281	<p>Item No 281:- Install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Raw/Pure water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its charges, validfor 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months</p>	As directed by Engineer Incharge	3.00	17152.00	No	51456.00	INR Fifty One Thousand Four Hundred & Fifty Six Only

	guarantee etc complete, as may be required at site & based on technical specifications. i) 700 mm dia.						
282	<p>Item No 282:- Install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Raw/Pure water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its charges, validfor 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months guarantee etc complete, as may be required at site & based on technical specifications. ii) 600 mm dia.</p>	As directed by Engineer Incharge	3.00	16131.00	No	48393.00	INR Forty Eight Thousand Three Hundred & Ninety Three Only

283	<p>Item No 283:- Install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Raw/Pure water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its charges, validfor 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months guarantee etc complete, as may be required at site & based on technical specifications.</p> <p>iii) 500 mm dia.</p>	As directed by Engineer Incharge	3.00	14301.00	No	42903.00	INR Forty Two Thousand Nine Hundred & Three Only
284	<p>Item No 284:-Install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Raw/Pure water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its charges, validfor 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months guarantee etc complete, as may be</p>	As directed by Engineer Incharge	4.00	13666.00	No	54664.00	INR Fifty Four Thousand Six Hundred & Sixty Four Only

	required at site & based on technical specifications.v) 450 mm dia.						
285	<p>Item No 285:- Install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Raw/Pure water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its charges, validfor 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months guarantee etc complete, as may be required at site & based on technical specifications. v) 400 mm dia.</p>	As directed by Engineer Incharge	6.00	342030.00	No	2052180.00	INR Twenty Lakh Fifty Two Thousand One Hundred & Eighty Only

286	<p>Item No 286:- Install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Raw/Pure water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its charges, validfor 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months guarantee etc complete, as may be required at site & based on technical specifications. vi) 350 mm dia.</p>	As directed by Engineer Incharge	6.00	10356.00	No	62136.00	INR Sixty Two Thousand One Hundred & Thirty Six Only
287	<p>Item No 287:- Install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Raw/Pure water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its charges, validfor 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months</p>	As directed by Engineer Incharge	12.00	8269.00	No	99228.00	INR Ninety Nine Thousand Two Hundred & Twenty Eight Only

	guarantee etc complete, as may be required at site & based on technical specifications. vii) 300 mm dia.						
288	Item No 288:- Install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Raw/Pure water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its charges, validfor 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months guarantee etc complete, as may be required at site & based on technical specifications.viii) 250 mm dia.	As directed by Engineer Incharge	7.00	6756.00	No	47292.00	INR Forty Seven Thousand Two Hundred & Ninety Two Only
289	Item No 289:- Install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Raw/Pure water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its	As directed by Engineer Incharge	1.00	5818.00	No	5818.00	INR Five Thousand Eight Hundred & Eighteen Only

	charges, valid for 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months guarantee etc complete, as may be required at site & based on technical specifications. ix) 200 mm dia.						
290	Item No 290:- Providing, erecting and commissioning M.S. Dismantling joint as per requirement and Department's approved drawing and specifications, including machining and rubber rings and suitable for 16 kg/cm ² working pressure with required flanges of suitable size with nut bolts etc complete. The joint should have through long bolts so that during normal working pressure there should be no sliding movement of sliding flanges. L.O.F. (length over flange) should not be less than 75% of dia. i) 700 mm dia	As directed by Engineer Incharge	4.00	86427.00	No	345708.00	INR Three Lakh Forty Five Thousand Seven Hundred & Eight Only
291	Item No 291:- Providing, erecting and commissioning M.S. Dismantling joint as per requirement and Department's approved drawing and specifications, including machining and rubber rings and suitable for 16 kg/cm ² working pressure with required flanges of suitable size with nut bolts etc complete. The joint should have through long bolts so	As directed by Engineer Incharge	3.00	66386.00	No	199158.00	INR One Lakh Ninety Nine Thousand One Hundred & Fifty Eight Only

	that during normal working pressure there should be no sliding movement of sliding flanges. L.O.F. (length over flange)should not be less than 75% of dia. ii) 600 mm dia.						
292	Item No 292:- Providing, erecting and commissioning M.S.Dismantling joint as per requirement and Department's approved drawing and specifications, including machining and rubber rings and suitable for 16 kg/cm ² working pressure with required flanges of suitable size with nut bolts etc complete. The joint should have through long bolts so that during normal working pressure there should be no sliding movement of sliding flanges. L.O.F. (length over flange)should not be less than 75% of dia. iii) 500 mm dia.	As directed by Engineer Incharge	3.00	54026.00	No	162078.00	INR One Lakh Sixty Two Thousand & Seventy Eight Only
293	Item No 293:- Providing, erecting and commissioning M.S.Dismantling joint as per requirement and Department's approved drawing and specifications, including machining and rubber rings and suitable for 16 kg/cm ² working pressure with required flanges of suitable size with nut bolts etc complete. The joint should have through long bolts so that during normal working pressure there should be no sliding	As directed by Engineer Incharge	5.00	44784.00	No	223920.00	INR Two Lakh Twenty Three Thousand Nine Hundred & Twenty Only

	movement of sliding flanges. L.O.F. (length over flange)should not be less than 75% of dia. v) 450 mm dia.						
294	Item No 294:- Providing, erecting and commissioning M.S.Dismantling joint as per requirement and Department's approved drawing and specifications, including machining and rubber rings and suitable for 16 kg/cm2 working pressure with required flanges of suitable size with nut bolts etc complete. The joint should have through long bolts so that during normal working pressure there should be no sliding movement of sliding flanges. L.O.F. (length over flange)should not be less than 75% of dia. v) 400 mm dia.	As directed by Engineer Incharge	6.00	36921.00	No	221526.00	INR Two Lakh Twenty One Thousand Five Hundred & Twenty Six Only
295	Item No 295:- Providing, erecting and commissioning M.S.Dismantling joint as per requirement and Department's approved drawing and specifications, including machining and rubber rings and suitable for 16 kg/cm2 working pressure with required flanges of suitable size with nut bolts etc complete. The joint should have through long bolts so that during normal working pressure there should be no sliding movement of sliding flanges. L.O.F. (length over flange)should not be	As directed by Engineer Incharge	11.00	27718.00	No	304898.00	INR Three Lakh Four Thousand Eight Hundred & Ninety Eight Only

	less than 75% of dia. vi) 350 mm dia.						
296	Item No 296:- Providing, erecting and commissioning M.S.Dismantling joint as per requirement and Department's approved drawing and specifications, including machining and rubber rings and suitable for 16 kg/cm ² working pressure with required flanges of suitable size with nut bolts etc complete. The joint should have through long bolts so that during normal working pressure there should be no sliding movement of sliding flanges. L.O.F. (length over flange)should not be less than 75% of dia. vii) 300 mm dia.	As directed by Engineer Incharge	17.00	20353.00	No	346001.00	INR Three Lakh Forty Six Thousand &One Only
297	Item No 297:- Providing, erecting and commissioning M.S.Dismantling joint as per requirement and Department's approved drawing and specifications, including machining and rubber rings and suitable for 16 kg/cm ² working pressure with required flanges of suitable size with nut bolts etc complete. The joint should have through long bolts so that during normal working pressure there should be no sliding movement of sliding flanges. L.O.F. (length over flange)should not be less than 75% of dia. viii) 250 mm dia.	As directed by Engineer Incharge	9.00	16949.00	No	152541.00	INR One Lakh Fifty Two Thousand Five Hundred & Forty One Only

298	Item No 298:- Providing, erecting and commissioning M.S.Dismantling joint as per requirement and Department's approved drawing and specifications, including machining and rubber rings and suitable for 16 kg/cm ² working pressure with required flanges of suitable size with nut bolts etc complete. The joint should have through long bolts so that during normal working pressure there should be no sliding movement of sliding flanges. L.O.F. (length over flange)should not be less than 75% of dia. ix) 200 mm dia.	As directed by Engineer Incharge	1.00	12312.00	No	12312.00	INR Twelve Thousand Three Hundred & Twelve Only
299	Item No 299:- Gas cutting (either square cut or V cut) pipes,plates, etc. of thickness 5 to 10 mm	As directed by Engineer Incharge	110.00	141.75	Rmt	15592.50	INR Fifteen Thousand Five Hundred & Ninety Two and Paise Fifty Only
300	Item No 300:- Welding in all positions with required number of runs, for M. S. pipes internally and / or externally including gauging wherever necessary, fixing appurtenances and other accessories in connection with pipe laying work as per specification.	As directed by Engineer Incharge	502.00	1349.25	Rmt	677323.50	INR Six Lakh Seventy Seven Thousand Three Hundred & Twenty Three and Paise Fifty Only
301	Item No 301:-i) Providing dry trap/granite/quartzite/gneiss, rubble stone soling in 15cm to 20 cm thick layers including hand packing and compacting, royalty charges etc. complete.(Bd-A-11/263)	As directed by Engineer Incharge	25.00	1233.75	cum	30843.75	INR Thirty Thousand Eight Hundred & Forty Three and Paise Seventy Five Only

302	Item No 302:- ii) Providing and laying in situ, following grades of C.C. of trap /granite / quartzite / gneiss metal for foundation and bedding including dewatering, formwork, compacting and curing, finishing, etc. complete.	As directed by Engineer Incharge	11.00	5444.25	cum	59886.75	INR Fifty Nine Thousand Eight Hundred & Eighty Six and Paise Seventy Five Only
303	Item No 303:- iii-a) Providing and laying in situ Cement concrete of trap/granite/quartzite/ gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stan- chions including normal dewatering, 'plywood form work, bully/ steel propups, compaction, finishing and curing, etc, complete. (By weigh batching and mix design for M-250 and M- 300 only. Use of L & T, A.C.C., Ambuja, Birla Gold, Manikgad Rajashree etc cement is permitted) (excluding Manikgad, Rajashree, etc. permitted.) M.S. or Tor reinforcement)	As directed by Engineer Incharge	32.00	7820.40	cum	250252.80	INR Two Lakh Fifty Thousand Two Hundred & Fifty Two and Paise Eighty Only
304	Item No 304:- iii-b) Providing and casting in situ C. C. of trap/granite/quartzite/ gneiss metal of approved quality for RCC work as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, 'plywood formwork, bully/steel prop-ups, compaction, finishing the formed surfaces with CM 1:3 of suf- ficient	As directed by Engineer Incharge	212.00	9709.35	cum	2058382.20	INR Twenty Lakh Fifty Eight Thousand Three Hundred & Eighty Two and Paise Twenty Only

	minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M- 250 and M-300 only. Use of L&T, A.C. C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted) (excluding M.S, or Tor reinforcement)						
305	Item No 305:- iv) Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircase, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F17/306) Tor steel	As directed by Engineer Incharge	6.40	102066.30	M.T	653224.32	INR Six Lakh Fifty Three Thousand Two Hundred & Twenty Four and Paise Thirty Two Only
306	Item No 306:- v)chamber Cover with Frame Providing and fixing M.S. chequered plate flooring of following thickness supported on M.S.angles (25 x 25 x 5 mm size) including welding, cutting and fabricating the plate to the required square or rounding shape, making holes in the plate, including	As directed by Engineer Incharge	154.00	4331.25	cum	667012.50	INR Six Lakh Sixty Seven Thousand &Twelve and Paise Fifty Only

	providing and applying 3 coats of anticorrosive paint, etc. complete as directed by Engineer-in-charge.(fo Valve Chamber 800 to 50 mm dia) 6 mmthick						
307	Item No 307:- Providing structural steel work in rolled sections like joists, channels, angles, tees, etc for fabrication work as per detailed designs and drawings including fixing in position without connecting plates, braces, etc. and one coat of anticorrosive paint and over it two coats of oil painting, of approved quality and shade, etc. complete. (Bd-C-2/275)	As directed by Engineer Incharge	16.50	74618.00	MT	1231197.00	INR Twelve Lakh Thirty One Thousand One Hundred & Ninety Seven Only
308	Item No 308:- a) Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 3½ core 25 sq. mm. aluminium conductor complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL	As directed by Engineer Incharge	6750.00	242.00	mtr	1633500.00	INR Sixteen Lakh Thirty Three Thousand Five Hundred Only
309	Item No 309:- b) Providing, supplying, lowering, laying and jointing in standard lengths ISI mark rigid unplasticised PVC pipes suitable for potable water with solvent cement joints including cost of couplers, as per IS specification no. 4985 / 1988	As directed by Engineer Incharge	2250.00	102.00	mtr	229500.00	INR Two Lakh Twenty Nine Thousand Five Hundred Only

	excluding GST levied by GOI and GOM in all respect, including transportation, freight charges, inspection charges, loading, unloading, onveyance to the departmental stores and stacking the same in closed shed duly protected from sun rays and rains including cost of jointing material. 63 mm dia.						
310	Item No 310:- c) Providing, supplying, lowering, laying of ISI mark G.I. pipe of following class and dia. excluding GST levied by GOI & GOM in all respect, inspection charges, transportation to stores, etc. complete as per IS-1239/2004. Note : One coupler shall be provided with each full length of pipe cost of which is included in rates below. 50 mm	As directed by Engineer Incharge	4050.00	418.35	mtr	1694317.50	INR Sixteen Lakh Ninety Four Thousand Three Hundred & Seventeen and Paise Fifty Only
311	Item No 311:- d)Fixing Energy Meter box to internal walls /external wall /open ground of buildings in a suitably designed panel cabinet with proper locking arrangement with glass window on front door for seeing the readings of energy consumption without opening of the panel cabinet. It should house complete ancillaries and including the provision for connection of electrical power supply from nearby apparatus. The panel cabinet shall be prewired and with suitable gland	As directed by Engineer Incharge	45.00	6603.00	Each	297135.00	INR Two Lakh Ninety Seven Thousand One Hundred & Thirty Five Only

	entries						
312	Item No 312:- e) Supplying and erecting LT CT multifunction DLMS compliance energy meter of accuracy of class 0.5 , 3x240V,50 Hz with optical & RS 232 port, backlit LCD, measures & displays trivector energy, load survey, TOD, tamper detection & logging, power ON /OFF events, instantaneous parameters of rating 1/5 A with display in absence of power complete with zero adjustment & test certificate from manufacturer erected on provided M.S. box and connected to CTs	As directed by Engineer Incharge	51.00	10731.00	Each	547281.00	INR Five Lakh Forty Seven Thousand Two Hundred & Eighty One Only
313	Item No 313:- f) Making trench in Hard murum/Tar road having 0.75 m depth and minimum 0.3mtr width as per IS for laying provided cables up to voltage level 1.1Kv cable complete as per specification No. CW-EXN-CTR	As directed by Engineer Incharge	3150.00	199.00	mtr	626850.00	INR Six Lakh Twenty Six Thousand Eight Hundred & Fifty Only
314	Item No 314:- h) Electrical Panel with Electrical accessories such as required MCB-2 nos, conduites, wiring, cable up to actuator, fues etc complte .	As directed by Engineer Incharge	45.00	2500.00	Each	112500.00	INR One Lakh Twelve Thousand Five Hundred Only

315	<p>Item No 315:- Designing, Supplying, Installing, commissioning & testing of pressure transmitter CE markd with following technical parameters at Raw Water Pump House and Interfacing with PLC panel including Mounting arrangement Designing, Output 4-20 mA / HART Power supply - 24V DC ext. Display - 4" LED Accuracy - +/- 0.1 % of full scale or better Enclosure- IP 68- 10 nos</p>	As directed by Engineer Incharge	10.00	36634.00	job	366340.00	INR Three Lakh Sixty Six Thousand Three Hundred & Forty Only
316	<p>Item No 316:- Design, manufacture, supply, installation, testing and commissioning of indoor type PLC panel of size approx. 800 mm X 700 mm X 800mm (LBH) , fabricated out of min. 2 mm thick CRCA sheet powder coated to Siemens gray color. The Panel shall be provided with reputed make PLC with following accessories as well as input output configuration. The PLC shall be programmed with IEC 61131 standards for control, monitoring and communication of equipments & instruments at GSR/ESR Tank.PLC shall have Ethernet port & protocol for Modbus TCP communication with following IO DI –16 num DO – 16 num AI –2 num AO – 1 num. The panel shall include all the ccessories (not limited to following) to achieve</p>	As directed by Engineer Incharge	10.00	83700.00	job	837000.00	INR Eight Lakh Thirty Seven Thousand Only

	purpose of smooth & trouble free operation at GSR/ESR functionality. Digital Flow Indicator-1 num Digital TDS Indicator – 1 num Led Level Indicator – 5 levels MCB 4A DP – 4 num 24 VDC Power Supply 10A – 1 num Push Buttons – 4 num Selector Switch - 1 num Control Relay –2 num Electronic Hooter – 1 num Control Transformer – 1 num Emergency PB – 1 num Panel Cooling Fan – 1 num Panel Light with Door Switch – 1 num Wiring + TB etc – 1 lot Hardware – 1 lot - 10 nos						
317	<p>Item No 317:- Asphalt Road restoration: Reinstatement of road by excavating the potholes in rectangular shape and filling of potholes by one layers of soiling of 15 to 20 cm thick and filler with one layer of 80 mm trap metal of 150 mm thick, after this laying of 75 mm thick Modified Penetration Macadam (MPM) road surface including all materials, preparing the existing road surface, spreading 40 mm. to achieve the desired degree of compaction as per Technical Specification Clause 506 etc.complete, including applying tack coat of VG 10 grade bitumen. After construction of MPM, tack coat will be done on the prepared surface heating by flames in Boiler and spraying bitumen with sprayer on</p>	As directed by Engineer Incharge	37861.15	1163.00	Sqm	44032511.64	INR Four Crore Forty Lakh Thirty Two Thousand Five Hundred & Eleven and Paise Sixty Three Only

	Dry / Hungry B.T. surface 3 kg/10 sqm. VG30 bulk bitumen. After the tack coat Open Graded Premix Surfacing Providing and Laying OGC 20 mm to the specified level and cross fall using Type A seal coat but excluding prime / tack coat. For Bitumen VG30 bulk USING 80 TPH Batch mix type hot mix plant with SCADA, Paver and Vibratory roller						
318	Item No 318:- Providing dry trap/ granite/ quartzite/ gneiss, rubble stone soling in 15 cm to 20 cm thick layers including hand packing and compacting, etc. complete. (Bd-A-12/264)	As directed by Engineer Incharge	2433.94	1343.54	cum	3270095.75	INR Thirty Two Lakh Seventy Thousand & Ninety Five and Paise Seventy Five Only
319	Item No 319:-Commissioning, running and maintaining the scheme to quantities, rated capacity, including manning necessary personnel such as operator, valveman, etc. as per requirements of the scheme and who should also administer chemical dose for a period of 1 month for individual scheme and for regional scheme, together with training of personnel spared by MJP / Local Body and handing over the scheme to Local Body after completion of the above period as directed by Engineer-in-charge. Note: Required chemicals to be supplied by Department free of cost and electricity bill will also be paid by	As directed by Engineer Incharge	12.00	39251.30	Month	471015.60	INR Four Lakh Seventy One Thousand & Fifteen and Paise Sixty Only

	the Department. For regional scheme upto 3 villages trial period shall be one year with raw water pumping with pumps, raw water pumping main, leading main, ESR, BPT and distribution system, etc. (For one year) without WTP						
320	Item No 320:- Add for every additional villages or part thereof (21 Water Districts)	As directed by Engineer Incharge	252.00	10660.10	Month	2686345.20	INR Twenty Six Lakh Eighty Six Thousand Three Hundred & Forty Five and Paise Twenty Only
321	Item No 321:- Add for every additional pumping station	As directed by Engineer Incharge	6.00	17705.60	Month	106233.60	INR One Lakh Six Thousand Two Hundred & Thirty Three and Paise Sixty Only
322	Item No 322:- Vertical Turbine Pump Designing, supplying, erecting, commissioning and giving test and trial of Self water lubricated Vertical Turbine Pump including bowl assembly, columns, discharge head etc on provided channel / RSJ / RCC beam including sole plate with blue matching etc. complete as per specifications. Discharge : 54 LPS, Head : 31 Mtr, Motor rating : 40 HP Operating head range : 24 mtr to 34 mtr	As directed by Engineer Incharge	2.00	1543722.00	No	3087444.00	INR Thirty Lakh Eighty Seven Thousand Four Hundred & Forty Four Only

323	Item No 323:- Designing, supplying, erecting, commissioning and giving test and trial of Self water lubricated Vertical Turbine Pump including bowl assembly, columns, discharge head etc on provided channel / RSJ / RCC beam including sole plate with blue matching etc. complete as per specifications. Discharge : 44 LPS, Head : 104 Mtr, Motor rating : 90 HP Operating head range : 85 mtr to 116 mtr	As directed by Engineer Incharge	2.00	1958472.0 0	No	3916944.00	INR Thirty Nine Lakh Sixteen Thousand Nine Hundred & Forty Four Only
324	Item No 324:- Designing, supplying, erecting, commissioning and giving test and trial of Self water lubricated Vertical Turbine Pump including bowl assembly, columns, discharge head etc on provided channel / RSJ / RCC beam including sole plate with blue matching etc. complete as per specifications. Discharge : 57 LPS, Head : 43 Mtr, Motor rating : 50 HP Operating head range : 35 mtr to 48 mtr	As directed by Engineer Incharge	2.00	1722222.0 0	No	3444444.00	INR Thirty Four Lakh Forty Four Thousand Four Hundred & Forty Four Only
325	Item No 325:- Designing, supplying, erecting, commissioning and giving test and trial of Self water lubricated Vertical Turbine Pump including bowl assembly, columns, discharge head etc on provided channel / RSJ / RCC beam including sole plate with	As directed by Engineer Incharge	2.00	1543722.0 0	No	3087444.00	INR Thirty Lakh Eighty Seven Thousand Four Hundred & Forty Four Only

	blue matching etc. complete as per specifications. Discharge : 45 LPS, Head : 37 Mtr, Motor rating : 40 HP Operating head range : 28 mtr to 41 mtr						
326	Item No 326:- Designing, supplying, erecting, commissioning and giving test and trial of Self water lubricated Vertical Turbine Pump including bowl assembly, columns, discharge head etc on provided channel / RSJ / RCC beam including sole plate with blue matching etc. complete as per specifications. Discharge : 68 LPS, Head : 44 Mtr, Motor rating : 60 HP Operating head range : 35 mtr to 51 mtr	As directed by Engineer Incharge	2.00	1827222.00	No	3654444.00	INR Thirty Six Lakh Fifty Four Thousand Four Hundred & Forty Four Only
327	Item No 327:- Designing, supplying, erecting, commissioning and giving test and trial of Self water lubricated Vertical Turbine Pump including bowl assembly, columns, discharge head etc on provided channel / RSJ / RCC beam including sole plate with blue matching etc. complete as per specifications. Discharge : 173 LPS, Head : 35 Mtr, Motor rating : 120 HP Operating head range : 31 mtr to 45 mtr	As directed by Engineer Incharge	2.00	2130722.00	No	4261444.00	INR Forty Two Lakh Sixty One Thousand Four Hundred & Forty Four Only

328	Item No 328:- Designing, supplying, erecting, commissioning and giving test and trial of Self water lubricated Vertical Turbine Pump including bowl assembly, columns, discharge head etc on provided channel / RSJ / RCC beam including sole plate with blue matching etc. complete as per specifications. Discharge : 171 LPS, Head : 29 Mtr, Motor rating : 100 HP Operating head range : 24 mtr to 34 mtr	As directed by Engineer Incharge	2.00	2130722.00	No	4261444.00	INR Forty Two Lakh Sixty One Thousand Four Hundred & Forty Four Only
329	Item No 329:- Designing, supplying, erecting, commissioning and giving test and trial of Self water lubricated Vertical Turbine Pump including bowl assembly, columns, discharge head etc on provided channel / RSJ / RCC beam including sole plate with blue matching etc. complete as per specifications. Discharge : 55 LPS, Head : 33 Mtr, Motor rating : 40 HP Operating head range : 25 mtr to 36 mtr	As directed by Engineer Incharge	2.00	1543722.00	No	3087444.00	INR Thirty Lakh Eighty Seven Thousand Four Hundred & Forty Four Only
330	Item No 330:- Vertical Solid Shaft Motor Providing, erecting and testing vertical solid shaft motor 1500 RPM, squirrel cage induction motor, conforming to IS 12615, class IE3 premium, having continuous rating suitable for operation at 415	As directed by Engineer Incharge	6.00	186333.00	No	1117998.00	INR Eleven Lakh Seventeen Thousand Nine Hundred & Ninety Eight Only

	Volts +/-10%, 3 Phase, 50 Hz +/- 5% with "F" class insulation temperature rise limited to class "B" insulation. 30 kW (40 HP)						
331	Item No 331:- Providing, erecting and testing vertical solid shaft motor 1500 RPM, squirrel cage induction motor, conforming to IS 12615, class IE3 premium, having continuous rating suitable for operation at 415 Volts +/-10%, 3 Phase, 50 Hz +/- 5% with "F" class insulation temperature rise limited to class "B" insulation. 75 kW (100 HP)	As directed by Engineer Incharge	2.00	507429.30	No	1014858.60	INR Ten Lakh Fourteen Thousand Eight Hundred & Fifty Eight and Paise Sixty Only
332	Item No 332:- Providing, erecting and testing vertical solid shaft motor 1500 RPM, squirrel cage induction motor, conforming to IS 12615, class IE3 premium, having continuous rating suitable for operation at 415 Volts +/-10%, 3 Phase, 50 Hz +/- 5% with "F" class insulation temperature rise limited to class "B" insulation. 37 kW (50 HP)	As directed by Engineer Incharge	2.00	241990.35	No	483980.70	INR Four Lakh Eighty Three Thousand Nine Hundred & Eighty and Paise Seventy Only
333	Item No 333:- Providing, erecting and testing vertical solid shaft motor 1500 RPM, squirrel cage induction motor, conforming to IS 12615, class IE3 premium, having continuous rating suitable for operation at 415	As directed by Engineer Incharge	2.00	291753.00	No	583506.00	INR Five Lakh Eighty Three Thousand Five Hundred & Six Only

	Volts +/-10%, 3 Phase, 50 Hz +/- 5% with "F" class insulation temperature rise limited to class "B" insulation. 45 kW (60 HP)						
334	Item No 334:- Providing, erecting and testing vertical solid shaft motor 1500 RPM, squirrel cage induction motor, conforming to IS 12615, class IE3 premium, having continuous rating suitable for operation at 415 Volts +/-10%, 3 Phase, 50 Hz +/- 5% with "F" class insulation temperature rise limited to class "B" insulation. 90 kW (120 HP)	As directed by Engineer Incharge	2.00	628644.75	No	1257289.50	INR Twelve Lakh Fifty Seven Thousand Two Hundred & Eighty Nine and Paise Fifty Only
335	Item No 335:- Providing, erecting and testing vertical solid shaft motor 1500 RPM, squirrel cage induction motor, conforming to IS 12615, class IE3 premium, having continuous rating suitable for operation at 415 Volts +/-10%, 3 Phase, 50 Hz +/- 5% with "F" class insulation temperature rise limited to class "B" insulation. 75 kW (100 HP)	As directed by Engineer Incharge	2.00	513429.30	No	1026858.60	INR Ten Lakh Twenty Six Thousand Eight Hundred & Fifty Eight and Paise Sixty Only
336	Item No 336:- GLYCERINE FILLED PRESSURE GAUGE Providing, erecting Pressure gauge of required range complete with Glycerine Filled Pressure gauge Bourdon's type as IS 3624:1987	As directed by Engineer Incharge	24.00	1382.00	No	33168.00	INR Thirty Three Thousand One Hundred & Sixty Eight Only

	Mounting - direct bottom, stainless steel body, toughened glass window Pressure gauge 100 mm dia (black & red marking)						
337	Item No 337:-SLUICE VALVE Providing double flange sluice valve confirming for IS- 14846 including worn gear arrangements as per test pressure, stainless steel spindle, caps, including inspection charges, transportation upto departmental store, unloading, stacking excluding GST levied by GOI & GOM in all respect etc. complete PN – 1 rating, Without bypass arrangement 350 mm dia (Pump Discharge Line)	As directed by Engineer Incharge	4.00	59651.00	No	238604.00	INR Two Lakh Thirty Eight Thousand Six Hundred & Four Only
338	Item No 338:- Providing double flange sluice valve confirming for IS- 14846 including worn gear arrangements as per test pressure, stainless steel spindle, caps, including inspection charges, transportation upto departmental store, unloading, stacking excluding GST levied by GOI & GOM in all respect etc. complete PN – 1.6 rating, Without bypass arrangement 200 mm dia (Pump Discharge Line)	As directed by Engineer Incharge	6.00	23231.00	No	139386.00	INR One Lakh Thirty Nine Thousand Three Hundred & Eighty Six Only

339	Item No 339:- NON RETURN VALVE Providing and supplying ISI mark CI D/F reflux valves (non-return valves) of following dia including railway freight, inspection charges, unloading from railway wagon, loading into truck, transportation upto departmental stores, unloading, stacking excluding GST levied by GOI & GOM in all respect etc. complete. Reflux valves as per I.S.5312 Part I (1984) PN – 1 rating, With bypass arrangement 200 mm dia (Pump Discharge Line & Common Header Line)	As directed by Engineer Incharge	6.00	20290.00	No	121740.00	INR One Lakh Twenty One Thousand Seven Hundred & Forty Only
340	Item No 340:- Providing and supplying ISI mark CI D/F reflux valves (non-return valves) of following dia including railway freight, inspection charges, unloading from railway wagon, loading into truck, transportation upto departmental stores, unloading, stacking excluding GST levied by GOI & GOM in all respect etc. complete. Reflux valves as per I.S.5312 Part I (1984) PN – 1 rating, With bypass arrangement 250 mm dia (Pump Discharge Line & Common Header Line)	As directed by Engineer Incharge	3.00	33166.00	No	99498.00	INR Ninety Nine Thousand Four Hundred & Ninety Eight Only
341	Item No 341:- Providing and supplying ISI mark CI D/F reflux valves (non-return valves	As directed by Engineer	5.00	78989.00	No	394945.00	INR Three Lakh Ninety Four Thousand Nine Hundred & Forty Five Only

	) of following dia including railway freight, inspection charges, unloading from railway wagon, loading into truck, transportation upto departmental stores, unloading, stacking excluding GST levied by GOI & GOM in all respect etc. complete. Reflux valves as per I.S.5312 Part I (1984) PN – 1 rating, With bypass arrangement 350 mm dia (Pump Discharge Line & Common Header Line)	Incharge					
342	Item No 342:- Providing and supplying ISI mark CI D/F reflux valves (non-return valves) of following dia including railway freight, inspection charges, unloading from railway wagon, loading into truck, transportation upto departmental stores, unloading, stacking excluding GST levied by GOI & GOM in all respect etc. complete. Reflux valves as per I.S.5312 Part I (1984) PN – 1 rating, With bypass arrangement 450 mm dia (Common Header Line)	As directed by Engineer Incharge	1.00	120595.00	No	120595.00	INR One Lakh Twenty Thousand Five Hundred & Ninety Five Only
343	Item No 343:- Providing and supplying ISI mark CI D/F reflux valves (non-return valves) of following dia including railway freight, inspection charges, unloading from railway wagon, loading into truck, transportation upto departmental stores, unloading,	As directed by Engineer Incharge	9.00	24377.00	No	219393.00	INR Two Lakh Nineteen Thousand Three Hundred & Ninety Three Only

	stacking excluding GST levied by GOI & GOM in all respect etc. complete. Reflux valves as per I.S.5312 Part I (1984) PN – 1.6 rating, With bypass arrangement 200 mm dia (Pump Discharge Line & Common Header Line)						
344	Item No 344:- LOWERING, LAYING OF SLUICE VALVE / NRV Lowering, laying and jointing in position following C.I.D/F Reflex valves, Butterfly valves and Sluice valves including cost of all labour jointing material, including nut bolts and giving satisfactory hydraulic testing etc. complete. (Rate for all class of valves.) 200 mm dia (Pump Discharge Line & Common Header Line)	As directed by Engineer Incharge	25.00	3899.70	No	97492.50	INR Ninety Seven Thousand Four Hundred & Ninety Two and Paise Fifty Only
345	Item No 345:- Lowering, laying and jointing in position following C.I.D/F Reflex valves, Butterfly valves and Sluice valves including cost of all labour jointing material, including nut bolts and giving satisfactory hydraulic testing etc. complete. (Rate for all class of valves.) 250 mm dia (Pump Discharge Line & Common Header Line)	As directed by Engineer Incharge	5.00	5080.95	No	25404.75	INR Twenty Five Thousand Four Hundred & Four and Paise Seventy Five Only

346	Item No 346:- Lowering, laying and jointing in position following C.I.D/F Reflex valves, Butterfly valves and Sluice valves including cost of all labour jointing material, including nut bolts and giving satisfactory hydraulic testing etc. complete. (Rate for all class of valves.) 350 mm dia (Pump Discharge Line & Common Header Line)	As directed by Engineer Incharge	9.00	6494.25	No	58448.25	INR Fifty Eight Thousand Four Hundred & Forty Eight and Paise Twenty Five Only
347	Item No 347:- Lowering, laying and jointing in position following C.I.D/F Reflex valves, Butterfly valves and Sluice valves including cost of all labour jointing material, including nut bolts and giving satisfactory hydraulic testing etc. complete. (Rate for all class of valves.) 450 mm dia (Common Header Line)	As directed by Engineer Incharge	1.00	9322.95	No	9322.95	INR Nine Thousand Three Hundred & Twenty Two and Paise Ninety Five Only
348	Item No 348:- VALVE ACTUATOR Providing, erecting electric Valve actuators totally enclosed, weather-proof and dust proof construction with IP-67, protection class suitable for installation in any position without lubrication, leakage or other operational difficulty with special grease filled gear box and hand wheel for emergency manual operation which will automatically dis-engage on restoration of power to motor and with 10 watt single phase space heater and contineous	As directed by Engineer Incharge	10.00	98403.00	No	984030.00	INR Nine Lakh Eighty Four Thousand &Thirty Only

	local mechanical position indicator and individually replaceable counter gear assembly and with two torque and four limit switches with S.S. flap and operated with gear driven cams and of rating 250 Volt, 5 Amp, AC/DC, torque switch dial and with TEFC squirell cage induction motor working on 440 Volts +/- 10%, 3 phase, 50 Hz AC of intermittent duty rating S-2, insulation class "F" and temp rise restricted to class "B" with IP - 67 protection class suitable for DOL starting and with three thermostat and 30 % over load margin. The torque rating of reduction gear box shall be atleast 1.5 times max. torque required for opening and closing of valve. Electric Valve Actuator with non rising spindle type sluice valve, PN 1 rating 200 mm dia (Pump Discharge Line)						
349	Item No 349:- Providing, erecting electric Valve actuators totally enclosed, weather-proof and dust proof construction with IP-67, protection class suitable for installation in any position without lubrication, leakage or other operational difficulty with special grease filled gear box and hand wheel for emergency manual operation which will automatically dis-engage on restoration of power	As directed by Engineer Incharge	2.00	104229.00	No	208458.00	INR Two Lakh Eight Thousand Four Hundred & Fifty Eight Only

	to motor and with 10 watt single phase space heater and continuous local mechanical position indicator and individually replaceable counter gear assembly and with two torque and four limit switches with S.S. flap and operated with gear driven cams and of rating 250 Volt, 5 Amp, AC/DC, torque switch dial and with TEFC squirrel cage induction motor working on 440 Volts +/- 10%, 3 phase, 50 Hz AC of intermittent duty rating S-2, insulation class "F" and temp rise restricted to class "B" with IP - 67 protection class suitable for DOL starting and with three thermostat and 30 % over load margin. The torque rating of reduction gear box shall be atleast 1.5 times max. torque required for opening and closing of valve. Electric Valve Actuator with non rising spindle type sluice valve, PN 1 rating 250 mm dia (Pump Discharge Line)						
350	Item No 350:- Providing, erecting electric Valve actuators totally enclosed, weather-proof and dust proof construction with IP-67, protection class suitable for installation in any position without lubrication, leakage or other operational difficulty with special grease filled gear box and hand wheel for emergency manual operation which will automatically	As directed by Engineer Incharge	4.00	113496.00	No	453984.00	INR Four Lakh Fifty Three Thousand Nine Hundred & Eighty Four Only

	dis-engage on restoration of power to motor and with 10 watt single phase space heater and contineous local mechanical position indicator and individually replaceable counter gear assembly and with two torque and four limit switches with S.S. flap and operated with gear driven cams and of rating 250 Volt, 5 Amp, AC/DC, torque switch dial and with TEFC squirell cage induction motor working on 440 Volts +/- 10%, 3 phase, 50 Hz AC of intermittent duty rating S-2, insulation class "F" and temp rise restricted to class "B" with IP - 67 protection class suitable for DOL starting and with three thermostat and 30 % over load margin. The torque rating of reduction gear box shall be atleast 1.5 times max. torque required for opening and closing of valve. Electric Valve Actuator with non rising spindle type sluice valve, PN 1 rating 350 mm dia (Pump Discharge Line)						
351	Item No 351:- DISMANTLING JOINT Providing, erecting and commissioning M.S. Dismantling joint as per requirement and Department's approved drawing and specifications, including machining and rubber rings and suitable for 16 kg/cm ² working pressure with required flanges of suitable size with	As directed by Engineer Incharge	10.00	12290.00	No	122900.00	INR One Lakh Twenty Two Thousand Nine Hundred Only

	nut bolts etc complete. The joint should have through long bolts so that during normal working pressure there should be no sliding movement of sliding flanges. L.O.F. (length over flange) should not be less than 75% of dia. 200 mm dia (Pump Discharge Line)						
352	Item No 352:- KINETIC AIR VALVE Providing and supplying Kinetic Double Orifice type Air Valves confirming to IS 14845 as per standard specifications combined with screw down isolating valve, small orifice elastic ball resting on a gun metal orifice nipple, large orifice vulcanite ball seating on moulded seat ring, inlet face and drilled, including insurance, third party inspection charges, loading, unloading, transportation upto departmental stores, excluding GST levied by GOI & GOM in all respect etc. complete Kinetic Air Valve Flanged Type - PN -1 50 mm dia (Common Header)	As directed by Engineer Incharge	5.00	10246.00	No	51230.00	INR Fifty One Thousand Two Hundred & Thirty Only
353	Item No 353:- Providing and supplying Kinetic Double Orifice type Air Valves confirming to IS 14845 as per MJP's standard specifications combined with screw down isolating valve, small orifice elastic ball resting on a gun metal orifice nipple, large orifice	As directed by Engineer Incharge	2.00	12019.00	No	24038.00	INR Twenty Four Thousand &Thirty Eight Only

	vulcanite ball seating on moulded seat ring, inlet face and drilled, including insurance, third party inspection charges, loading, unloading, transportation upto departmental stores, excluding GST levied by GOI & GOM in all respect etc. complete Kinetic Air Valve Flanged Type - PN -1 80 mm dia (Common Header)						
354	Item No 354:- Providing and supplying Kinetic Double Orifice type Air Valves confirming to IS 14845 as per MJP's standard specifications combined with screw down isolating valve, small orifice elastic ball resting on a gun metal orifice nipple, large orifice vulcanite ball seating on moulded seat ring, inlet face and drilled, including insurance, third party inspection charges, loading, unloading, transportation upto departmental stores, excluding GST levied by GOI & GOM in all respect etc. complete Kinetic Air Valve Flanged Type - PN -1 100 mm dia (Common Header)	As directed by Engineer Incharge	1.00	13102.00	No	13102.00	INR Thirteen Thousand One Hundred & Two Only

355	Item No 355:- LOWERING, LAYING OF KINETIC AIR VALVE Lowering, laying and fixing in proper alignment and position all types of C.I. air valves as directed by Engineer-in-charge including cost of conveyance from stores to site of work, cost of all material and giving satisfactory hydraulic testing, etc. complete. (for all class of valves).50 mm dia (Common Header)	As directed by Engineer Incharge	5.00	401.10	No	2005.50	INR Two Thousand &Five and Paise Fifty Only
356	Item No 356:- Lowering, laying and fixing in proper alignment and position all types of C.I. air valves as directed by Engineer-in-charge including cost of conveyance from stores to site of work, cost of all material and giving satisfactory hydraulic testing, etc. complete. (for all class of valves). 80 mm dia (Common Header)	As directed by Engineer Incharge	2.00	480.90	No	961.80	INR Nine Hundred & Sixty One and Paise Eighty Only
357	Item No 357:- Lowering, laying and fixing in proper alignment and position all types of C.I. air valves as directed by Engineer-in-charge including cost of conveyance from stores to site of work, cost of all material and giving satisfactory hydraulic testing, etc. complete. (for all class of valves). 100 mm dia (Common Header)	As directed by Engineer Incharge	1.00	529.20	No	529.20	INR Five Hundred & Twenty Nine and Paise Twenty Only
358	Item No 358:- M.S PIPE Manufacturing, providing and supplying double flanged M. S. pipes (Commercial Quality) including	As directed by Engineer Incharge	80.00	4223.00	Rmt	337840.00	INR Three Lakh Thirty Seven Thousand Eight Hundred & Forty Only

	<p>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 railway freight, insurance, unloading from railway wagon, loading into truck, transport to stores, unloading, stacking, excluding GST levied by GOI & GOM in all respect etc. complete as per IS - 3589 and IS-5504 as applicable as per specifications (No negative tolerance in thickness is permissible).</p> <p>200 mm dia 8 mm thick</p>						
359	<p>Item No 359:- Manufacturing, providing and supplying double flanged 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 railway freight, insurance, unloading from railway wagon, loading into truck, transport to stores, unloading, stacking, excluding GST levied by GOI & GOM in all respect etc. complete as per IS - 3589 and IS-5504 as applicable as per specifications (No negative tolerance in thickness is</p>	As directed by Engineer Incharge	16.00	5238.00	Rmt	83808.00	INR Eighty Three Thousand Eight Hundred & Eight Only

	permissible). 250 mm dia 8 mm thick						
360	<p>Item No 360:- Manufacturing, providing and supplying double flanged 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 railway freight, insurance, unloading from railway wagon, loading into truck, transport to stores, unloading, stacking, excluding GST levied by GOI & GOM in all respect etc. complete as per IS - 3589 and IS-5504 as applicable as per specifications (No negative tolerance in thickness is permissible). 350 mm dia 8 mm thick</p>	As directed by Engineer Incharge	24.00	7270.00	Rmt	174480.00	INR One Lakh Seventy Four Thousand Four Hundred & Eighty Only
361	<p>Item No 361:- Manufacturing, providing and supplying double flanged 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</p>	As directed by Engineer Incharge	60.00	9300.00	Rmt	558000.00	INR Five Lakh Fifty Eight Thousand Only

	welding machine and forming 'V' edge on both ends of pipes including railway freight, insurance, unloading from railway wagon, loading into truck, transport to stores, unloading, stacking, excluding GST levied by GOI & GOM in all respect etc. complete as per IS - 3589 and IS-5504 as applicable as per specifications (No negative tolerance in thickness is permissible). 450 mm dia 8 mm thick						
362	Item No 362:- MAKING FLANGED JOINT Providing and making flanged joints to flanged C.I./M.S. pipes of all classes/specials etc. including cost of all jointing materials (rubber packing, nut bolts, etc.), labour, hydraulic testing etc. complete. 200 mm dia	As directed by Engineer Incharge	48.00	943.00	Joint	45264.00	INR Forty Five Thousand Two Hundred & Sixty Four Only
363	Item No 363:- Providing and making flanged joints to flanged C.I./M.S. pipes of all classes/specials etc. including cost of all jointing materials (rubber packing, nut bolts, etc.), labour, hydraulic testing etc. complete. 250 mm dia	As directed by Engineer Incharge	10.00	1352.00	Joint	13520.00	INR Thirteen Thousand Five Hundred & Twenty Only

364	Item No 364:- Providing and making flanged joints to flanged C.I./M.S. pipes of all classes/specials etc. including cost of all jointing materials (rubber packing, nut bolts, etc.), labour, hydraulic testing etc. complete. 350 mm dia	As directed by Engineer Incharge	16.00	1828.00	Joint	29248.00	INR Twenty Nine Thousand Two Hundred & Forty Eight Only
365	Item No 365:- Providing and making flanged joints to flanged C.I./M.S. pipes of all classes/specials etc. including cost of all jointing materials (rubber packing, nut bolts, etc.), labour, hydraulic testing etc. complete. 450 mm dia	As directed by Engineer Incharge	24.00	2784.00	Joint	66816.00	INR Sixty Six Thousand Eight Hundred & Sixteen Only
366	Item No 366:- LIFTING ARRANGEMENT a) Hand Operated Circular or Rectangular Travelling Crane (Single Girder) Providing , erecting and commissioning Single Girder Hand Operated Circular / Rectangular Travelling Crane with 6 m lift complete with chain pulley block ISI marked and travelling trolley both tested for 50 % overload including arrangement for longitudinal travel / circular travel and cross travel with wheel, hand chain, etc complete. 3 Tonne Capacity (Above 5 m upto 6 m span)	As directed by Engineer Incharge	3.00	253574.00	No	760722.00	INR Seven Lakh Sixty Thousand Seven Hundred & Twenty Two Only

367	Item No 367:- Providing , erecting and commissioning Single Girder Hand Operated Circular / Rectangular Travelling Crane with 6 m lift complete with chain pulley block ISI marked and travelling trolley both tested for 50 % overload including arrangement for longitudinal travel / circular travel and cross travel with wheel, hand chain, etc complete. 5 Tonne Capacity (Above 5 m upto 6 m span)	As directed by Engineer Incharge	3.00	315584.00	No	946752.00	INR Nine Lakh Forty Six Thousand Seven Hundred & Fifty Two Only
368	Item No 368:- b) Square Bar / Rail Providing, erecting and fixing square bar of EN 8 as rail for over head crane on provided track, girder 1 continuous corbel beam, including supporting plate and "J" bolts. 50 X 50 mm (EN 8)	As directed by Engineer Incharge	120.00	2231.00	Mtr	267720.00	INR Two Lakh Sixty Seven Thousand Seven Hundred & Twenty Only
369	Item No 369:- Flow Control Valve Designing, Supplying, Installing, Commissioning & testing of Flow Control Valve / Pressure reducing valve for inlet with flow measuring , flow controlling , pressure monitoring & web based with cable , PLC etc. complete. Hydraulically operated self -actuated Flow & Level Control Valve (either with float or altitude pilot) with downstream orifice having Ductile Iron valve body , Y-Pattern, Double chamber unitized actuator , Fusion bonded Epoxy	As directed by Engineer Incharge	1.00	429295.00	No	429295.00	INR Four Lakh Twenty Nine Thousand Two Hundred & Ninety Five Only

	coating , Copper control tubing , with Latching Solenoid & Pilot operated as per design , additional Speed control feature , drip tight sealing , In-line serviceable, Internals Stainless steel & protected diaphragm suitable for drinking water WRAS/NSF/DVGW approved. 250 mm dia PN rating is 1.6						
370	Item No 370:- ELECTROMAGNETIC FLOW METER Supply, install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Sewage / water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its charges,valid for 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months guarantee etc complete, as may be required at site & based on technical specifications. 300 mm dia	As directed by Engineer Incharge	5.00	223710.00	No	1118550.00	INR Eleven Lakh Eighteen Thousand Five Hundred & Fifty Only

371	<p>Item No 371:- Supply, install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Sewage / water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its charges,valid for 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months guarantee etc complete, as may be required at site & based on technical specifications. 350 mm dia</p>	As directed by Engineer Incharge	1.00	307184.00	No	307184.00	INR Three Lakh Seven Thousand One Hundred & Eighty Four Only
372	<p>Item No 372:- Supply, install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Sewage / water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its charges,valid for 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months</p>	As directed by Engineer Incharge	1.00	372347.00	No	372347.00	INR Three Lakh Seventy Two Thousand Three Hundred & Forty Seven Only

	guarantee etc complete, as may be required at site & based on technical specifications. 450 mm dia						
373	Item No 373:-Supply, install and commission Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Sewage / water with accuracy +/- 0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrestor, cable GI duct if suitable size for 25 mtrs built in GSM (with Simcard and its charges,valid for 36 months) including the pipe cutting, leveling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months guarantee etc complete, as may be required at site & based on technical specifications.700 mm dia	As directed by Engineer Incharge	1.00	533722.00	No	533722.00	INR Five Lakh Thirty Three Thousand Seven Hundred & Twenty Two Only
374	Item No 374:- Transformer Supplying, installing, testing & commissioning of 3 phase, 11/0.433 kV, 50 Hz., 100 kVA, Mineral oil immersed and naturally cooled indoor type, aluminium wound Non-sealed transformer, delta/star connected with additional neutral brought out on load side,	As directed by Engineer Incharge	2.00	250607.00	Nos	501214.00	INR Five Lakh One Thousand Two Hundred & Fourteen Only

	temperature rise should not exceed 40°C by thermometer in oil and 45°C by the resistance method in winding at full load rating, using type A winding insulation (kraft paper) , with standard accessories complete with test certificate with losses below 475 Watts at 50% load, 1650 Watts at 100% load as per IS:1180 (part 1) : 2014, with necessary permissions of Electrical Inspector, as per specification no SS- TR-NSL.						
375	Item No 375:- Supplying, installing, testing & commissioning of 3 phase, 11/0.433 kV, 50 Hz., 160 kVA, Mineral oil immersed and naturally cooled indoor type, aluminium wound Non-sealed transformer, delta/star connected with additional neutral brought out on load side, temperature rise should not exceed 40°C by thermometer in oil and 45°C by the resistance method in winding at full load rating, using type A winding insulation (kraft paper) , with standard accessories complete with test certificate with losses below 475 Watts at 50% load, 1650 Watts at 100% load as per IS:1180 (part 1) : 2014, with necessary permissions of Electrical Inspector, as per specification no SS- TR-NSL.	As directed by Engineer Incharge	1.00	331280.00	No	331280.00	INR Three Lakh Thirty One Thousand Two Hundred & Eighty Only

376	Item No 376:- Supplying, installing, testing & commissioning of 3 phase, 11/0.433 kV, 50 Hz., 250 kVA, Mineral oil immersed and naturally cooled indoor type, aluminium wound Non-sealed transformer, delta/star connected with additional neutral brought out on load side, temperature rise should not exceed 40°C by thermometer in oil and 45°C by the resistance method in winding at full load rating, using type A winding insulation (kraft paper) , with standard accessories complete with test certificate with losses below 475 Watts at 50% load, 1650 Watts at 100% load as per IS:1180 (part 1) : 2014, with necessary permissions of Electrical Inspector, as per specification no SS- TR-NSL.	As directed by Engineer Incharge	1.00	784625.00	No	784625.00	INR Seven Lakh Eighty Four Thousand Six Hundred & Twenty Five Only
377	Item No 377:- RMU Supplying, erecting, testing & commissioning 11kV, 630A, 21kA/3sec, 3 way outdoor, extensible motorised SCADA compatible RMU, internal arc tested consisting of 1 no. feeder with 1 LBS and 2 nos. feeder with 2 VCB. compliant to IEC 62271 -100,200 and 102, as per specification no. SW-HTS/RMU SCAD	As directed by Engineer Incharge	4.00	598300.00	Nos	2393200.00	INR Twenty Three Lakh Ninety Three Thousand Two Hundred Only

378	<p>Item No 378:- PMCC Panel :- Providing ,erecting , testing and commissioning of LT Panel including panel fabrication, iron work, internal wiring . labour charges for internal wiring, aluminium buasbar. CTs of required ratio. name board, danger board, lifting, for providing required control supply along with required accessories.</p> <p>Panel Enclosure - 1) I/C -trafo- MCCB 200,4P 36 KA, Mechanical interlock voltmeter ,ammeter with switch, multifunction meter with RS 232/ 485 ,TNC Switch, indication Lamp, control MCB neutral link CT,MCB Indication lamps (On ,Off, Trip) -2 nos qty 2) For Pump motor 40 HP - 100 A MCCB 3P,25 KA, Mechanical interlock voltmeter ,ammeter with switch, multifunction meter with RS 232/485 ,TNC Switch, indication Lamp, control MCB neutral link CT ,MCB Indication lamps (On ,Off, Trip)-3 nos 3) TPMCB 6A to 32A ,10KA 1 Nos Qty for Fixed Type Capacitor -2nos 4) FPMCB 6A to 32A ,10KA 1 Nos Qty for internal lighting -4 Nos Qty 5) Acuator forward & reversed Starter for pumps</p>	As directed by Engineer Incharge	1.00	152101.00	Job	152101.00	INR One Lakh Fifty Two Thousand One Hundred & One Only
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379	<p>Item No 379:- PMCC Panel :- Providing ,erecting , testing and commissioning of LT Panel including panel fabrication, iron work, internal wiring . labour charges for internal wiring, aluminium buasbar. CTs of required ratio. name board, danger board, lifting, for providing required control supply along with required accessories.</p> <p>Panel Enclosure - 1) I/C -trafo- MCCB 200,4P 36 KA, Mechanical interlock voltmeter ,ammeter with switch, multifunction meter with RS 232/ 485 ,TNC Switch, indication Lamp, control MCB neutral link CT,MCB Indication lamps (On ,Off, Trip) -2 nos qty 2) For Pump motor 40 HP - 100 A MCCB 3P,25 KA, Mechanical interlock voltmeter ,ammeter with switch, multifunction meter with RS 232/485 ,TNC Switch, indication Lamp, control MCB neutral link CT ,MCB Indication lamps (On ,Off, Trip)-3 nos 3) TPMCB 6A to 32A ,10KA 1 Nos Qty for Fixed Type Capacitor -2nos 4) FPMCB 6A to 32A ,10KA 1 Nos Qty for internal lighting -4 Nos Qty 5) Acuator forward & reversed Starter for pumps</p>	As directed by Engineer Incharge	1.00	156434.00	job	156434.00	INR One Lakh Fifty Six Thousand Four Hundred & Thirty Four Only
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380	<p>Item No 380:- PMCC Panel :- Providing ,erecting , testing and commissioning of LT Panel including panel fabrication, iron work, internal wiring . labour charges for internal wiring, aluminium buasbar. CTs of required ratio. name board, danger board, lifting, for providing required control supply along with required accessories.</p> <p>Panel Enclosure - 1) I/C -trafo- MCCB 200,4P 36 KA, Mechanical interlock voltmeter ,ammeter with switch, multifunction meter with RS 232/ 485 ,TNC Switch, indication Lamp, control MCB neutral link CT,MCB Indication lamps (On ,Off, Trip) -2 nos qty 2) For Pump motor 40 HP - 100 A MCCB 3P,25 KA, Mechanical interlock voltmeter ,ammeter with switch, multifunction meter with RS 232/485 ,TNC Switch, indication Lamp, control MCB neutral link CT ,MCB Indication lamps (On ,Off, Trip)-3 nos 3) TPMCB 6A to 32A ,10KA 1 Nos Qty for Fixed Type Capacitor -2nos 4) FPMCB 6A to 32A ,10KA 1 Nos Qty for internal lighting -4 Nos Qty 5) Acuator forward & reversed Starter for pumps</p>	As directed by Engineer Incharge	1.00	151350.00	job	151350.00	INR One Lakh Fifty One Thousand Three Hundred & Fifty Only
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381	<p>Item No 381:- PMMC Panel PMCC Panel :- Providing ,erecting , testing and commissioning of LT Panel including panel fabrication, iron work, internal wiring . labour charges for internal wiring, aluminium buasbar. CTs of required ratio. name board, danger board, lifting, for providing required control supply along with required accessories.</p> <p>Panel Enclosure - 1) I/C -trafo- MCCB 200,4P 36 KA, Mechanical interlock voltmeter ,ammeter with switch, multifunction meter with RS 232/ 485 ,TNC Switch, indication Lamp, control MCB neutral link CT,MCB Indication lamps (On ,Off, Trip) -2 nos qty 2) For Pump motor 40 HP - 100 A MCCB 3P,25 KA, Mechanical interlock voltmeter ,ammeter with switch, multifunction meter with RS 232/485 ,TNC Switch, indication Lamp, control MCB neutral link CT ,MCB Indication lamps (On ,Off, Trip)-3 nos 3) TPMCB 6A to 32A ,10KA 1 Nos Qty for Fixed Type Capacitor -2nos 4) FPMCB 6A to 32A ,10KA 1 Nos Qty for internal lighting -4 Nos Qty 5) Acuator forward & reversed Starter for pumps</p>	As directed by Engineer Incharge	1.00	207734.00	job	207734.00	INR Two Lakh Seven Thousand Seven Hundred & Thirty Four Only
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382	<p>Item No 382:- PMCC Panel :- Providing ,erecting , testing and commissioning of LT Panel including panel fabrication, iron work, internal wiring . labour charges for internal wiring, aluminium buasbar. CTs of required ratio. name board, danger board, lifting, for providing required control supply along with required accessories.</p> <p>Panel Enclosure - 1) I/C -trafo- MCCB 200,4P 36 KA, Mechanical interlock voltmeter ,ammeter with switch, multifunction meter with RS 232/ 485 ,TNC Switch, indication Lamp, control MCB neutral link CT,MCB Indication lamps (On ,Off, Trip) -2 nos qty 2) For Pump motor 40 HP - 100 A MCCB 3P,25 KA, Mechanical interlock voltmeter ,ammeter with switch, multifunction meter with RS 232/485 ,TNC Switch, indication Lamp, control MCB neutral link CT ,MCB Indication lamps (On ,Off, Trip)-3 nos 3) TPMCB 6A to 32A ,10KA 1 Nos Qty for Fixed Type Capacitor -2nos 4) FPMCB 6A to 32A ,10KA 1 Nos Qty for internal lighting -4 Nos Qty 5) Acuator forward & reversed Starter for pumps</p>	As directed by Engineer Incharge	1.00	206473.00	job	206473.00	INR Two Lakh Six Thousand Four Hundred & Seventy Three Only
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383	<p>Item No 383:- PMCC Panel :- Providing ,erecting , testing and commissioning of LT Panel including panel fabrication, iron work, internal wiring . labour charges for internal wiring, aluminium buasbar. CTs of required ratio. name board, danger board, lifting, for providing required control supply along with required accessories.</p> <p>Panel Enclosure - 1) I/C -trafo- MCCB 200,4P 36 KA, Mechanical interlock voltmeter ,ammeter with switch, multifunction meter with RS 232/ 485 ,TNC Switch, indication Lamp, control MCB neutral link CT,MCB Indication lamps (On ,Off, Trip) -2 nos qty 2) For Pump motor 40 HP - 100 A MCCB 3P,25 KA, Mechanical interlock voltmeter ,ammeter with switch, multifunction meter with RS 232/485 ,TNC Switch, indication Lamp, control MCB neutral link CT ,MCB Indication lamps (On ,Off, Trip)-3 nos 3) TPMCB 6A to 32A ,10KA 1 Nos Qty for Fixed Type Capacitor -2nos 4) FPMCB 6A to 32A ,10KA 1 Nos Qty for internal lighting -4 Nos Qty 5) Acuator forward & reversed Starter for pumps</p>	As directed by Engineer Incharge	1.00	326535.00	Job	326535.00	INR Three Lakh Twenty Six Thousand Five Hundred & Thirty Five Only
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384	<p>Item No 384:- CABLES i) Supply, erection, testing & commissioning of H.T. cable as below a) Supplying , erecting & terminating XLPE insulated galvanised steel formed wire armoured (strip) cable 22 kV(E), 3 x 95 sq. mm. aluminium conductor laid in provided trench / pipe as per specification no. CB-HT DP structure to Metering Kisok -2 run , Metering Kisok to RMU HT - 1 run , from RMU to Transformer HT side -1 run</p>	As directed by Engineer Incharge	750.00	1704.00	mtr	1278000.00	INR Twelve Lakh Seventy Eight Thousand Only
385	<p>Item No 385:- Supplying , erecting & terminating XLPE insulated, galvanised steel formed wire armoured (strip) cable 11 kV(UE), 3 x 95 sq. mm. aluminium conductor laid in provided trench / pipe as per specification no. CB-HT MSDCL to RMU ...2 Run DP RMU to Transformer...1 Run</p>	As directed by Engineer Incharge	250.00	1770.00	mtr	442500.00	INR Four Lakh Forty Two Thousand Five Hundred Only
386	<p>Item No 386:- b)Providing and erecting Heat shrinkable outdoor termination kit for 11 kV (UE)/ 22 kV (E) XLPE HT cable 3x 95 sq. mm. with necessary material as per specification no. CBJT/ HT</p>	As directed by Engineer Incharge	11.00	15986.00	Nos	175846.00	INR One Lakh Seventy Five Thousand Eight Hundred & Forty Six Only

387	<p>Item No 387:- i) Supply, erection, testing & commissioning of L.T. cable as below a) Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 3½core 240 sq. mm. aluminium conductor complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL From Transformer to PMMC Panel - 3 run From DG Panel To PMCC Panel -3 run</p>	As directed by Engineer Incharge	200.00	1369.00	mtr	273800.00	INR Two Lakh Seventy Three Thousand Eight Hundred Only
388	<p>Item No 388:- b) Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 3½ core 185 sq. mm. aluminium conductor complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL Transformer To Pmcc Panel</p>	As directed by Engineer Incharge	360.00	1093.00	mtr	393480.00	INR Three Lakh Ninety Three Thousand Four Hundred & Eighty Only
389	<p>Item No 389:- c) Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 3 core 95 sq. mm. aluminium conductor complete erected with glands & lugs, on wall/ trusses/pole or laid in provided</p>	As directed by Engineer Incharge	120.00	627.00	mtr	75240.00	INR Seventy Five Thousand Two Hundred & Forty Only

	trench/ pipe as per specification no. CB-LT/AL PMCC panel To Pumps						
390	Item No 390:- d) Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 3½ core 70 sq. mm. aluminium conductor complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL Transformer To Pmcc Panel	As directed by Engineer Incharge	220.00	494.00	mtr	108680.00	INR One Lakh Eight Thousand Six Hundred & Eighty Only
391	Item No 391:-e) Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 3 core 70 sq. mm. aluminium conductor complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL PMCC to APFC PMCC to 90HP Pump	As directed by Engineer Incharge	80.00	502.00	mtr	40160.00	INR Forty Thousand One Hundred & Sixty Only
392	Item No 392:- f) Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 3½ core 50 sq. mm. aluminium conductor complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL Transformer To Pmcc Panel	As directed by Engineer Incharge	200.00	381.00	mtr	76200.00	INR Seventy Six Thousand Two Hundred Only

393	Item No 393:- g) Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 3 core 35 sq. mm. aluminium conductor complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL PMCC panel To Pumps & APFC Panel	As directed by Engineer Incharge	90.00	267.00	mtr	24030.00	INR Twenty Four Thousand &Thirty Only
394	Item No 394:- h) Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 3 core 25 sq. mm. aluminium conductor complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL PMCC panel To Pumps	As directed by Engineer Incharge	350.00	214.00	mtr	74900.00	INR Seventy Four Thousand Nine Hundred Only
395	Item No 395:- i) Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 3 core 6 sq. mm. aluminium conductor complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL For Fixed Type Capacitor	As directed by Engineer Incharge	120.00	137.00	mtr	16440.00	INR Sixteen Thousand Four Hundred & Forty Only

396	Item No 396:- j) Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 4 core 4 sq. mm. aluminium conductor complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL For lighting	As directed by Engineer Incharge	300.00	135.00	mtr	40500.00	INR Forty Thousand Five Hundred Only
397	Item No 397:- k) Supplying, installing, testing and commissioning FR, XLPE armoured cable 12 core 1.5 sq.mm. copper conductor complete erected on wall/ ceiling complete as per specification no. CB-LT/CU for Actuator	As directed by Engineer Incharge	300.00	322.00	mtr	96600.00	INR Ninety Six Thousand Six Hundred Only
398	Item No 398:- CABLE TRAY Providing & erecting hot dipped galvanised ladder type cable tray manufactured from 16 SWG (1.6 mm thick) GI sheet of 200 mm width & 75 mm height complete with necessary coupler plates & hardware. 200 mm x 75 mm	As directed by Engineer Incharge	130.00	699.00	Mtr	90870.00	INR Ninety Thousand Eight Hundred & Seventy Only
399	Item No 399:- EARTHING i) Providing earthing with galvanized iron earth plate size 60 x 60 x 0.6 cm with funnel with a wire mesh for watering and brick masonry block C.I. cover complete with all materials, testing & recording the results as per specification no. EA-	As directed by Engineer Incharge	65.00	6055.00	Nos	393575.00	INR Three Lakh Ninety Three Thousand Five Hundred & Seventy Five Only

	EP						
400	Item No 400:- ii) Supplying and erecting GI strip of required size used for earthing on wall and/or any other purpose with necessary GI clamps fixed on wall painted with bituminous paint in an approved manner with joints required. As per specification no EA-EP.	As directed by Engineer Incharge	650.00	222.00	Kg	144300.00	INR One Lakh Forty Four Thousand Three Hundred Only
401	Item No 401:- iii) Providing earthing with copper earth plate size 30 x 30 x 0.315 cm complete with all materials, testing & recording the results as per specification no. EA-EP	As directed by Engineer Incharge	8.00	6486.00	Nos	51888.00	INR Fifty One Thousand Eight Hundred & Eighty Eight Only
402	Item No 402:- iv) Supplying and erecting copper strip of required size used for earthing on wall and/or any other purpose with necessary copper clamps fixed on wall painted with bituminous paint in an approved manner with joints required. As per specification no. EA-EP.	As directed by Engineer Incharge	90.00	883.00	Kg	79470.00	INR Seventy Nine Thousand Four Hundred & Seventy Only
403	Item No 403:- PUMP STARTER Auto transformer Starter with air break contactor a) Providing erecting and giving test	As directed by Engineer Incharge	4.00	84964.00	Nos	339856.00	INR Three Lakh Thirty Nine Thousand Eight Hundred & Fifty Six Only

<p>and trial of Fully Automatic, Auto Transfonner Starter with Air Break Contactor, assembled locally with contactors of approved make in 14 SWG sheet steel fabricated, floor mounted type cubical panel, suitable for operation on 380 - 440 Volts, 3 Phase, 50 Hz, fitted with accessories a<; below. The incoming and outgoing cable end boxes shall be on either sides of main panel. The cable entries from auto transfonner shall be totally enclosed in sheet metal. The starter shall have screened louvers on both sides..</p> <p>1) Oil immersed copper wound auto transformer with 50%,65%, and 80% tapping including first fill of oil.</p> <p>2) All Air Break Contactors of AC 3 duty of suitable rating as mentioned.</p> <p>3) Bimetallic overload relay.</p> <p>4) Timer ON and OFF delay.</p> <p>5) Master timer.</p> <p>6) Ammeter with CTs and selector switch.</p> <p>7) No Volt release.</p> <p>8) Motor 'ON', "OFF" and "TRJP" indication lamp.</p> <p>9) Motor Protection Relay, solid state with protection CTs.</p>						
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	10) Thennostat with I NO + I NC for Oil temperature.)) Door interlock switch with) NO +) NC. 12) Control fuse. Starter for Motor HP / Contactor Rating " Main/Start! Run". 40 HP						
404	Item No 404:- PUMP STARTER Auto transformer Starter with air break contactor a)Providing erecting and giving test and trial of Fully Automatic, Auto Transfonner Starter with Air Break Contactor, assembled locally with contactors of approved make in 14 SWG sheet steel fabricated, floor mounted type cubical panel, suitable for operation on 380 - 440 Volts, 3 Phase, 50 Hz, fitted with accessories a<; below. The incoming and outgoing cable end boxes shall be on either sides of main panel. The cable entries from auto transfonner shall be totally enclosed in sheet metal. The starter shall have screened louvers on both sides.. I) Oil immersed copper wound auto transformer with 50%,65%, and 80% tapping including first fill of oil.	As directed by Engineer Incharge	2.00	115266.00	Nos	230532.00	INR Two Lakh Thirty Thousand Five Hundred & Thirty Two Only

	2) All Air Break Contactors of AC 3 duty of suitable rating as mentioned. 3) Bimetallic overload relay. 4) Timer ON and OFF delay. 5) Master timer. 6) Ammeter with CTs and selector switch. 7) No Volt release. 8) Motor 'ON', "OFF" and "TRJP" indication lamp. 9) Motor Protection Relay, solid state with protection CTs. 10) Thennostat with I NO + I NC for Oil temperature.))) Door interlock switch with) NO +) NC. 12) Control fuse. Starter for Motor HP / Contactor Rating " Main/Start! Run". 50 HP						
405	Item No 405:- PUMP STARTER Auto transformer Starter with air break contactor a) Providing erecting and giving test and trial of Fully Automatic, Auto Transfonner Starter with Air Break Contactor, assembled locally with contactors of approved make in 14 SWG sheet steel fabricated, floor mounted type cubical panel, suitable	As directed by Engineer Incharge	2.00	115266.00	Nos	230532.00	INR Two Lakh Thirty Thousand Five Hundred & Thirty Two Only

<p>for operation on 380 - 440 Volts, 3 Phase, 50 Hz, fitted with accessories a<; below. The incoming and outgoing cable end boxes shall be on either sides of main panel. The cable entries from auto transfonner shall be totally enclosed in sheet metal. The starter shall have screened louvers on both sides..</p> <p>1) Oil immersed copper wound auto transformer with 50%,65%, and 80% tapping including first fill of oil.</p> <p>2) All Air Break Contactors of AC 3 duty of suitable rating as mentioned.</p> <p>3) Bimetallic overload relay.</p> <p>4) Timer ON and OFF delay.</p> <p>5) Master timer.</p> <p>6) Ammeter with CTs and selector switch.</p> <p>7) No Volt release.</p> <p>8) Motor 'ON", "OFF" and "TRJP" indication lamp.</p> <p>9) Motor Protection Relay, solid state with protection CTs.</p> <p>10) Thennostat with I NO + I NC for Oil temperature.</p> <p>))) Door interlock switch with) NO +) NC.</p> <p>12) Control fuse.</p>						
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	Starter for Motor HP / Contactor Rating " Main/ Start! Run". 60 HP						
406	<p>Item No 406:- PUMP STARTER</p> <p>Auto transformer Starter with air break contactor</p> <p>a)Providing erecting and giving test and trial of Fully Automatic, Auto Transfonner Starter with Air Break Contactor, assembled locally with contactors of approved make in 14 SWG sheet steel fabricated, floor mounted type cubical panel, suitable for operation on 380 - 440 Volts, 3 Phase, 50 Hz, fitted with accessories a<; below. The incoming and outgoing cable end boxes shall be on either sides of main panel. The cable entries from auto transfonner shall be totally enclosed in sheet metal. The starter shall have screened louvers on both sides..</p> <p>1) Oil immersed copper wound auto transformer with 50%,65%, and 80% tapping including first fill of oil.</p> <p>2) All Air Break Contactors of AC 3 duty of suitable rating as mentioned.</p> <p>3) Bimetallic overload relay.</p> <p>4) Timer ON and OFF delay.</p> <p>5) Master timer.</p>	As directed by Engineer Incharge	2.00	175969.00	Nos	351938.00	INR Three Lakh Fifty One Thousand Nine Hundred & Thirty Eight Only

	6) Ammeter with CTs and selector switch. 7) No Volt release. 8) Motor 'ON", "OFF" and "TRJP" indication lamp. 9) Motor Protection Relay, solid state with protection CTs. 10) Thennostat with I NO + I NC for Oil temperature.))) Door interlock switch with) NO +) NC. 12) Control fuse. Starter for Motor HP / Contactor Rating " Main/Run". 90 HP						
407	Item No 407:- Electrical Soft starter b)Providing erecting and giving test and trial of FCMA fully Automatic, Starter with DOL Soft Starter complete with main Contactor, VAF meter , PLC and HMI , push buttons and indications,FCMA module with bypass contactor and its control circuitry etc complete. 40 HP	As directed by Engineer Incharge	2.00	84964.00	Nos	169928.00	INR One Lakh Sixty Nine Thousand Nine Hundred & Twenty Eight Only

408	Item No 408:- Electrical Soft starter b)Providing erecting and giving test and trial of FCMA fully Automatic, Starter with DOL Soft Starter complete with main Contactor, VAF meter , PLC and HMI , push buttons and indications,FCMA module with bypass contactor and its control circuitry etc complete. 100 HP	As directed by Engineer Incharge	2.00	188710.00	Nos	377420.00	INR Three Lakh Seventy Seven Thousand Four Hundred & Twenty Only
409	Item No 409:- Electrical Soft starter b)Providing erecting and giving test and trial of FCMA fully Automatic, Starter with DOL Soft Starter complete with main Contactor, VAF meter , PLC and HMI , push buttons and indications,FCMA module with bypass contactor and its control circuitry etc complete.120 HP	As directed by Engineer Incharge	2.00	209224.00	Nos	418448.00	INR Four Lakh Eighteen Thousand Four Hundred & Forty Eight Only
410	Item No 410:- APFC Panel Supplying and erecting 100kVAr, 440 V 3 phase, 50 Hz., Contactor Logic & Intelligent Relay micro APFC passive filter panel, consisting of suitable steps of APP/MPP type capacitor units with Detuned (harmonic filter) reactors of suitable rating , APFC panel shall be compliance to IEC 61439 and power quality IEC 61921 standard as per specification no CP-ED/APFC	As directed by Engineer Incharge	1.00	278656.00	Each	278656.00	INR Two Lakh Seventy Eight Thousand Six Hundred & Fifty Six Only

411	Item No 411:- Supplying and erecting 75 kVAR, 440 V 3 phase, 50 Hz., Contactor Logic & Intelligent Relay micro APFC passive filter panel, consisting of suitable steps of APP/MPP type capacitor units with Detuned (harmonic filter) reactors of suitable rating , APFC panel shall be compliance to IEC 61439 and power quality IEC 61921 standard as per specification no CP-ED/APFC	As directed by Engineer Incharge	1.00	224460.00	Each	224460.00	INR Two Lakh Twenty Four Thousand Four Hundred & Sixty Only
412	Item No 412:- Supplying and erecting 75 kVAR, 440 V 3 phase, 50 Hz., Contactor Logic & Intelligent Relay micro APFC passive filter panel, consisting of suitable steps of APP/MPP type capacitor units with Detuned (harmonic filter) reactors of suitable rating , APFC panel shall be compliance to IEC 61439 and power quality IEC 61921 standard as per specification no CP-ED/APFC	As directed by Engineer Incharge	1.00	168806.00	Each	168806.00	INR One Lakh Sixty Eight Thousand Eight Hundred & Six Only
413	Item No 413:- Supplying and erecting 75 kVAR, 440 V 3 phase, 50 Hz., Contactor Logic & Intelligent Relay micro APFC passive filter panel, consisting of suitable steps of APP/MPP type capacitor units with Detuned (harmonic filter) reactors of suitable rating , APFC panel shall be compliance to IEC 61439 and power quality IEC 61921 standard as per specification no CP-ED/APFC	As directed by Engineer Incharge	3.00	129187.00	Each	387561.00	INR Three Lakh Eighty Seven Thousand Five Hundred & Sixty One Only

414	Item No 414:- Fixed Type Capacitor Supplying and erecting 525 V 3 phase, 50 Hz., APP type capacitor having minimum overcurrent capacity of 1.8 In, peak inrush current capacity 300 In and minimum life 150000 hours kVAR bank of all polypropylene condensers (APP) with the standard capacities of 2, 3, 5, 7, 10, 12.5 and 15 kVAR units of P.F. correction for operation on 3 phase 50 Hz. with externally discharging resistances, earthing terminals and built on angle iron or channel iron frame work and provided with terminal cover box complete erected on provided iron bracket or on floor duly tested by licensee.	As directed by Engineer Incharge	50.00	591.00	KVAR	29550.00	INR Twenty Nine Thousand Five Hundred & Fifty Only
415	Item No 415:- ELECTRIFICATION i) Point wiring in PVC trunking (casing-capping) with 1.5 sq.mm (2+1E) FRLSH grade copper wire, flush type switch, earthing and required accessories as per specification No: WGPW/ SW	As directed by Engineer Incharge	12.00	365.00	points	4380.00	INR Four Thousand Three Hundred & Eighty Only
416	Item No 416:- ii) Point wiring for independent plug in PVC trunking (casingcapping) with 1.5 sq.mm FRLSH grade copper wire, flush type switch, earthing and required accessories as per specification No: WG-PW/SW	As directed by Engineer Incharge	12.00	434.00	points	5208.00	INR Five Thousand Two Hundred & Eight Only

417	Item No 417:- iii) Wiring for plug on board with Switch socket, copper wiring and earthing as per specification No: WG-PW/SW	As directed by Engineer Incharge	12.00	116.00	points	1392.00	INR One Thousand Three Hundred & Ninety Two Only
418	Item No 418:- iv) Supplying & erecting mains with 3x2.5 sq.mm FRLHS copper PVC insulated wire laid in provided conduit/trunking/inside pole/Bus bars or any other places as per specification No: WGMA/ BW	As directed by Engineer Incharge	240.00	93.00	Mtr	22320.00	INR Twenty Two Thousand Three Hundred & Twenty Only
419	Item No 419:- v) Supplying & erecting inverter LED batten 20W tube light fitting with polycarbonate housing, heat sink, integrated HF electronic driver, Min. 2600 mAh Lithium ion Battery with charging time of 8-10 Hours and backup time of Min. 3 hrs. with minimum 25% of initial Watts having luminous efficacy of 100 lumen/watt, CRI>80, CCT of 6500K and THD<=20% having useful life of minimum 25000 hrs. with overheating protection with 2 years warranty.	As directed by Engineer Incharge	12.00	1114.00	Each	13368.00	INR Thirteen Thousand Three Hundred & Sixty Eight Only
420	Item No 420:- vi) Supplying and erecting integrated LED street light fitting 70-75W IP65 & IK08 class having single piece pressure die-cast aluminium housing, having system lumens output of Min. 7700 Lumens, min. efficacy of 110 lumen/W, CRI>70, CCT upto 6500K, THD<10%, p.f.	As directed by Engineer Incharge	6.00	5945.00	Each	35670.00	INR Thirty Five Thousand Six Hundred & Seventy Only

	>0.95, operating range of 140-270V, inbuilt surge protection of 10 kV, Life class of 50,000 Hrs. at L70B50, including driver complete with 3 Years warranty as per specification No FG-ODF/FLS2.						
421	Item No 421:- vii) Supplying and erecting street light Wall bracket made from 40 mm. dia 'B' class G.I. pipe 1.2 m in total length complete as per specification no. FG-BKT/WB	As directed by Engineer Incharge	6.00	736.00	Each	4416.00	INR Four Thousand Four Hundred & Sixteen Only
422	Item No 422:- viii)Supplying & erecting water tight terminal box of 1.6 mm (16 gauge) CRCA sheet of size 150 x 100 x 100 mm complete on pole as per specification no. CB-SB	As directed by Engineer Incharge	6.00	325.00	Each	1950.00	INR One Thousand Nine Hundred & Fifty Only
423	Item No 423:- ix)FRP box of size 150mm x 125mm x 100 mm, 2.7 mm thick complete on pole as per specification No. CB-SB	As directed by Engineer Incharge	6.00	496.00	Each	2976.00	INR Two Thousand Nine Hundred & Seventy Six Only
424	Item No 424:- Half Round RCC Hume Pipe Supplying & laying (including excavation) half round reinforced cement concrete pipe of IS 458:2003 NP-2 class of 150 mm internal diameter in proper line, level and slope including providing and fixing collars in cement mortar 1:2 and curing etc. complete.	As directed by Engineer Incharge	180.00	508.00	Mtr	91440.00	INR Ninety One Thousand Four Hundred & Forty Only

425	<p>Item No 425:- Automation a)Ultrasonic level transmitter Designing, Supplying, Installing, commissioning & testing of Ultrasonic Raddar type level transmitter CE marked with following technical parameters at Raw Water Pump House and Interfacing with PLC panel including mounting arrangement Output-4-20 mA, Power supply - 24V DC ext, Display - 4" LED, Range- 0 to 10 mtrs, Accuracy - +/- 0.25% of Full Scale or better, Enclosure- IP 68, Mounting - On PLC panel</p>	As directed by Engineer Incharge	6.00	65085.00	Nos	390510.00	INR Three Lakh Ninety Thousand Five Hundred & Ten Only
426	<p>Item No 426:- b) Pressure Transmitter Designing, Supplying, Installing, commissioning & testing of Power Analyser interfacing to PLC Panel with modbus communicatuion port , as per IEC 62053 and in the prescribed format including mounting arrangement. Output-4-20 mA Power supply - 24V DC ext. Display - 4" LED Accuracy - +1- 0.1 % of full scale or better Enclosure- IP 68</p>	As directed by Engineer Incharge	16.00	36634.00	Nos	586144.00	INR Five Lakh Eighty Six Thousand One Hundred & Forty Four Only

427	Item No 427:-c)Power Analyser Designing, Supplying, Installing, commissioning & testing of Power Analyser interfacing to PLC Panel with modbus communicatuion port , as per IEC 62053 and in the prescribed format including mounting arrangement.	As directed by Engineer Incharge	6.00	33133.00	Nos	198798.00	INR One Lakh Ninety Eight Thousand Seven Hundred & Ninety Eight Only
428	Item No 428:- d) PLC panel for Pure Water pump House with Two Pumps Design, manufacture, supply, installation, testing and commissioning of indoor type PLC panel of size approx. 1000 mm X 700 mm X 1500mm (LBH), fabricated out of min. 2 mm thick CRCA sheet powder coated to Siemens gray color. The Panel shall be provided with reputed make PLC with following accessories as well as input output configuration. The PLC shall be programmed with IEC 61131 standards for control, monitoring and communication of equipments & instruments at Raw water Pumphouse PLC shall have Ethernet port & protocol for Modbus TCP communication with following IO DI -32 num DO - 16 num AI -16 num AO - 4 num. 7 inch color TFT HMI complete with programming shall be provided to	As directed by Engineer Incharge	5.00	163300.00	No	816500.00	INR Eight Lakh Sixteen Thousand Five Hundred Only

	<p>interact with PLC The panel shall include all the accessories (not limited to following) to achieve purpose of smooth & trouble free operation of pump house</p> <p>MCB 10A DP – 1 num MCB 4A DP – 4 num 24 VDC Power Supply 10A – 1 num Push Buttons – 7 num Selector Switch - 2 num Control Contactor – 2 num Annunciator with 6 Windows NO to NC Type Electronic Hooter – 1 num Control Transformer – 1 num Emergency PB – 1 num Panel Cooling Fan – 1 num Panel Light with Door Switch – 1 num Control Indication Lamp – 5 num Wiring + TB etc – 1 lot Hardware – 1 lot PLC panel for Pure Water pump House with Six Pumps</p>						
429	<p>Item No 429:- PLC panel for Pure Water pump House with Two Pumps Design, manufacture, supply, installation, testing and commissioning of indoor type PLC panel of size approx. 1000 mm X 700 mm X 1500mm (LBH), fabricated out of min. 2 mm thick CRCA sheet powder coated to Siemens gray color. The Panel shall be provided with reputed make PLC with following accessories as well as</p>	As directed by Engineer Incharge	1.00	271700.00	No	271700.00	INR Two Lakh Seventy One Thousand Seven Hundred Only

<p>input output configuration. The PLC shall be programmed with IEC 61131 standards for control, monitoring and communication of equipments & instruments at Raw water Pumphouse PLC shall have Ethernet port & protocol for Modbus TCP communication with following IO</p> <p>DI -32 num DO - 16 num AI -16 num AO - 4 num.</p> <p>7 inch color TFT HMI complete with programming shall be provided to interact with PLC The panel shall include all the accessories (not limited to following) to achieve purpose of smooth & trouble free operation of pump house</p> <p>MCB 10A DP - 1 num MCB 4A DP - 4 num 24 VDC Power Supply 10A - 1 num Push Buttons - 7 num Selector Switch - 2 num Control Contactor - 2 num Annunciator with 6 Windows NO to NC Type Electronic Hooter - 1 num Control Transformer - 1 num Emergency PB - 1 num Panel Cooling Fan - 1 num Panel Light with Door Switch - 1 num Control Indication Lamp - 5 num Wiring + TB etc - 1 lot Hardware - 1 lot</p>						
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	PLC panel for Pure Water pump House with Six Pumps						
430	Item No 430:- e) Power Cable Designing, Supplying, Installing, commissioning & testing with Terminating & Interfacing of 2 C x 1.5 sq.mm as per IS 694 twisted shielded copper armoured conductor on wall in GI tray or in ground suitable for supplied D. C. Voltage	As directed by Engineer Incharge	350.00	110.00	Mtr	38500.00	INR Thirty Eight Thousand Five Hundred Only
431	Item No 431:- f) Communication Cable Designing, Supplying, Installing, commissioning & testing with Terminating & Interfacing of CAT 6 as per ISO/IEC-11801 std.cable for networking on wall in GI tray or on ground etc.	As directed by Engineer Incharge	350.00	126.00	Mtr	44100.00	INR Forty Four Thousand One Hundred Only
432	Item No 432:- g) Signal Cable Designing, Supplying, Installing, commissioning & testing with Terminating & Interfacing of 1.0 sq.mm as per IS 694 copper shielded, twisted,multi stranded armoured cable on wall in GI tray or on ground. 2 Pair x 1 Sqmm	As directed by Engineer Incharge	400.00	199.00	Mtr	79600.00	INR Seventy Nine Thousand Six Hundred Only
433	Item No 433:- Designing, Supplying, Installing, commissioning & testing with Terminating & Interfacing of 1.0 sq.mm as per IS 694 copper shielded, twisted,multi stranded armoured cable on wall in GI tray or	As directed by Engineer Incharge	400.00	253.00	Mtr	101200.00	INR One Lakh One Thousand Two Hundred Only

	on 3 Pair X 1 Sqmm	ground.					
434	Item No 434:- Designing, Supplying, Installing, commissioning & testing with Terminating & Interfacing of 1.0 sq.mm as per IS 694 copper shielded, twisted,multi stranded armoured cable on wall in GI tray or on 4.5 Pair X 1 Sqmm	As directed by Engineer Incharge	400.00	372.00	Mtr	148800.00	INR One Lakh Forty Eight Thousand Eight Hundred Only
435	Item No 435:- Designing, Supplying, Installing, commissioning & testing with Terminating & Interfacing of 1.0 sq.mm as per IS 694 copper shielded, twisted,multi stranded armoured cable on wall in GI tray or on 8 Pair X 1 Sqmm	As directed by Engineer Incharge	400.00	665.00	Mtr	266000.00	INR Two Lakh Sixty Six Thousand Only
436	Item No 436:- h) Scada system for Pure Water pump House Design, manufacture, supply, installation, testing and commissioning of SCADA System for pump house. Windows based PC with latest configuration & OS complete with necessary office & antivirus softwares. PC configuration shall not be less than Intel i5 10th Gen CPU, 16 GB Ram, 128 GB SDD, 500 GB HDD, DVD RW, Rs232 & Rs485 port, 2 RJ45 ports, Keyboard, Optical Mouse, 32 inch color TFT Monitor, Latest Windows	As directed by Engineer Incharge	6.00	273000.00	Nos	1638000.00	INR Sixteen Lakh Thirty Eight Thousand Only

	<p>Pro OS, Microsoft Office & Antivirus & Internet Security software for 3 years license. SCADA Software of reputed company with developer & runtime license with minimum 256 number of Tags with following features & functions</p> <ol style="list-style-type: none"> 1. Supervise real-time data in the form of graphical presentation 2. Control pumping processes locally or through Remote locations 3. Dynamic process Graphic, It should resemble the process mimic. SCADA should have good library of symbols so that develop the mimic as per required. When operator sees the screen he should know what's going in plant 4. Alarm summery & Alarm history, SCADA system must be able to detect, display, and log alarms and events. When there are problems the SCADA system must notify the operators to take corrective action. 5. Acquire real-time data as well as logs data with Real time trend & Historical time trend. 6. Web Connectivity, Real-time displays can be accessed on remotely attached PCs and notebooks using internet. SCADA Programming shall be done so as operator can visualize and control complete pump house operation from operator desk. All important alarms & events shall be logged. All the data from field 					
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	instruments & equipments shall be logged. There shall be provision to take reports in required formats of real time & historical data, events & alarms. There shall be provision of broadcasting messages, emails of reporting information. There shall be provision of access security. An Industrial grade Din rail mounting ethernet switch with 5 ports shall be provided. An Industrial grade modem with 4G/5G GSM connectivity shall be provided.						
437	Item No 437:- i) UPS system Supplying & erecting on line UPS pure sine wave of 2 kVA capacity complete with standard features, along with necessary SMF batteries for 30 mins battery backup, as per specification no. AP-UPS	As directed by Engineer Incharge	6.00	48983.00	Nos	293898.00	INR Two Lakh Ninety Three Thousand Eight Hundred & Ninety Eight Only
438	Item No 438:- Cable Tray Providing & erecting hot dipped galvanised ladder type cable tray manufactured from 16 SWG (1.6 mm thick) GI sheet of 150 mm width & 75 mm height complete with necessary coupler plates & hardware.	As directed by Engineer Incharge	300.00	614.00	Mtr	184200.00	INR One Lakh Eighty Four Thousand Two Hundred Only

439	Item No 439:- Cable Tray Cover Providing & erecting Hot dipped galvanized cover suitable for perforated type cable tray manufactured from 18 swg (1.2 mm thick) GI sheet of 150 mm width & 20 mm height complete with necessary hardware in approved manner.	As directed by Engineer Incharge	300.00	369.00	Mtr	110700.00	INR One Lakh Ten Thousand Seven Hundred Only
440	Item No 440:- Copper Plate Earthing Providing making separate Earthing arrangement for SCADA & Automation system with copper Earth Pit & Copper Earth Plate etc. complete Providing earthing with copper earth plate size 60 x 60 x 0.315 cm with funnel with a wire mesh for watering and brick masonry block C.I. cover with minimum 25 kg Carbon based environment friendly back fill Ground Enhancing compound complete with all materials, testing & recording the results as per specification no ESE – LA	As directed by Engineer Incharge	6.00	15734.00	Nos	94404.00	INR Ninety Four Thousand Four Hundred & Four Only

441	Item No 441:- Designing, supplying, installing, commissioning & testing of CCTV IR water proof camera suitable for upto 100ft. with control key board, DVR, Hard Disk,cables, UPT transreceivers etc. complete with not less than following specifications. 1. Four numbers of IP Camera with night vision functionality 2. Eight Channel DVR with metal body construction, having software features of motion detect recording. 3. 3.5 inch 2 GB HDD 4. 8 port POE Switch 5. 32 inch LED Screen, Keyboard & mouse	As directed by Engineer Incharge	11.00	56000.00	Nos	616000.00	INR Six Lakh Sixteen Thousand Only
442	Item No 442:- o) Other Accessories Operator work station with Furniture Desk, Storage Cupboards,modem for fax and internet,A4 Size printer,Chairs etc comple.	As directed by Engineer Incharge	6.00	78750.00	Nos	472500.00	INR Four Lakh Seventy Two Thousand Five Hundred Only
						1183631598.00	One Hundred Eighteen Crore Thirty Six Lakh Thirty One Thousand Five Hundred & Ninety Eight Only

GST at the rate of 18% will be paid as per Government GR.

Total -

(Contractors Quoted percentage (+ / -)-

(In Words -----)

Quoted Amount Rs. -

(In Words -----)

Signature of Tenderer

No. of Corrections

Signature Executive Engineer

Signature Add. City Engineer

Signature City Engineer

ANNEXURE-1**INFORMATION ABOUT WORK IN HAND**

(To be supported with certificate signed by concerned Superintending Engineer/City Engineer) in case Col. 8 shows the cost of completed work as more than 80%)

Sr. No .	Name of Works	Name of Division /MC	Accepted Tender Cost.	Cost of supply of pipes	Balance cost (4-5)	Cost of work completed as on <hr/> (Excluding supply of pipe)	Proportion of Col.7 to Col.6 %	Reason for delay (if any) for completion of balance work.
1	2	3	4	5	6	7	8	9

Contractor

No. of correction

City Engineer

ANNEXURE-2**DETAILS OF MACHINERY AVAILABLE WITH THE TENDERER
FOR THE USE ON THIS WORK**

Sr.No	Name of Equipment	No. of unit	Name of Make	Capacity	Age and Condition	Remark

Contractor

No. of correction

City Engineer

ANNEXURE-3

FORM OF BANK GUARANTEE
BANK GUARANTEE
(Security for Performance)

In consideration of the City Engineer/ Commissioner (hereinafter called "Navi Mumbai Municipal Corporation" (NMMC) having agreed to exempt hereafter called "The said contractor") from the demand, under the terms and conditions of an Agreement dated (hereafter called "the said Agreement") made between the Commissioner NMMC and the said contractor for the Security Deposit for the due fulfillment by the said contractor of the terms and conditions contained in the said Agreement, on production of the Bank Guarantee for Rs _____ (In words Rs _____) we, (herein after referred to as "the Bank" at the request of the said contractor do hereby undertake to pay to the MC an amount not exceeding the above said amount of Guarantee against any loss or damage caused to or would be caused to or suffered by the NMMC by reason of any breach by the said contractor or any of the terms or conditions.

2. We, _____ do hereby undertake to pay the amounts due and payable under this Guarantee without any demur, in hereby on a demand from the NMMC stating that the amount claimed is due by way of loss or damage caused to or would be to or suffered by the NMMC by reason of breach of the said contractor of any of the terms or condition contained in the said agreement or any reason of the contractors failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this Guarantee shall be restricted to an amount not exceeding the above said amount Guarantee.

3. WE undertake to pay to the NMMC any money so demanded notwithstanding any dispute or disputes raised by the Contractor in any suit or proceeding pending before any court or Tribunal relating there to our liability under this present being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the contractor shall have no claim against us

for making such payment

4. We further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continued to be enforceable till all the dues of the NMMC under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged till NMMC certified that the terms and conditions of the said Agreement have been duly and properly carried out by the said contractor and accordingly discharges this guarantee unless a demand or claim under this guarantee is made on us in writing on or before we shall be discharged from all liability under this guarantee thereafter.

5. We _____ further agree with the NMMC that the NMMC shall have the fullest liberty without our consent and without affecting in any manner our obligations here under to varyany of the terms and conditions of the said Agreement or to extend time of performance by the said contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the NMMC against the said contractor and to forbear or enforce any of the terms and conditions relating to the said Agreement, and we shall not be relieved from any liability by reason of any such variation, or extension being granted to the said contractor, or for any forbearance act or omission on the part of the NMMC any indulgence by the NMMC to the said contractor or by any such matter or thing whatsoever whichunder the law to sureties would, but for this provisions, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or of the Contractor.

7. We, lastly undertake not revoke this guarantee during its currency except with the previous consent of the NMMC in writing.

Dated the _____ *day of* _____ **2022-23**

For _____
(Indicate the name of the Bank)

Note: However, these forms will be as per the current practices of NMMC and Banks.

ANNEXURE-4

UNDERTAKING FOR GUARANTEE

I/We Guarantee that :

- 1 I/We will replace repair and adjust free of all charges to the employer any part of the work which fails to comply with the Specifications or amendment to such specifications as refereed to in our specifications attached to tender, fair were and tear except until the completion and for a period mentioned under clause 20 from the date or completion of contract.
- 2 All the work will be reliable.
- 3 All the work will be of a type which has been proved in service to be suitable for the duty required by the specifications and will be manufactured and tested in accordance with the appropriate standard specifications approved by the Engineer-in-charge.
- 4 I/We accept the abide by the clause relating to quality and guarantee of work.

DATE :

CONTRACTOR

ANNEXURE-5

DECLARATION BY CONTRACTOR

Contractor

No. of correction

City Engineer

**NAVI MUMBAI MUNICIPAL CORPORATION
CITY ENGINEER DEPARTMENT**

Name of work :- 24 X 7 WATER SUPPLY SCHEME OF BELAPUR WARD NAVI MUMBAI UNDER AMRUT-2.0 MISSION

DECLARATION

I hereby declare that I have made myself thoroughly conversant with the local conditions regarding all materials such as stones, murum, sand, availability of water etc. and labour on which I have based my rates for this work. The specifications and requirements of lead for this work have been carefully studied and understood by me before submitting the tender. I undertake to use only the best materials, to be approved by the City Engineer/Commissioner of the work or his duly authorized representative, before starting the work and also to abide by his decision.

I hereby undertake to pay the labours engaged on the work as per Minimum Wages Act 1984 applicable to the zone concerned.

Contractor's Signature

Annexure-VII

Details of audited turnover executed by the contractor in last five years and existing commitment of ongoing work.

Sr. No	Name of Works	Name of Division /MC	Accepted Tender Cost.	Amount of work completed					Amount of balance work	Remark
				2017-18	2018-19	2019-20	2020-21	2021-22		

(in Rs. Cr.)

Abstract for BID Capacity Calculation

Details of audited turnover executed by the contractor in last five years and existing commitment of ongoing work.

Year	Max. value of engineering works executed in the year	Maximum value of engineering works executed by the the contractor in any one year, during the last five years		Remarks
		Value	Year	
1	2	3	4	5
2017-18		Write the max value here	Write concerned year here	
2018-19				
2019-20				
2020-21				
2021-22				

(Rs. In Crore)

Contractor

No. of correction

City Engineer

<u>Year</u>	Value of existing commitment of ongoing work to be completed during next N years	Total value of existing commitment of ongoing work to be completed during next N years. (B)
1	2	3
2022-23		
2023-24		
2024-25		

Average of engineering works of a maximum value executed in any three years during last five years upgrade to present year (i.e. Tender submission year) by increasing the cost as per rise in wholesale price index between the year of maximum value and month and year of tender submission (A) =.....

No. of year prescribed for completion of work for which present tender are invited (N) =

Total value of existing commitment of ongoing work to be completed during next N years (B) =

Note :-

- Since all the data is pertaining to the contractors own performance, the contractors are requested to provide its bidding capacity for this work by furnishing the calculations and supporting documents duly certified by chartered accountant to prove its contentions
- Ongoing works and works were contractor is lowest and for which letter intent has been issue to the contractor shall be considered in the calculation of value of existing commitment and ongoing works. (B)
- The statement showing the value of existing commitments of ongoing works during next N years for each of works in the list should be counter signed by Engineer-in-charge not below the rank of City Engineer or equivalent officer or head of any other Govt/semi Govt. organization.
- Submission of false information results in blacklisting of the contracting agency.
- Bidder shall submit the affidavit as per the format provided in the Annexure 14.
- Bidder shall submit the self declaration as per the format provided in

Annexure 15.

- Annual turnovers and Bid capacity calculations shall submitted in contractors letter head with signature of contractor. Same shall be submitted due verified certification of the Chartered Accountant.
- If support documents are not found uploaded, bid capacity will not be taken into account which will result in disqualification for this tender .

ANNEXURE-8

BAR CHART

Sr. No.	Name Of Subwork	Month																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Contractor

No. of correction

City Engineer

ANNEXURE-XIII

SELF DECLARATION

Iage.....years occupation business
 residing at
do hereby state on oath as under :-

That I am proprietor / Director / Partner / Power of Attorney Holder of the company name
 and style as M/s.....having its address at

That I further say that M/s ----- is **not black listed** by any
 Government / Semi Government Organization / any Local Bodies and any other Private
 Bodies.

Whatever information of documents submitted for registration are true and correct as per my
 knowledge. I take full responsibility regarding genuineness of documents submitted by me.

Date :-

Place :-

Signature of Contractor

Annexure - XIV

Name of work :-

Date :-

Draft Affidavit Regarding**The work in hand & work where bids have been submitted**

I / We hereby declare that, I / We have bidden for for the work of _____ and at the date of bided in the below given Table – I (A). The following works amounting to Rs. _____ Crores are the balance works. Which are yet to be executed by my / our firm.

Table I (A) During th next _____ Years

Sr. No.	Description of works	Place & State	Contract No. & Date of W.O.	Name & Address of Department	Accepted Tender Cost Rs. (In Lakhs)	Sanction date of Completion
1	2	3	4	5	6	7
Ongoing works						

Details of ongoing works			Value of works remaining to be completed (Rs. In Lakhs)	Reasons for delay
Expenditure	Expected progress in % & Amount	Actual progress % & Amount		
8	9	10	11	12
To be certified by CA.				

Similarly in the works mentioned in the table 1 (b) , my / our firm is lowest and the tender Iis approved and work order is yet to issued. The cost of such work in is Rs. _____ cr.

Contractor

No. of correction

City Engineer

Table 1 (B)

Sr. No.	Description of works	Place & State	Contract No. & Date of W.O.	Name & Address of Department	Accepted Tender Cost Rs. (In Lakhs)	Sanction date of Completion
1	2	3	4	5	6	7
Tender where bidder is lowest and tender is approved, work order to be issued.						

Details of ongoing works			Value of works remaining to be completed (Rs. In Lakhs)	Reasons for delay
Expenditure	Expected progress in % & Amount	Actual progress % & Amount		
8	9	10	11	12
To be certified by CA.				

I / We here by declare that, the above given information is true as on _____the day of month____year____. No any information is false and misleading, I have not abandond any work or action under clause 3 (c) is not executed against me / our firm. I am not black listed for any of the work.

If information is above table is found to be false or in complete or the department finds that any information is hidden by me / our firm, the department will have all the liability to debar my firm from this binding or any further binding and department can black listed my / our firm for the period as it may find suitable for such action.

Date : -	Signature
Place :-	Name of the firm

Annexure - XV**Self Declaration**

- All the information provide in the forms, statements and attachments submitted in proof of the qualification requirements are correct. No any misleading or false information provided.
- I have not abandoned the works and I have properly completed all the contractor in time.
- I have / have not participated in the previous biddings for the same work and had/ had not quoted unreasonably high bid prices and could not furnish rational justification
- The details of litigation history is as below.

Name of Other party(s)	Cause of dispute	Litigation where (Court/arbitration)	Amount involved
------------------------	------------------	--------------------------------------	-----------------

- I am not financially failed.

GENERAL SPECIFICATION

GS-1

- 1) All the materials used in the work shall be of best quality and the material rejected shall be removed from the site by the contractor within 36 hours in the presence of the Engineer in charge at his own cost.
- 2) All other rules regarding workmen compensations etc will be binding on the contractor.

Unwanted persons shall be dispensed with if called upon by the Engineer in charge.

- 3) Other unforeseen items to be executed in course of work will have to be done by the contractor as per specifications, in P.W.D. Hand book volume I and II (Latest Edition) I.S. code of practice and as per standard specifications book of latest edition.
- 4) The contractor shall be responsible and liable to pay for the damages caused by him to public property etc.
- 5) All T and P machinery shall be provided by the contractor. Non availability of the same shall not be an excuse for application for extension of time limit.
- 6) Water of good quality for labour, construction, washing and such other purposes shall be provided by the contractor without any claim for extra cost.
- 7) Materials belonging to contractor if not removed from site of works after completion of the work within a period of 15 days shall be taken over by Maharashtra Jeevan Pradhikaran department at contractors risk and cost and then shall be auctioned at the contractors risk and cost. The amount so recover shall be credited to contractors account after recovery of any dues or over payments etc.
- 8) The final bill and deposits will not be paid unless the site is cleared off all rubbish materials and contractors stores etc from the site of the work.
- 9) The contractor will have to pay the royalties and municipal taxes, if charged by the Maharashtra Jeevan Pradhikaran. The same will not be refunded.
- 10) Specifications given for relevant nature and type of work, for any particular item of the tender shall also be applicable to the other item of work when

similar work is repeated or carried out in part or full although the item numbers may not have been mentioned especially against the particular specifications.

- 11) The contractor shall be responsible for obtaining permission from Government local bodies, private party for storing, stacking of materials required for execution of work.
- 12) Necessary sign board, danger flags, red lamps shall be provided by the contractor to avoid accidents. Necessary guarding will also have to be provided.
- 13) Before entering any land, the contractor shall make independent enquiry regarding ownership of land. Any action regarding trespassing will be at the risk of contractor.
- 14) Materials remaining unsold or unserviceable as per discretion of the City Engineer shall be confiscated destroyed or disposed off without any compensation to the contractor, who will be responsible for all legal disputes at his own cost and consequences without reference to the department.
- 15) In case of legal disputes for materials brought and stores at site without permission of the City Engineer, the contractor will be responsible for all legal disputes at his own cost and consequences without reference to the department.

GS 2: SPECIFICATION OF WORK :

The work shall be carried out as per practices and procedures laid down in P.W.D. Hand book Volume - I & II Latest Edition and Public Works Department's standard specifications (Latest Publication of Government of Maharashtra) with amendments from time to time and as per I. S. applicable for respective items of works, as directed by the Engineer in charge.

GS 3: MOTIVE POWER :

No electric power supply shall be entered by the NMMC during construction and testing of various structures under different sub-works. The contractor shall have to make his own arrangement for the same at his cost. During trial period of the plant, power supply shall be made available by the department. The firm should inform within one month from the date of receipt of work order, the total electrical load required for successful operation of the treatment plant. This electrical load shall also include lighting load for inside and outside light points etc.

attached to the buildings in proper as well as premises of the plant.

GS 4: FOUNDATION CONDITIONS AND PRESCRIBED BEARING CAPACITIES

The tenderer shall acquaint himself for results of S.B.C. by taking actual trial pits on site and refilling them afterwards at his cost. The foundation depth shall be considered as minimum 3.00 m below G.L. for the construction of BPT, MBR & E.S.R.. The bearing capacities of the actual strata met with the foundation levels shall wherever be required got tested from reputed institution, at contractors cost and in the presence of Engineer-in-charge. Detailed design shall be prepared and submitted by the contractor and got approved from the department after actual confirmation of S.B.C.

GS 5: WATER TIGHTNESS TEST

All the water retaining and carrying structures will have to be tested for their water tightness by filling them with water up to their designed F.S.L. Similarly the pipe line will have to be tested hydraulically. Structures will be considered water tight when the reductions in filled up level is not more than 6 mm in 48 hours with outer surface dry. As regards pipe line, they should hold pressure as directed by Engineer in charge without reduction for thirty minutes. The contractor will have to give all such hydraulic tests by making his own arrangements for water supply, filling and disposing off water after the test. He shall repeat this test if necessary until the above results are achieved and certified by the Engineer-in-charge without any claim for extra cost. The contractor shall carry out the rectification of the structures or pipe lines to achieve the above tests at his own cost. The structures and pipe lines shall be kept filled with water upto F.S.L. after the above test are over at his own cost.

GS 6: SATISFACTORY COMPLETION OF VARIOUS ITEMS :

The sub works included in the schedule of works for BPT MBR WTP & ESR on Lump sum basis.

The various items of the sub work are to fit in perfectly in the whole system physically, hydraulically, architecturally and mechanically.

GS 7: DISPOSAL OF EXCAVATED STUFF :

All materials obtained from any excavation carried out under this contract will be the property of Maharashtra Jeevan Pradhikaran and the contractor shall not have any claim on it. It will not be used by the contractor for any other purpose than the legitimate use on the work itself. Stuff still remaining surplus shall be spreaded over the different site of work or disposed off as directed by the Engineer in charge without extra cost.

GS 8: SUBMISSION OF DETAILED DESIGNS AND DRAWINGS AFTER ACCEPTANCE OF TENDER :

For Lump sum job works the contractor shall submit complete detailed designs and drawings within one month from the date of issue of work order for approval to the department. Piecemeal submission of designs and drawings shall not be permitted to commence the actual work at site unless detailed structural designs and working drawing are approved by the department. If called upon, the contractor shall also submit within reasonable time relevant books and other literature which have been referred to by him in working out the design for civil, mechanical or electrical works involved in the construction. Such books and literature will be returned to him. Reason of secrecy in regard to details of designs, materials, equipments etc shall not be placed by the contractor in the name of „TRADE SECRET“ for not furnishing the requisite details called for the Maharashtra Jeevan Pradhikaran. The design get approved from Govt. Engineering College structural consultants approved inlisted in MJP/NMMC shall be subjected to modifications if found necessary and such modification shall not violate the contract. The contractor shall be responsible for the correctness and soundness of the designs submitted by him. The structures shall be as per recognized engineering practices and if any provisions, are found inadequate or faulty, necessary modifications will have to be carried out by him at any stage up to the expiry of guarantee period and no extra payment will be made on the account.

Six copies of all the approved designs and drawings should be furnished by the contractor to the department free of cost.

GS-9: REQUIREMENT OF STRENGTH OF CONCRETE

The contractor shall make field arrangements for testing of all materials for cement concrete i.e. slumps test, compression test etc. The concrete cube moulds 3 Nos. of 15 x 15 x 15 cm size shall be kept during concreting operation. Three cubes shall be prepared from at site during concreting to be used in work for compression test, for each concreting to be used in work for compression test, for each concreting of the structures. One cube shall be tested for test at 7 days age and two at 28 days in Regional Testing Laboratory at Govt. Polytechnic/Engineering college / Vishveshvarayya National Institute of Technology, Nagpur or at any approved laboratory, by Engineer -In-Charge. ALL THE TESTING CHARGES SHALL BE PAID BY CONTRACTOR. The entire responsibility of the testing of materials will be borne by the contractor.

Mixing of concrete shall be done with Concrete Mixers.

- a) The contractor will make his own arrangement for receiving all materials, tools, etc. required for the work.
- b) No extra charges for the carriages of water will be allowed.
- c) The rates for all items are inclusive of all charges such as carting, lifting etc. No extra payment for any lead and lifts will be paid for any item.
- d) The contractor should not be subletted without written permission of the Engineer-In-Charge.
- e) The conditions in the tender notice will be binding on the contractor and the Tender Notice will form a part of agreement.
- f) The material required for carrying out the work for which the tender is offered shall be brought by the tenderer.

GS-10 ORDINARY CONCRETE

Full payment shall be made when 75% of the result are equal and above the specified strength and the remaining 25% of the result are above 75% of specified strength.

Cases failing outside the above limit shall be examined by the Engineer-In-Charge on merits in each case.

- 1) The charges for preliminary design of concrete mix shall be entirely borne by the contractor .
- 2) For grades of concrete M-20 and above where cement is to be used by weighment, the cost of extra cement required to make up under weight bags shall be borne by the contractor.
- 3) For the item of concrete and other items in the agreement where cement is not to be used by weighment the cement bags are received from the manufacturer shall be assumed to contain cement of 50 kg. net weight. The work shall carried out as per this method of reckoning.

TECHNICAL SPECIFICATIONS

DETAILED SPECIFICATION

All material such as sand, metal, rubble, steel, bricks, cement etc. shall be get checked from laboratory of Government Polytechnique or Engineering College. Then it should be allowed to use. Charges for this shall have to be borne by the contractor.

1. EXCAVATION IN ALL SOFT AND HARD STRATA MATERIAL

1.0 GENERAL

The specifications contained in the standard specification volume IInd published by Public Works and Housing Department, Govt. of Maharashtra, Chapter Bd.A shall apply. In addition to above following specification shall apply. In case of any discrepancy between the two the below given specifications shall govern.

1.1 SITE CLEARANCE

The area to be excavated shall be cleared off. All trees and bushes and rubbish and other objectionable materials removed shall be burnt or disposed off as directed by the Engineer-in-Charge. The cost of such clearing shall be deemed to have been included in the rates accepted for different items under excavation.

1.2 DEWATERING

No distinction shall be made as to whether the materials being excavated is dry, moist or wet. The item also includes bailing out of water by manually or pumps to keep the trenches reasonable dry for all further works of lowering, laying, jointing and testing of the pipe line till the completion of the work.

1.3 SHORING AND STRUTTING

The item includes all shoring and strutting that may be required. On no account the width of trenches more than these mentioned here in after shall be measured. If excavation width more than the specified is required for the purpose of keeping machinery, steeping due to loose material or for any other reasons the same shall be at the Contractors cost.

1.4 LIGHTING, BARRICADING AND GUARDING

The items of excavation are including necessary lighting at night at suitable intervals, but not more than 15 meter along the excavated trenches and at all crossing and barricading the same by fencing so as to avoid the accident. Chowkidars shall be employed at place where the trenches cross over any traffic road to caution the vehicles and pedestrians etc. The arrangements shall be maintained till completion of work and at the cost of the Contractor.

1.5 ALIGNMENT AND LEVELS

Before the trenches excavation is commenced, sight rails shall be erected at every 30 meters and at all points of change of direction, gradient and at ends. The excavation work shall be preceded by a detailed survey along the alignment of the main to obtain ground levels at every 30 meters or less distance. Temporary bench mark shall be constructed at every 30 meters distance along the alignment and shall be maintained till the completion of work. All labour and materials required for the survey work of fixing bench mark etc. shall be provided by the Contractor at his own cost. For any mistakes in survey the Contractor is fully responsible. He should not lay the pipes, unless the alignment is thoroughly checked by the Engineer-in-Charge or his authorized representative who is empowered to sign the work order book in token of checking the exact grade and level of the trenches excavation.

Excavation at random places shall not be measured by the Pradhikaran's Engineer. Any non-technical practices during the excavation of the contracted work shall be viewed very seriously by the Pradhikaran and a note to that effect will be recorded against the Contractor in his name.

1.6 DEPTH AND GRADES OF TRENCHES

The trenches shall be excavated to the required grades and depth in all types of strata and on the lines as shown on approved drawings or as directed by the Engineer-in-Charge,. If not so, the payment for the item will not be paid to the Contractor. The depth of excavation and the levels of the pipe inverts shall be checked by means of boning rods of suitable lengths. Additional depths if required to be excavated for pipes, for sockets, collars, specials, joints and for any other working facility and shall not be measured and paid. The minimum cover above the pipe shall be 0.90 m.

The Contractor shall notify the Engineer when the trenches are ready for bedding so that the Engineer can inspect and record the depth. Only on explicit approval by Engineer, the bedding shall be provided by the Contractor. If any public utility i.e. electrical cable, telephone cable, water connections, sewer connections, gutter damage etc. then same will be rectified by contractor at his own cost.

1.7 WIDTH OF TRENCHES

The maximum width of the trenches admissible for payment shall be as under

Sr. No.	Internal dia of pipe	Width of excavation of trenches	Nature of strata
1.	80 mm and below	0.70 M	In soft and hard material
2.	100 mm	0.75 M	In soft and hard material
3.	150 mm	0.75 M	In soft and hard material
4.	200 mm	0.85 M	In soft and hard material
5.	250 mm	0.85 M	In soft and hard material
6.	300 mm	0.90 M	In soft and hard material
7.	350 mm	0.95 M	In soft and hard material
8.	400 mm	1.10 M	In soft and hard material
9.	450 mm	1.15 M	In soft and hard material
10.	500 mm	1.20 M	In soft and hard material
11.	550 mm	1.25 M	In soft and hard material
12.	600 mm	1.25 M	In soft and hard material
13.	700 mm	1.30 M	In soft and hard material
14.	750 mm	1.40 M	In soft and hard material
15.	More than 750 mm	OD + 0.60 M	In soft and hard material

For excavated width whichever is less shall be recorded and paid for. Extra widths for pits at sockets, collars, specials, joints, construction and also for working liabilities shall neither be measured nor paid for. However, excavation required for providing and casting fixity block, thrust blocks, encasing etc. will be measured and paid for under relevant item of excavation. The pits for welding joints will also be paid under relevant item of excavation.

1.8 PRESSING AND CONSOLIDATING OF THE TRENCHES

The bed of the trenches shall be well rammed before laying of the murrum or sand for bedding hollows, if any, shall be filled with murrum duly rammed and watered to required level and grade at cost of the Contractor.

1.9 CLASSIFICATION OF MATERIALS IN TRENCHES

The exact classification of the strata met with during the excavation shall be done by the representative of Engineer-in-Charge and accordingly measurement shall be recorded under different items of excavation provided under Annexure to Clause-38 of tender for the purpose of excess quantity. In case of any, dispute regarding classification of strata, the decision of Engineer-in-Charge shall be final and binding. The strata classifications and its quantity shown are indicative only. The Contractor

therefore, shall carry out his own assessment regarding the strata at different depth along the alignment, before submission of the tender.

**1.10 EXCAVATION BY CHISELLING MECHANICAL MEANS
(In Hard Strata)**

Excavation in hard strata shall be done by chiseling, wedging or line drilling as specified any mechanical all means or ordered by the Engineer. The excavation refers to excavation generally for foundation, wet or dry, in hard rock by chiseling, wedging or line drilling and shall comply with the specifications.

1.11 MODE OF MEASUREMENT AND PAYMENT

The excavation shall be measured in Cubic meters only. Dimensions shall be measured correct to two decimal of meter and quantity shall be calculated to two places of Decimal of Cubic meters. The item mentioned in Schedule-B in which includes disposing excess excavated material remained after refilling will not be paid separately for disposing excavated material.

2. PLAIN/REINFORCED CEMENT CONCRETE

a) PLAIN CEMENT CONCRETE

b) REINFORCED CEMENT CONCRETE

2.1 (a) Proportions of concrete for types of work

- i) M-100 - For leveling course and foundation of chairs and thrust blocks etc
- ii) M-150 PCC with temperature nominal 0.15% reinforcement for footing thrust blocks, anchor blocks, chairs and encasing of pipes etc.
- iii) M-200 PCC for water retaining structure
- iv) M-300 for Construction of Jack well, Pump House & Water Retaining Structure. Such as ESR, WTP, MBR, BPT.
- v) M-250 Pump house and bridges (excluding sub-merged portion)
- b) General specifications of this work shall be as per standard specification of Public Works Department, latest edition, for PCC Bd.- E1 to E-7 and for RCC Bd.F2 to F16.
- c) Whenever concrete is to be laid in trenches, the trench shall be cleaned, and watered before placing. The sub-soil water which is met shall be removed and the trench shall be kept dry during and after 2 hours of placing concrete.
- d) Pedestal pier shall be perpendiculars to center line of pipe.
- e) Proper seat shall be left on top of pedestal pier to construct saddle. Seat shall be strictly done within 24 hours, failing which NMMC will not

accept it for payment

- f) RCC saddle shall be constructed as per detailed drawing. The top of saddle where pipe rests shall be provided with wearing plate fixed in CM 1.3 smoothly and CM grouting may be done after pipe is placed and no extra payment will be made for this.

2.2 MODE OF MEASUREMENT AND PAYMENT.

The tender rate shall be for one cubic meter of concrete. The concrete shall be measured for its length, breadth and depth limiting dimensions to those specified in drawing or as per direction of Engineer-in-Charge.

The damages to concrete during laying of pipe line shall be rectified free of cost. The rate for the concrete includes all labour, material centering shuttering securing etc. all leads and lifts.

Mixing of concrete shall be done with concrete mixer.

For providing Electric wiring duct tubes of the required diameter and length shall be provided through walls beams and floors, slabs as and when directed without any extra cost.

- a) The contractor will make his own arrangement for receiving all material tools etc. required for the work.
 - b) No extra charges for the carriages of water will be allowed.
 - c) The rates for all items are inclusive of all charges such as carting, lifting, etc. No extra payment for any lead and lifts will be paid for any item.
 - d) The contractor should not be Sublette without written permission of the Engineer-in-Charge
- a. The conditions in the tender notice will be binding on the contractor and the Tender Notice will form a part of agreement.

Cement cubes of size 15 cm x 15 cm x 15 cm are taken during the concreting of important structure like RCC well, water treatment plant, elevated service reservoirs, bridge etc. to check the strength of the concrete and its acceptability it is observed that while taking cubes the requirement specified in the relevant Indian Standard specification are not observed properly and cubes are not cast in the required numbers. Due to this the acceptability of the concrete can not be decided correctly. Similarly, proper care is also not taken for curing of the cubes the requirements specified in the ISS in respect of casting of concrete cubes and curing thereof, with acceptability criteria of concrete are reproduced below, which shall be following scrupulously.

2.3 FREQUENCY OF SAMPLING (IS:456:2000 (Clause 15.2)

- a) Number of samples to be taken during concreting based on the quantum of concrete cast shall be as below.

Quantity of concrete in Cum	No. of samples
01 to 05	1
06 to 15	2
16 to 30	3
31 to 50	4
50 and above	4 + 1 for every 50 Cum part thereof

At least one sample shall be taken from each shift of concrete and three test specimens (cubes of size (15 x 15 x 15 cm) shall be cast from each such sample for testing of the compressive strength additional three cubes will also have to be taken for 7 days test.

The test strength of the sample shall be the average the strength of the three specimen.

2.4 ACCEPTANCE CRITERIA (IS:456:2000 Clause 16)

The concrete cost shall be supposed to be acceptable in the compressive strength (i.e. average strength of the three specimen) of the samples fulfill the following requirements.

- a) Every sample has a test strength not less then characteristic value.

OR

- b) The strength of one or more samples, though less the characteristic value is in each case, not less then the greater of following.

- i) The characteristic strength minus 1.35 times the standard deviation.

and

- ii) 0.80 times the characteristics strength.

- c) And the average strength of all the samples is not less than the characteristic strength plus

$$\text{standard} \quad 1.65 * \frac{1.65}{\text{No. of samples}} = \text{times the deviation}$$

- d) However, it should be noted that individual variation should not be

more than the percent of average.

STANDARD DEVIATION VALUES

Grade of Concrete	Assumed Standard deviation in Kg/Cm ²
M-100	35.00
M-200	46.00
M-250	53.00
M-300	80.00

2.5 CURING OF CONCRETE CUBES (IS:516:1959, CLAUSE 3.3)

The test specimen (cubes) shall be stored on the site at place free from vibration, under damp matting, sacks or other similar material for 24 hours + ½ hour from the time of adding the water to the other ingredients. The temperature of the place of storage shall be within the range of 22° to 32°C. After the period of 24 hours, stored in clean water at temperature of 24° to 30°C until those are transported to the testing laboratory. Samples shall be sent to the testing laboratory well packed in damp sand, damp sacks or other suitable material as to arrive there in a damp condition, not less than 24 hours before the time of test.

On arrival at the testing laboratory, the specimen shall be stored in water at a temperature of 27° + 2° C until the time of test. Record of the daily minimum and maximum temperature shall be kept, both during the period specimen remain on the site and in the laboratory.

2.6 TEST PROCEDURE (IS:516:1959 CLAUSE 5.5)

Specimen stored in water shall be tested immediately on removal from water and while those are still in the wet condition. Surface water and grit shall be wiped off the specimens and any projecting fins removed. Specimen, when received dry, shall be kept in water for 24 hours before taken for testing. The dimensions of the specimens to the nearest 0.2 mm and also weight shall be noted before testing.

2.7 OTHER THINGS

Here, it should be specifically noted that age of concrete cube will be age as on the date of testing i.e. time difference between addition of water to dry ingredient and actual testing.

2.8 MIX DESIGN

The following instructions shall be followed as regards preliminary design of mix and methods of batching of plain cement and reinforced cement concrete. These instructions should be treated as supplementary to the relevant provision in the specifications for the respective items contained in the book of standard specification and will be carried the provisions

contained therein, wherever they are contrary to the following instructions.

The preliminary design and batching for various grades of concrete shall be governed by the following guidelines.

No.	Concrete Grade	Guidelines
1	Upto M-150	This should only be ordinary concrete. No change may be prescribed in the present practice as regards preliminary design of mix and permitting volume batching.
2.	M-200 to M-250	Preliminary mix design must be carried out for these mixes. However, weigh batching shall be insisted for cement, fine aggregate and coarse aggregate.
3.	Above M-250	Preliminary mix design must be prepare for such mixes weigh batching should be for cement fine aggregate and coarse aggregate.

For the grades of concrete M-200 and above the preliminary mix design shall be carried out from the approved laboratory. The rate quoted by the contractor in the agreement for these items shall be final and binding on him, irrespective of content of cement required as per preliminary mix design and there shall be no adjustment in the agreement rate for these item on this account.

The charges for preliminary design of concrete mix shall be entirely borne by the contractor.

For grades of concrete M-200 and above where cement is to be used by weightment, the cost of extra cement required to make up the under weight bags shall be borne by the contractor.

For the items of concrete of grades lower than M-200 and other items in the agreement where cement is not to be used by weightment the cement bags as received from the manufacturer and shall be assumed to contain cement of 50 kg net weight.

This shall be as per specification of P.W.D. (Hand Book) and as directed by Engineer-in-charge. Only trap stone shall be used other than the specification for this item in Standard Specification Book.

1. SPECIFICATIONS FOR MILD STEEL AND TOR STEEL REINFORCEMENT FOR RCC WORKS

- 3.1 The item provides for supply of mild steel, tor steel bars, cutting, bending with G.I. wire and placing in position, welding for reinforcement in the RCC.
- 3.2 Mild steel and tor steel bars shall confirm to Specification A-10 of Standard Specification of Public Works Department, Latest Edition.
- 3.3 The binding wire shall confirm to Specification A-15 of Standard Specification of Public Works Department, Latest Edition.
- 3.4 During contractor's supply, if any, the steel bars shall be supplied directly to the site of work.
- 3.5 Bending reinforcement confirm accurately to the dimensions and shapes in the details drawings (approved) or as directed by the Engineer-in-charge.
- 3.6 Bars shall be bend cold only. In no way bending by heat will be allowed.
- 3.7 Bars with kinks, bends or cracks shall not be used.
- 3.8 Details of length, size, laps and bending diagram shall be got approved by the Engineer-in-charge.
- 3.9 As far as possible full length of bars shall be placed as per drawing details. When full lengths are not available, bars be supplies only after written permission of the Engineer-in-charge. Supplies shall be staggered and in tension zone shall be avoided strictly. Bars shall be lapped as specified in IS:456-2000 with due regards to the grade of concrete. Welding may be used for large diameter of bar only after permission of Engineer-in-charge.
- 3.10 Welding, if permitted shall conform to specification B.10.7 of Standard Specification of Public Works Department.
- 3.11 All reinforcement shall be accurately placed in position with spacing and cover shown in detailed drawing and firmly held during the placing and setting of concrete. Bars shall be ties at all intersections. Binding wire of 1.63 mm or 1.22 mm diameter (about 16 or 18 gauge) shall be used. Spacing of the bars shall be maintained by means of stays, blocks ties, spacers, hangers or other approved supports at sufficient close intervals so that bars will not be displaced. During placing vibrating or compacting concrete, placing bars for reinforcement on a layer of fresh concrete as the work progress will not be permitted. The use of pieces of broken stones or bricks or wooden blocks for maintaining spacing or cover shall not be

permitted. Layers of bars shall be separated by precast cement blocks, spacer bars or other devices.

- 3.12 Full details of numbers, sizes, lengths, weights, laps, welds, spacing of bars placed in position in different parts of the work shall be recorded by the contractor and certified and signed by the Engineer-in-charge or his representative to show that all reinforcement has been placed correctly as per sanctioned drawing or as directed by the Engineer-in-charge in writing, before placing concrete. No concrete shall be placed in position until the certified the correctness of reinforcement, recording the steel measurements and has given permission in writing to place concrete. After approval of reinforcement as above, it will be the contractor's responsibility to seal that the spacing of reinforcement and arrangements are not tampered with in any way before or during concreting.
- 3.13 Any steel is required to be procured by Contractor. He shall produce the test certificate. In addition, actual test shall be carried out according to IS:432-1982, in an Government laboratory and the cost of test shall be borne by the contractor, including all transport, etc.
- 3.14 This item includes,....**
- a) Cost of labour, materials, use of tools, plant and tackle and other incidental items to complete the work satisfactorily.
 - b) Supplying, conveying, cleaning, cutting, bending, binding with (1.63 mm or 1.22 mm diameter - 16 to 18 gauge) wire on spot, welding and placing reinforcement in position and maintaining it clean and in position till the concrete is laid.
 - c) Cost of sampling and testing, as required.
- 3.15 In no case, any foreign material e.g. oil, grease, etc. which prevent bonding between steel and concrete shall remain on steel on steel bars during placing of concrete.

3.16 MODE OF MEASUREMENT AND PAYMENT

The tender rate shall be on weight basis for MT of MS/tor steel reinforcement. The weight of steel reinforcement used for the item of concrete will be measured in tonnes based on total compacted weight for the sizes and lengths of bars as shown in drawing or as directed by Engineer-in-charge.

- 3.16.1 The lengths of the bars shall be measured correct to 2 places of decimals of meters. The weights for payments shall be calculated according to standard weights mentioned in the ISI Hand Book correct upto 0.10 Kg.

4. BURNT BRICK MASONRY SECOND CLASS

4.1 GENERAL

This specification lays down the requirements for B.B. Masonry 1st class in cement mortar of specified proportion required for various structures, including necessary scaffolding, watering etc. The specifications shall conform to IS:2212-1991 its latest revision.

4.2 MATERIALS

BRICKS : Bricks shall be first class and shall conform IS:1077-1992.

4.3 MORTAR

The quantity of mortar to be used per Cum of B.B. masonry shall be about 30 to 32% or 300 to 320 liters for conventional bricks and 32 to 33% or 320 to 330 liters for ISI bricks. The proportion of mortar shall be as specified in the item of the tender.

Mode of Measurement :

The contract rate shall be for a unit of one cubic meter of Masonry. The concrete shall be measured for its length, breadth and depth limiting dimensions to those specified on the plan or as directed by Engineer-in-Charge. No deduction shall be made for reinforcement in concrete in RCC work. Individual dimension shall be measured in Cum. And quantities shall be worked out correct upto three places of decimal of a cubic meter.

4.4 CONSTRUCTION

JOINTS : Joints shall not exceed 12 mm (about ½") in thickness and shall be uniform throughout.

All other specifications of KB-1 for B.B. masonry first class shall apply to this class of masonry also.

4.5 HALF BRICK MASONRY

The half brick masonry shall be in cement mortar specified in the item but not weaker than 1:4.

Mode of measurement : Per Sq,mt.

The half brick masonry shall be reinforced by 2 No. of 6 mm dia M.S. longitudinal bars or 2 No. of hoop item strips of 25 x 1.6 mm size, at even

third course properly bent and bounded in vertical joints of the brick work or to main walls as directed by the Engineer-in-charge, if continuous strip is not available, strips shall be rivet jointed with a minimum overlap of 8 cm. All the bricks shall be laid stretch wise breaking joint with the upper and lower courses. Fixtures, plugs, hold, fasts, frame down, windows shall be based into brick work while laying only and of the correct levels and positions. Holes of required size and stage shall be left in the brick work during laying for fixing pipes or service lines, passage of water etc. After the pipeline work is completed, extra hollow left around the hole shall be plugged with 1:3 cement mortar or 1:3:6 cement concrete. Hold fasts for frames of doors and windows shall be accommodated in the joints of the brick which laying. The joints in the courses where reinforcements is places shall admit of a mortar cover at least 5 mm for the brick work with 15 bricks and not more than 12 mm for conventional brick work. A set of mason's tools shall be maintained on work for each group of 3 masons or less for frequent use and checking. The ends of walls shall be bonded into the side walls where necessary.

The joints shall be raked out to depth not less than the thickness of the joints.

This item shall include :

- a) Providing and fixing mild steel reinforcement bars or hoop iron strips as mentioned above.
- b) Leaving holes for fixtures or pipes and making them good after completion of the work.
- c) Building in frames, hold fasts etc. and forming chassis and grooves.

Mode of measurement

The contract rate shall be for a unit of one Square meter and quantities shall be worked out correct upto three places of decimal of a Sqmt..

5. CEMENT PLASTER : Internal Neeru finish

5.1 GENERAL

This specification lays down the requirement of cement plaster to be applied to concrete or brick masonry surface. In cement mortar of specific proportion and thickness.

5.2 PREPARATION

For masonry all joints in the frame work that is to be plastered shall be raked out to a depth not less than the width of the joints or as directed by the Engineer-in-charge. The raking shall be done taking care not to allow

any chipping of masonry. In new work the raking out shall be done while the mortar in the joints is still green. Smooth surface of concrete or plaster etc. must be suitably roughened to provide necessary bond for the plaster all dirt, soot oil paint or any other materials that might interfere with satisfactory bond shall be removed and surface wetted before plastering is started.

5.2.1 General : The item shall comply with specification B.11.b subject to the additional clauses Bd.L 1.2, Bd.L 1.3, Bd.L 1.4 and the following

5.2.2 Finishing : When no finish is specified the plastered surface shall be rubbed well to an even plane with a wooden float for external surfaces and finished smooth with a steel trowel for internal surfaces.

- When cement finish is specified, coat of pure Portland cement slurry 1.5 mm (1/6") thick shall be applied to the plastered surface while the second coat is still fresh. If neeru finish is specified, then the surface shall be finished as per specification for Item Bd.L-10.

The thickness of the cement plaster shall be 12 mm excluding cement or neeru finish.

5.2.4 Mode of measurement

As per NdL-1.7 on square meter basis

5.3 MATERIALS

Cement mortar shall be prepared from cement and as specified for RCC work and mixed in the proportion specified. Sand shall be screened and washed if called upon to do so. Water proofing compound of directed make in directed quantities shall be added where it is water proof plaster, scaffolding shall be prepared from sound materials and shall be provided, where ever situation demands for facility of proper working.

5.4 GAUGES

Patch of plaster 15 x 15 cm shall be put on about 3 m apart as gauges to ensure even plastering in one place.

5.5 FINISHING

In any continuous face of wall, finishing treatment of any type shall be carried out continuously and day to day breaks made to coincide with architectural breaks in order to avoid unsightly junctions. All mouldings shall be worked true to template and drawn neat, clean and level. All exposed angles, junctions and openings shall be carefully finished.

5.6 WATERING

All pointing work shall be kept damp continuously for a period of 14 days. To prevent excessive evaporation of the sunny and wind ward side of the building in hot, dry weather matting or gunny bags may be hung over on the outside of the plaster in the beginning and kept moist. If the contractor fails to water the work to the satisfaction of the Engineer-in-charge, the requisite labour, materials and equipment to water the work properly shall be engaged departmentally at the cost of the contractor.

5.7 Cost all scaffolding is included in the tender rate.

6. SAND FACED CEMENT PLASTER

6.1 GENERAL

The item shall comply with the specification B.11 in all pertinent particulars. In addition Bd.L.1.2, Bd.L 1.3, Bd.L 1.4 and the following specifications shall also be complied with.

Base Coat : The base coat plaster shall be of cement mortar 1:4. Water proofing compound of approved make like Pudlo, Sika, Accorproof shall be added according to the maker's instruction in Bd.L 2 which a thickness of 15 mm for brick work and concrete surfaces and 20 mm for rubble stone masonry. Keys shall be formed on the surface by thoroughly combing it with wavy horizontal lines about 12 mm apart and about 3 mm deep when the mortar is still plastic.

Sand Faced Treatment : The cement mortar for sand faced plaster shall have washed Kharsalia or Kasaba or similar type of approved sand with slightly larger proportion of coarse material. The proportion of cement to sand shall be 1:4. The water is added gradually to make the mixture homogeneous. The thickness of finishing coat shall not exceed 8 mm. After applications the surface should be finished with a wooden float lined with cork and tapped gently to retain a coarse surface texture. When the finishing coat has hardened the surface shall be kept moist continuously for 14 days.

Item to include relevant portion of Bd.L 1.6. It shall also include the base coat and sand face treatment of above.

Mode of Measurement and payment per Bd.L 1.7 on square meter basis

The specification lays down the requirements of applying sand faced plaster in specified thickness with cement mortar to concrete or masonry surface in

specified coats. This shall conform to specification for ordinary cement plaster where ever it is not irrelevant and in addition following shall also be applicable.

Tools and accessories used in plastering work be thoroughly cleaned before plastering is done.

The programming of other building operations before during and after plastering shall be according to the instructions contained in Clause 4 of IS:1661-1960 or its latest revision. The item shall be executed as per Red book specification BdL-7 to 7.50 page No. 351)

Care shall be taken that other parts of work of adjacent work are not damaged while plastering.

The base coat plaster shall be of cement mortar of specified proportion 1:4 and thickness as mentioned in the item or otherwise, it shall be of cement mortar 1:3 and thickness 15 mm to 20 mm. The base coat shall be laid in a similar manner as stipulated in. However, instead of finishing the top surface smooth keys shall be formed on the surface thoroughly combined in with wavy horizontal lines about 12 mm apart and about 3 mm deep when the mortar is still plastic. The base coat shall be cured for suitable period as per relevant code.

7. DOORS, WINDOWS AND ROLLING SHUTTERS

The specification for this work are as per Standard Specification BD-T-2 and T-7 and as directed by Engineer-in-Charge. (The item shall be executed as per Red book specification)

8. PAINTING WHITE WASH

This item is to be executed as per Standard Specification and as directed by Engineer-in-Charge. (The item shall be executed as per Red book Specification)

9. WATER PROOFCEMENT PAINTING

9.1 GENERAL

This specification lays down the requirement of applying cement based paint in specified coats to concrete or masonry surface.

9.2 MATERIALS

Cement paint with a base of white portland cement of approved manufacture. Colour and shade shall be used. Approved quality cement based paint shall be brought to site in original air tight containers with seal intact.

Scaffolding wherever necessary shall be provided to the entire satisfaction of the Engineer-in-Charge.

9.3 PREPARATION

The surface to be painted shall be cleaned of all loose dust, and dirt paints and all cracks, holes and surface defects shall be repaired with cement plaster cured and allowed to set hard. Before the painting is commenced the surface is wetted well and water is allowed to run off. Any grease, oil paint, shall be removed by approved methods.

9.4 APPLICATION OF PAINT

Mixing of paint and procedure of painting shall be as specified by the manufacturer when no specification are following specification shall generally apply.

The dry cement shall be thoroughly mixed with clean fresh water to produce paint of required consistency (normally that of ordinary paints). The paint shall be kept stirred and used within one hour of mixing hardened or damaged paint shall not be used. The paint shall be applied by brushes in the manner specified by the manufacturer.

The number of coats shall be specified in the wording of the item. When more than one coat is to be given the subsequent coats shall be applied after the preceding coat has thoroughly hardened, inspected and approved.

9.5 CURING

Each application of paint should be wetted at the end of the day with a fine water spray, depending on climatic conditions. Wetting shall be done only after an interval of at least 6 to 8 hours after the applications. In dry weather the painted surfaces shall be kept damp for at least two days and protected from direct sun.

9.6 MODE OF MEASUREMENT AND PAYMENT

The item includes,

- a) All materials and labour for painting.
- b) All equipment and scaffolding.
- c) Curing as per specification
- d) Non uniform colour or shade shall be rectified without any extra cost.

The item shall measured and paid in per Sqmt basis of area painted.

10. STEEL ROLLING SUTTERS

10.1 The specifications lays down requirements of providing and fixing steel rolling

shutters with accessories locking arrangement top hood cover and painting in three coats of synthetic enamel paint of approved quality and shade
The specification for this work as per standard specification of Red Book - and as directed by Engineer-in-Charge.

10.2 MATERIALS

The rolling shutters shall conform to IS:6248:1979. Rolling shutter shall be supplied of specified type with accessories. The size of the rolling shutters shall be as specified in the drawings. The shutters shall be constructed with interlocking lathe sections foamed from cold rolled steel strips not less than 0.9 mm thick and 80 mm wide for shutters upto 3.5 m width and not less than 1.25 mm thick and 80 mm wide for shutters 3.5 m width and above unless otherwise specified. Guide channels shall be of mild steel deep channel section and or rolled pressed or built up (fabricated) jointless construction. The thickness of sheet used shall not be less than 3.15 mm.

Head cover shall be made of M.S. sheet not less than 0.9 mm thick for shutters upto 3.5 m width. For shutters having width 3.5 mm and above the thickness of M.S. sheet for the hood cover shall not be less than 1.25 mm.

The spring shall be of best quality and shall be manufactured from tested high tensile spring steel wire or strip of adequate strength to balance the shutters in all positions. The spring pipe shaft etc. shall be supported on stron M.S. or Malleable C.I. brackets the brackets shall be fixed on or under the lintel as specified with raw plugs and screws bolts etc.

The rolling shutters shall be self rolling type upto 8 Sq.mt clear area without ball bearing and upto 12 Sqm.. Clear area with ball bearing. If the rolling shutters are of larger size, then gear operated type shutters shall be used.

The locking arrangement shall be provided at the bottom of shutters at bottom ends. The shutters shall be opened from outside.

The shutters shall be complete with door suspension shafts, locking arrangements, pulling hooks, handless and other accessories.

10.3 WORKMANSHIP

Rolling shutters and top hood with all accessories shall be supplied of specified type and shall be got approved before fixing by the Engineer-in-Charge. The fixing shall be done in true line and level. The damaged work shall be made good to the level of original works. The fixing work shall be done to the entire satisfaction of the Engineer-in-Charge. After the erection and fixing the rolling shutters with hood shall be painted with synthetic

enamel paint in three coats. The paint shall be of approved quality and shade.

10.4 MODE OF MEASUREMENT AND PAYMENT

The item shall include -

- a) Providing and fixing the rolling shutters of specified size, material with all accessories, locking arrangement and top hood cover.
- b) Painting the same with approved synthetic enamel paint in three coats.
- c) Redoing the damaged works

The item will be measured and paid in Sqmt. Basis of the shutter area.

11. PROVIDING, FIXING RSJ AND OTHER STRUCTURAL STEEL WORK

The specification of the work as per standard specification Bd.C2 and the item cover fixing MS/RS girders, M.S. angle, channels, flats, base plate gusset plates, cleat, bracket etc. and other accessories as per requirement and as directed and fabricating the assembly by cutting, drilling holes etc and erecting and fixing item as site with necessary riveted or welded joints fixtures with nuts and bolts etc. wherever necessary together with their proper fixing and embedding in masonry or slabs of concrete as directed. Structural steel works materials shall be procured by the Contractor from open market at his cost. The item includes 3 coats of oil paint of shade as directed to all structural work.

All above operations including cost of materials and labour thereof are included in the tender item. The measurement and payment shall be on the weigh basis in the unit as mentioned in Schedule-B actually erected at site as directed shall be admissible for payment. RSJ channels, angles, flats, gusset plates, brackets base plate, cleats, packing pieces actual used as directed shall be admissible for payment but not the rivets, nuts and bolts etc.. the riveted or welded joints or fixing with nuts are included in the tendered rates. The specifications for this item given in Standard Specification (Red Book) published by B&C Department will be followed.

12. STRUCTURAL STEEL WORK (for pipe line, outlet arrangement and weir work only)

- 12.1 Requirements specified in this section will form a part of detailed specifications for items of works falling under this category. Indian Standard shall apply as if included herein. Design of structure shall be compliance with Indian Standard (IS) viz. Rivet IS:1148-1964 for bolts IS:1148-1964 and IS:800-1962 for structural fabrication IS:800-1962, etc.

PRINCIPAL ITEMS

- 1) Structural steel members
- 2) Steel joints
- 3) Plates and connection
- 4) Steel chair assembly
- 5) Pipe supports and hangers for piping in all locations
- 6) Pipe railing
- 7) Ladders and stairs
- 8) Misc. metal work for water supply and sewerage disposal installations.

12.2 QUALITY ASSURANCE

Unless otherwise specified all work specified herein and shown on the drawings shall conform to the applicable requirements of the following specifications and codes.

- A) Fabrication and erection of structural steel shall be in accordance with IS:800-1962. (latest edition)

B) WELDING INSPECTION

The contractor shall perform all structural field welding under continuous inspection of a representative of the Pradhikaran. Notice will be given at least 24 hours in advance of needed inspection.

12.3 SUB METALS

SHOP DRAWINGS

The contractor shall submit shop drawings for approval before fabrications of any of the work. Complete fabrication details with material and specification lists showing all welds, fabrication and finish details, and shop painting will be shown with the drawing. In approving shop drawings, the owner does not assume responsibility for accuracy of the work relative to other components as constructed.

12.4 SHOP FABRICATION

GENERAL

- A) The maximum possible fabrication on structural steel work shall be manufactured off-site in a fabrication shop.
- B) Shop connections shall be welded or bolted, unless otherwise indicated.
- C) In so far as possible all work shall be fitted and assembled in shop ready for erection.

12.5 MEMBERS

- A) All members shall be free from twists, kinks, buckness or open joints.
- B) All members, holes and their spacing shall be so accurately made that when assembled the parts shall cone together and bolt without

distortion.

- C) Parts assembled with bolts shall be in close contact, except where separators are required where unlike metals are in contact, to insulate as necessary to prevent corrosion.
- D) Bolt holes will be provided to secure special items, if any, to structural members.
- E) Bearing surface shall be planned to true beds. Abutting surface shall be closely fitted. Steel requiring accurate alignment shall be provided with slotted holes and/or washers for aligning the steel.
- F) All materials shall delivered in the order, in which they will be required so as to avoid all delay in completion of the project.

12.6 WELDING

- A) Welding in shop and field shall be done by qualified operators who have experience of similar work. The standard for welders will be as required by IS:817-1966.
- B) All steel before being fabricated shall be thoroughly wire brushed, cleaned of all scale and rust and thoroughly straightened by approved methods, that will not injure the materials being worked on. Welding shall be continuous along the entire line of contact except where tack or intermittent welding is permitted. Where exposed welds shall be cleaned of flux and slag and ground smooth.

12.7 ERECTION

- A) Erection shall include the installation and erection of all steel as called for in this section. The contractor shall verify correctness before starting erection.
- B) As erection progresses, the work shall be securely bolted up to take care of all dead-load, wind and erection stresses.
- C) No final bolting or welding shall be done until each portion of the structure has been properly aligned and plumbed.
- D) Bolts shall be drawn up tight and threads set so that nuts cannot become loose.
- E) **DAMAGED MEMBERS**
During erection, members which are bent, twisted or damaged shall be straightened or replaced as directed. If heating is required in straightening, a heat method shall be used, which will ensure uniform temperature throughout the entire members. Members which in the opinion of the Pradhikaran are damaged to an extent impairing

appearance, strength or service ability, shall be removed and replaced with new members.

F) ANCHOR BOLTS AND ANCHORS

Anchor bolts and anchors shall be properly located and built into connection work. Bolts and nuts shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately. Embedded anchor bolts that are submerged in process, water or pump room floors, or are in enclosed tanks or spaces exposed to process gas or moisture shall be of stainless steel with nuts of same material. To such stainless steel bolts, a non-oxidizing lubricant grease will be applied before bolting.

G) BEARING PLATES

Bearing plates shall be provided under beams and columns resting on walls or footings. Bearing plates may be attached or loose and aligned on steel wedges or shims. After the supported members have been plumbed and properly positioned and the anchor nuts tightened, the entire bearing area under the plate shall be dry packed solidly with bedding mortar. Wedges and shims shall be cut off flush with edge of bearing plate and shall be left in place.

H) SUBSTITUTIONS

Unless otherwise directed, the exact sections, shapes, thickness, sizes, weights and the details of construction shown for the structural steel work, shall be furnished. However the contractor, because of his stock or shop practices, may suggest change of the net area of section is not thereby reduced, if the section properties are at least equivalent and if the overall dimensions are not exceeded. All substitutions or otherwise deviations from drawings and/or specifications shall be specifically noted or 'clouded' on the shop drawing submittals.

I) FLAME CUTTING

Flame cutting by the use of a gas cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing. The use of a flame cutting torch will be permitted only on minor members, when the members is not under stress, and only after the approval of the Pradhikaran has been obtained.

J) STORAGE OF MATERIALS

Structural materials, either plain or fabricated shall be stored above ground upon platforms, skids, or other supports. Materials shall be

kept free from dirt, grease and other foreign matter and shall be protected for corrosion.

K) TEST REPORTS

Certified physical and chemical mill test reports for material used for major structural members shall be furnished. All tests shall be performed in accordance with applicable Indian Specification Standards.

12.8 MATERIALS AND WORKMANSHIP

A) STRUCTURAL STEEL AND MISCELLANEOUS METAL WORKS

i) GENERAL

This work shall include the furnishing and installation of all structural steel and miscellaneous metal work and related work including grating and grating supports, pipe hangers and supports, tanks, manhole steps, equipment guards, anchors and other appurtenances and any other shown on the drawings or herein specified. All materials shall be new, sound and of the best quality available.

ii) MATERIAL

Steel rolled sections, plates and bars shall conform to the latest editions of IS:226, 808, 1730, 1731, 1732 and 3954. Pipe used for columns or other structural purposes shall conform to IS:1161-1968. Iron for castings shall conform to IS:210.

B) STEEL JOINTS

These shall be fabricated true to size and details shown on drawings in strict conformance with requirements of reference standards.

C) COMMON BOLTS

Bolts and nuts shall conform to IS:1363-1967.

D) WELDING ELECTRODES

The electrodes shall conform to the requirements of IS:814, latest edition.

E) SHOP PAINTING

Structural steel not designated to be galvanized shall be shop coated, using priming coat of red lead as specified in painting section, of these specifications. The portion of steel to be embedded in concrete shall not be painted.

F) GALVANIZING

All metal work shown or specified to be galvanized, shall be zinc coated, as per IS:2629-1966. The zinc coating should be free from defects and shall have uniform thickness of coating.

Galvanizing coating marred or damaged during erection or fabrication shall be repaired by any approved process as directed by the Engineer.

G) SHOP PAINTING

Before leaving the shop all steel not shown or specified to be galvanized shall be given one coat of primer red lead. Final painting shall be in specified coats of approved and approved brand oil paint. The portion of steel to be embedded in concrete shall not be painted.

H) TEST REPORTS

Certified physical and chemical mill test reports for material used for major structural members shall be furnished by the contractor.

I) SHOP DRAWINGS

Five sets of shop drawings shall be submitted to the Engineer, for approval before fabrications of any of the work. In approving shop drawings, the Engineer does not assume responsibility for accuracy of the work relative to other plant components, as constructed.

J) ANCHOR BOLTS

Anchor bolts shall be galvanized and shall be fabricated as shown or as specified by the equipment manufacturer.

Suitable expansion bolts may be used in lieu of anchor bolts, at certain locations. It shall be the responsibility of the contractor to request the substitution and obtain the Engineer's approval, regarding type and location of expansion and bolts proposed to be used prior to pouring concrete.

K) STEEL GRATING

Seat angles and anchors shall be of steel, grating and support shall be galvanized. Gratings to be supplied and installed as detailed in the drawings.

L) MECHANICAL EQUIPMENT GUARDS

All rotating belts, pulleys and shafting shall be covered and guarded in conformity with applicable safety requirements or as directed by

the Engineer.

MODE OF MEASUREMENT

This item will be calculated as per Metric Tone basis.

13. CHEQUERED PLATE

Plate shall be of regular quality carbon steel of the thickness shown on the drawings. The raised lugs shall be diamond shaped and have an angled and opposed pattern.

This item will be calculated as per Square meter basis.

14. PROVIDING & FIXING SLUICE VALVES & BUTTERFLY VALVES, AIR VALVES SPECIFICATION FOR MANUFACTURE, SUPPLY AND DELIVERY OF SLUICE VALVES, BUTTERFLY VALVES SLUICE VALVES

These specifications cover general provisions and requirements and are supplementary to the General conditions of contract.

GENERAL

The Sluice Valves proposed to be procured through this tender are to be used for drinking water supply schemes under execution.

WORK UNDER THIS CONTRACT

The work entitled manufacture, supply and delivery of Sluice valves for transmission mains shall comprise the manufacture, supply and delivery of the goods as mentioned in the Bill of Quantities.

a)	Sluice Valves	Ductile iron / spheroidal graphite (S.G.) iron D/F non-rising spindle resilient seated glandless sluice valves with handwheel & without bypass arrangement. Valves in accordance with BS 5163 of PN-10/ 16 rated, with body and bonnet of ductile iron confirming to IS 1865 Gr. 500/7 or Gr.400/15.
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The manufacturer of sluice valves should be from NMMC approved Vendor

NOTE :

The above goods to be used for conveyance of potable water at temperatures varying from 10 degree centigrade to 40 degree centigrade.

The tender price shall include all labour and machinery and all materials necessary for the proper, manufacture of the goods, for tests at the

contractor's works for the insurance and for delivery to works for the proper maintenance and for discharging every obligations and requirement of the contract, in accordance with the intent of the contract documents, as stated in the General Conditions of Contract.

STANDARDS

Where reference is made to a particular standard, it shall be the latest revision of the Indian Standard Institution. Unless otherwise specified, the sluice valves shall be in accordance with the provisions of IS:1865 Gr. 500/7 or Gr. 400/15. sizes of the sluice valves covered under relevant standards.

MARKING OF SLUICE VALVES

Each sluice valve shall be marked as per IS:1865 Gr. 500/7 or Gr. 400/15 (for sizes from 50mm to 600mm)

PACKING AND HANDLING

The contractor shall dispatch from the manufacturer's works goods adequately protected to prevent damage and deterioration during transportation and storage, etc. The packing is to be quite robust to withstanding rough handling during the transit by road/ rail/ sea and storage.

Each package / create will contain sluice valve of one size only in relevant class.

The packing procedure followed shall be in accordance with IS:1865 Gr. 500/7 or Gr. 400/15

The contractor shall use proper handling equipment or follow suitable handling method as approved by the Engineer to unload the materials at the delivery site to prevent damage to the goods and equipments.

Third party inspection from agency approved by NMMC should be carried out at contractor's cost only.

The contractor should produce manufacturer's test certificate conforming that the valves have been tested in accordance with I.S. specifications, stating the actual pressure and the medium used in the test. The design workmanship, material, strength and dimensions of all parts shall be as per I.S.S. The product shall be of proven quality rendering reliable service during maintenance and requirement.

THIRD PARTY INSPECTION

Third party inspection shall be carried from 1) M/s Central Institute of Plastic Engineering & Technology, Aurangabad. 2) M/s Dr.Amin Controler Pvt.Ltd, Mumbai 3) M/s WAPCOS Ltd., Gandhi Nagar

The valve shall be tested in factory by third party in presence of Maharashtra Jeevan Pradhikaran representative at least for

- a. Review of martial of construction
- b Overall dimension of all component
- c. Hydraulic testing.

Mode of Measurement

This item will be measured and paid as per unit basis. 10% amount of this item will be withheld for hydraulic testing respectively and will be released after satisfactory hydraulic test.

PROVIDING AIR VALVES OF ALL CLASSES AND DIAMETERS.

This item includes Air valves (with IS make) and firm approved by MWSSB's letter No. 1091/33/Store/5284 dated 17.07.1992. The cost of valves should be including all taxes (Central & Local) railway freight, transportation upto site of work or departmental store.

Mode of Measurement

This item will be measured and paid as per unit basis. 10% amount of this item will be withheld for hydraulic test and will be released after satisfactory hydraulic test.

15. HYDRAULIC TESTING OF PIPELINE :

After the work of laying pipeline is completed and before it is commissioned, the pipeline shall be tested in the field both for its strength and leakage in the following manner.

NOTE

Whether stated specifically elsewhere or not, the testing in section of 1 km shall have to be completed within 3 months of laying and jointing.

The pipeline laid length will be divided into sections specified by Engineer-in-Charge. The contractor shall recheck pipe and valves for cleanliness and shall recheck operations of the valves. The open ends of the pipeline or sections thereof shall normally be stopped off by blank flanges or cap ends additionally secured where necessary by temporary struts and wedges. All anchor and thrust blocks must have been completed and all pipe

straps and other devices intended to prevent movement of pipe must have been securely fastened. The contractor shall clean out the whole pipeline and flush it with water, so as to remove dust, dirt and any foreign matter laying in the pipeline. No separate payment for the work of cleaning will be made and the rates under various items of work include thereof.

Each valves section of the pipeline shall be subjected to hydraulic test in section. For this test, the pipe shall be slowly filled with clean water by opening cross connection with the existing mains or otherwise by pumping water into the line (water and pumping arrangement is to be arranged by contractor) as directed and all air shall be expelled from the pipeline through hydrants, air valves and blow off fixed on the pipeline. Once the pipe is full, the cross connection or pumping shall be closed. The pressure in the pipeline should then be raised in stages and built up and maintained by means of suitable approved pumps, to the specified test pressure based on the elevation of the lowest point on the line or per section under test.

The pipe line should be tested hydraulically upto required pressure as per IS specification or as per detailed specification for the Sub-Work. Before starting the pressure test, the expansion joint shall be tightened the test pressure shall be maintained for at least 24 hours. The drop in pressure shall not exceed 0.7 kg/cm² within a period of 2 hours after the full test pressure is built-up. Under this pressure no leak or sweating shall be visible at the joints. During the test, the pipe shall be struck sharp blows with 1.5 kg hammer. Water shall not spout, ooze or sweat through any part. In case of any leak observed anywhere in the field joints whether welded or bolted, the same shall be repaired entirely at the contractor's cost which shall include repairs to welding and regunitting etc. The repaired joint shall be subjected to retest. No section shall be accepted unless it is perfectly water tight.

The entire cost of testing, retesting including cost of water taken together shall be paid under relevant item or Bill of Quantities. The contractor shall make all the arrangements for all labour, pumps, pressure gauge equipment etc. The gauges should be got tested if insisted by the Engineer-in-Charge. The contractor shall arrange for labour required for operating air valves, scour valves etc. Any labour of Corporation employed for the above activities of the test other than supervision shall charged to the contractor as per rules.

The hydraulic testing of the water main will be carried out for entire

length as directed by Engineer-in-Charge. If any leakages are observed even during defects liability period due to defective workmanship, the same shall be rectified immediately. The charges of repairs if done departmentally will be recovered from the amount of retention money. Repairs on live water mains are to be carried out immediately to avoid wastage of water and other problems such as disruption of water supply and traffic etc. In view of this, it will be very difficult to give prior intimation to concerned contractor. As such the cost of repairs, being the expenditure will be recovered from the contractor's retention money withheld in deposit without giving any prior intimation. The contractor will not challenge or claim any extra for such action on the part of the Department.

Generally the contractor shall be required to test the pipe line sections of 2 km using necessary equipment. However, if the Engineer-in-Charge directs, to test full pipeline lengths in further suitable sections in the interest of the work, the tenderers will have to carry out the test in such sections as directed by Engineer-in-Charge.

Mode of Measurement

This item will be measured and paid as per km basis measured up to 3 digits

16. REFILLING OF TRENCHES OF PIPELINE

After lowering, laying, jointing and welding of pipe line, site gunitting and concreting work, refilling of trenches with available excavated stuff shall be done.

The available excavated stuff shall be laid in layers of 15 cm to 20 cm. Each layer shall be watered and compacted before the upper layer is laid till the required level is reached. First 2 layers of 15 to 20 cms shall be free from stones or chips or any harmful material, to protect the pipe from damage.

Only soil or soft murum shall be used for filling.

Originally filling shall be done 30 to 40 cms above natural ground or road level.

Sinking below the road or ground level, if noticed till the completion of work, the contractor shall have to make it level at his cost.

This item includes,..

- a) Clearing useful excavated material of rubbish bracking clods, stone,

- etc.
- b) Conveying the useful excavated material upto 500 M and filling in layers, watering and compacting.
 - c) All labour, equipment and other arrangements necessary for the satisfactory completion and completion of the item.

Mode of measurement and payment of the rate shall be for a unit of 1 Cum of compacted trench filling with approved excavated material. The measurement shall be net for the compacted filing and no deduction for shrinkage or voids shall be made. However, deduction for pipe volume will be made. Depth of filling for measurement will be limited from natural ground level only. No payment will be made for filling for 30 to 40 cms above natural ground level, if so insisted by the Engineer-in-charge.

Surplus excavated material is the property of Pradhikaran. So contractor is not empowered to sell this excavated material to any other agency.

This disposal will not be considered for initial 500 M lead from edge of pipe line trenches and so will not be paid for.

The material shall be conveyed by means of suitable devices/manner.

The material conveyed to the place of disposal shall either be stocked or spread as directed by Engineer-in-charge or his representative.

The route opening and maintenance, payment of any royalties, compensation to land owners and for damaged of any etc. during the process of conveyance etc. shall be the entire responsibility of the contractor.

10% amount will be withheld till satisfactory hydraulic testing of pipe line.

17. DEWATERING

The rate of the items requiring dewatering viz. excluding foundation concrete RCC or masonry shall be deemed to be inclusive of provision of dewatering and no separate claim shall be entertained. The amount is restricted. In any case no extra will be paid for dewatering. The specifications hereunder shall cover diversion of steams, providing coffer dams, bunds, etc. as necessary for carrying out work and bailing out and pumping work as per requirement of work.

The foundation trenches shall kept dry by resort to pumping alone or pumping in combination with diversion, channels, cofferdams, bunds,

diversion weirs, drainage channels, or other method suitable for the local conditions at the choice of the contractor. The responsibility of adequacy of dewatering arrangements and quality and safety of work rests solely with the contractor.

Though the method to be adopted is the choice of the contractor, the scheduled programme shall have to be strictly adhered to.

The contractor shall plan, construct and maintain necessary diversion and protective works, so as to keep the work safe at all stages. The coffer dams where required shall be carried out to required depths and heights and safety designed and constructed with suitable dimensions and protections and shall be made enough water tight for facility of construction inside it. The coffer dam shall leave sufficient clearance for construction and inspection facility and permit installation of pumping machinery as required.

The item includes the entire dewatering operation from start of work till its completion in all respect.

The measurement under RCC works for net dimension cast as directed without allowance for rendering finishing etc.

MODE OF PAYMENT

The provision for this item is made in lump sum basis. There shall not be excess in any case for all season till completion of work.

- After completion of construction of jack well 80%
- After satisfactory completion of all work 20%

18. PROVIDING AND FILLING BAGS FOR COFFER DAM

The item provides for constructing temporary coffer dam for river dam providing barricade, signs, signals, watchman and red light, maintaining the diversion, etc. a condition satisfactory for the use of construction work till the completion and dismantling on complete completion of the work. During the execution of this item photographs shall be taken at various stages such as construction, after completion, during removal and after complete removal of coffer dam. The photographs may be produce during the submission of bill otherwise payment will not be made.

This item shall be carried out as directed by Engineer-in-Charge.

ALIGNMENT

If the alignment of cofferdam is specified on the drawing, the same shall be adopted without any deviations unless found necessary and permitted and directed by the Engineer-in-Charge, or as directed by the Engineer. In the absence of such specified alignment, the contractor shall align the cofferdam suitably and obtained approval of the Engineer before construction the same.

LANDS

The contractor shall be allowed if possible and convenient to the Department, to make use of the Department land free or royalties, rents, etc. complete.

CONSTRUCTION

The cofferdam shall be constructed to the satisfaction of the Engineer on the approved alignment with and eye to the safety and convenience for the construction at all times and shall,....

- a. not have a gradient
- b. have a specified width and specified height.
- c. have a two lane of filled empty cement bags of murum and in between black cotton soil for stopping seepage of flow for construction purpose.

The Engineer may permit in writing deviation in the above, if circumstances justify.

The coffer dam shall be formed in layers as directed. Two lane of filled empty cement bags by murum or sand shall be used as directed and then in between the lane of bags of hearting material should be laid and should be consolidated to required strength and condition or as directed by the Engineer.

MAINTENANCE

The contractor shall maintain the coffer dam in a reasonable good condition till the work is over. He shall also be responsible to reconstruct it or parts of it if damaged due to floods, or any other cause without extra claims for the same.

If the contractor fails to repair the coffer dam in a satisfactory manner, even after being required by the Engineer to do so within a specified period in writing, the Engineer will be free thereafter to repair and keep the coffer dam in satisfactory condition at the cost of the contractor.

Special points

The Contractor shall be responsible thus for,

- i) suitable alignment of the coffer dam.
- ii) construction of the coffer dam as directed by the Engineer.
- iii) providing adequate and necessary barricades, sign boards, signals and watchmen.
- iv) maintenance of the coffer dam in good condition.
- v) accident over or due to the coffer dam cause by etc. bad condition and compensation, if any on that connection.
- vi) reconstruction of the coffer dam when damaged.

Item to Include

- i) All the labour, material use of equipments, tools and plants necessary for lighting constructing, maintaining the coffer dam satisfactory.
- ii) All sorts of compensation and responsibilities arising out of the coffer dam.
- iii) After completion of work the constructed coffer dam will be dismantled and all material should be lifted from river bridge.

MODE OF MEASUREMENT AND PAYMENT

The cofferdam shall be measured in cubic meter only. Dimensions shall be measured correct to two decimal of meter and quantity shall be calculated to two places of decimal of cubic meter.

Break-up of payment

- 50% on physical completion of coffer dam as per approved design and drawing
- 40% proportionate to progress of civil works affected by the coffer dam
- 10% on removal and disposal of coffer dam material as directed by Engineer-in-Charge

19 G.I. HAND RAILING

The item shall be executed as specified in the tender item and as shown on drawing. The vertical supports shall be properly fixed at base either in masonry or concrete by nuts and bolts duly embedded in the form, right anchorage holes in the vertical support to pass G.I. piping in it or welding to fix the G.I. pipes to supports together with M.S. cleats, etc. are included in this item. The G.I. piping shall be provided along with required specials, fixtures, fastening, etc. and G.I. piping shall be bent in circular or spiral railing pipes and shall be jointed by G.I. collar or welded as per necessity. The diameter of G.I. piping, number of rows size and type to vertical posts

together with its centre to centre distance height, etc. shall be as specified in the tender item and in absence thereof as per the NMMCs type design in force. The rate shall also include two coats of approved shade oil paint. Cost of all the materials which shall be procured by the Contractor, labor involved for executing this item is included in tender item. The measurements and the payment shall be on the basis of lengths in running meters occupied by the complete railing assembly in plan.

The agency should provide G.I. pipe railing having one meter height consisting 50 x 50 x 6 mm thick MS angles and vertical at 1.50 m c/c and additional post at every corner bends or curved point with three rows of 25 mm G.I. pipe of medium class variety of horizontal at 3 coats of oil paints over one coat of anti corrosive paint approved colour including cost of labour, transport, materials etc. complete

Mode of payment

The payment shall be made on running meter basis

20. TRIAL RUN OF THE SCHEME

The period of trial run is 12 months and shall start from the satisfactory commissioning of the scheme.

Log book of pumping shall be maintained.

Daily record of bulk meter reading from source to ESR shall be maintained.

**22. DETAILED SPECIFICATIONS FOR MS PIPELINE
THE PIPES TO BE SUPPLIED WITH INTERNAL CLEAR DIAMETER WITH INSIDE
MORTAR LINING.**

1. Pipes to be supplied under this contract shall conform to IS:3589-2001, (latest version) and IS:5504 (Latest version) Indian Standard for Electric Resistance welded or seamless or spirally welded steel pipes for water, gas and sewage (subject to specific requirements given below).
2. In case supplier proposes to supply pipes to the standards superior to the above standards no weightage will be given while evaluating the bid and for payment.

Method of Manufacture	Electric resistance welded (ERW)
Applicable Standards (with latest edition)	
Welded or seamless steel tubes for water, gas and sewage	ISO-1977
Steel pipes and tubes for pressure purposes, carbon steel, ordinary duties	BS:3601 (Latest version)
Specification for gas line pipe	API 5L-1980
Specification for electrically welded steel pipes for water, gas and sewage.	IS:3589-2001 IS:5504 (Latest version)
Methods of sampling of steel pipes, tubes and fittings	IS:5711- (latest version)
Methods of tensile testing of steel tubes	IS:1984 (latest version)
Code of practice for laying and jointing MS pipes	IS:5822- (latest version)

26.1 INSPECTION

Inspection of MS pipe is divided in 2 parts.

Inspection during manufacturing.

- a) Identification of plate/strip material for manufacturing.
- b) Qualification of welding process to be used for manufacturing of pipes.
- c) Qualification of welders.
- d) Dimensional check before start of welding to avoid rejection at a

later stage.

Inspection of ready built pipes.

26.2 SPECIFICATION FOR LAYING OF MS PIPELINE

Warped or deformed timber shall not be used for shoring. Shoring shall project atleast 150 cms above ground and shall extended the trench as approved by the Engineer. Planks shall be placed close enough to avoid any running in of sand or earth through the joints.

For walling pieces round timber shall not be allowed.

Spacing of struts shall be as per the requirements of the design of shoring. The shoring material shall be of the minimum sizes as specified below unless steel sheet piling is used.

- | | | |
|----|----------------|--------------|
| a) | Planks | 5 cms thick. |
| b) | Walling Pieces | 20 x 10 cms |
| c) | Struts | 20 x 15 cms |

Shoring shall be removed only after the approval of the Engineer-in-Charge. In case shoring may be required to be left in trenches after confirmation that its removal is likely to cause damage to the structure or utilities etc. the same shall be left therein permanently

with all accessories without any compensation or extra cost. Payment for providing shoring in square meter of area shored and leaving it in the trench in cubic meter of timber left is included in the item of excavation. Projection above ground level after attaining final depth, however, shall not be retained in any circumstances.

26.3 UNDERGROUND PIPE LAYING GENERAL

Pipe laying shall be done as shown on the drawings or as directed by Engineer, to the correct line and level. The Engineer, at his discretion, may change the alignment and/or levels depending on the site conditions. The minimum cover under roadway etc. where traffic is expected over the pipeline shall be 120 cm as specified in IS: 5822 (latest version). The minimum cover for pipeline along the major district road and State Highway shall generally be 1.0 m, where traffic is not expected over the pipeline. Pipes and specials to be laid underground shall be provided either with C.M. gunitting Coal tar wrapping or cement concrete encasing as specified separately as per requirement. Care shall be taken to see that while handling these pipes, the pipe and unitted portion is not damaged. The rate includes all expenses on account of labour, machinery, material etc. required for complete process of lying. No extra rate for any reason for this job will be admissible even if the process of lowering and laying of these

pipes requires additional labour, machinery, materials etc. From safety point of view.

26.3.1 LAYING PROCEDURE

The contractor shall lower the pipes of standard lengths. Short length pipes shall be lowered only if found necessary and only after obtaining the permission of Engineer-in- Charge. The pipes shall be lowered in the trench on prepared bedding or concrete bedding as per the decision of Engineer-in-Charge. Pipes shall not be laid on the open rock bottom as it may damage the pipe shell on account of point loads.

The alignment and levels shall be checked by the theodolite. Cutting of pipes shall not be allowed for matching the sides of trenches excavated. While assembling the pipes the ends shall be brought close enough to leave a uniform gap not exceeding 3 mm. Marginal cutting and grinding shall be done if found necessary, for which no extra payment shall be made. There shall be no lateral displacement between pipe faces to be jointed.

When the pipe is properly assembled and checked by Engineer-in-Charge for correct line and level, it shall be firmly supported on wooden beams and wedges and then tack welded.

In the trenches where shoring is provided, care shall be taken to see that during lowering of pipes, only required struts are removed at a time with additional precautions to keep the shoring in position if necessary.

26.3.2 SPECIAL PRECAUTIONS FOR MAINTAINING CIRCULAR SHAPE OF PIPE

Special attention of the tenderer is drawn to the fact that the proposed pipeline is to be provided with cement mortar lining. It is therefore very necessary that the circular shape of the pipes be maintained till these pipes are mortars lined. The contractor shall provide adjustable steel struts of the approved design for this purpose. Minimum three sets of struts shall be provided per pipe length of 6 meter. They shall be retained till complete refilling is done and properly consolidated or till concrete encasing is set. Any diametric variation beyond + 2% shall have to be rectified by the contractor at his cost, which may include, removing the section of the pipeline and relaying it along with all other ancillary operations. Providing required number of adjustable struts and all other operations involved as above shall be deemed to have been included in the item of laying and no separate payment on this account will be admissible.

26.3.3 MODE OF MEASUREMENT

The payment for MS pipe, the measurement of this will be taken on running meter basis and paid on running meter basis at the rate specified in Schedule-B. The break-up of payment shall be as under

Supply of MS pipe with inside mortar lining and third party inspection report

75% of cost mentioned in

Laying of pipes & outside wrapping of pipes 15% -- do -

Hydraulic testing of pipe line And 'C' value test of 140 10% -- do --

26.4.0 SPECIFICATIONS FOR LAYING SPECIALS

26.4.1 GENERAL

All specials like distance pieces, straps, tapers, saddles, branches, tees etc. shall be generally fabricated in the factory. Only small kinks or bends or saddles may be fabricated on site, care being taken to see that the length of the fabricated fitting is at least equal to the diameter of the pipe to which it is being fixed. Such fabrication of specials on site shall be done only on approval of the Engineer and as his direction. As specified earlier, only kinks or bends shall be fabricated on site by cutting the pipe faces and then welding shall be carried out as specified hereinafter and shall be paid separately.

All specials shall necessarily as specified in BOQ and shall be laid in the same manner specified in pipes section.

26.4.2 STRAPS

Whenever the pipe laying work proceeds from two ends and if gap between two faces is less than 30 cms., this gap shall be bridged by providing a strap. Strap shall also be provided during fixing of expansion joints as has been specified earlier. Such strap shall be fabricated on site by cutting a piece from the pipe. This piece shall be split longitudinal and stepped over the gap. A minimum gap of 8 cm shall be kept on both the pipes to be connected and strap shall be welded with required number of fillet welds from inside and outside. The gap between the ends of straps shall be welded longitudinally butt welded.

26.4.3 DISTANCE PIECES

Distance piece shall be provided with the gap between the pipe faces to be jointed is more than 30 cms measured in the evening. Distance pieces shall be cut from the pipe pieces on site or can be cut in factory. These will be measured and paid for laying as specials

26.4.4 TAPERS AND BENDS ETC.

These shall be fabricated in the factory and shall be welded on site as per requirements. Laying of tapers shall be paid for laying as specials for the diameter in the larger size. Bends shall be measured along the mean

length and paid for in the respective items of Bill of Quantities.

26.4.5 MODE OF MEASUREMENT

The MS specials including all above described will be paid on weight basis in Kg. Unit on supply, while lowering, laying of specials will be paid as mentioned in Schedule-B. However, 10% of the amount of lowering, laying will be withheld till satisfactory hydraulic testing of pipe line is given.

26.5. WELDING JOINTS

26.5.1 GENERAL

Before aligning, assembling and welding the pipe faces shall be cleared by scraping with wire brushes or by any other method approved by the Engineer. Welding of pipes in field shall conform to ISS:816-1969 (code of practice for use of metal arc welding for general construction in Mild Steel). In case of variance, specifications hereunder shall have precedence.

Welder shall be qualified, experienced and approved by the Engineer-in-Charge to do the welding at the locations welding shall not be allowed to be done by helpers. Contractor shall remove such of the welders from the job, whose work is not found to be satisfactory. The Engineer may ask them to do test welding before approving their employment on the job.

The contractor shall keep record of the welding for each circumferential joint. It shall contain the name of the Welder, Operator and Date of Completion of such run of internal and external welding.

26.5.2 GOUSING AND CHIPPING

MS Pipes of diameter larger than 1016 mm shall be welded with two number of runs from inside and a sealing run from outside. External sealing run shall be done only after internal welding is completed. Before starting the external welding the weld material in the joint shall be cleaned by clipping out loose scales. Gousing shall be done before rectification of any defective welding wherever necessary and as directed by the Engineer. Gousing or chipping shall not be paid for separately and the rate for welding shall be deemed to include the cost of gousing

26.5.3 ELECTRODES

Welding electrodes to be used for welding in this contract shall conform the Indian Standard Specifications ISS:814-1971 (Specification for covered electrodes for metal arc welding of Mild Steel)

The contractor shall use standard electrodes depending on the thickness of the plates to be welded and the type of joint. The contractor shall also use standard current and A.C. voltage required for the machine as per

Contractor

No. of correction

City Engineer

manufacture's directions.

26.5.4 TYPES OF WELDED JOINTS

The circumferential joints of the pipes shall be butt welded with required number of runs externally and internally.

All fillet welds shall have a throat thickness not less than 0.7 times the thickness of the pipe to be welded.

26.6.0 WELDING PROCEDURE

All parts of pipes, specials, etc. shall have all loose scale, slag, rust, paint and any other foreign material shall be removed with wire brush and left clean and dry. All scale and slag shall be removed from each run of weld when that run is completed.

Openings in the form of manholes in the laid pipeline at suitable distance of access for the work of cleaning, repairs etc. Such manholes, as far as possible shall be provided on sides of the pipe line and cutting manholes at the crown shall be strictly avoided.

Patch Plates for plugging the above manholes shall be cut from a separate pipe of the same diameter. Edges of the patch plate shall be properly shaped and shall be inserted in the opening leaving a gap of 3 to 4 mm and tacked. Welding of patch plate shall be done in segments in a proper sequence conforming to Indian Standard Specifications IS : 823

26.6.1. TESTING OF WELDED JOINTS :

Welded joints shall be tested in accordance with procedure laid down in Indian Standard Specifications (IS : 3600, Part I -1985 of procedure for Testing Fusion welded joints and weld metals in steel)

At least one test specimen shall be taken out for testing for every fifty field joints done. Test pieces shall be taken out from the places pointed out by the Engineer. These shall be machined and tested early as possible. The shape of the test pieces removed for testing shall be such that it shall be such that it shall give the specimen of the required dimensions with the weld in the middle of the specimen and at the same time leave the holes in the pipe with rounded corner. This hole shall be patched with a plate of suitable size cut from a separate pipe of same diameter. It must ensure good butt weld.

26.6.1.1 TENSILE TEST

The test specimen taken perpendicularly across the weld shall be shaped in accordance with Indian Standard Specifications IS:223. The tension test specimen shall be machined. The protruding welded portion from inside as well as outside shall be machined. The protruding welded portion from inside as well as outside shall be removed by machining before the specimen

is tested.

If the specimen shows defective machining or develops flaws not associated with welding, It shall be discarded and another specimen substituted. The welded joint shall show a strength not less than the minimum tensile strength for the plate in accordance with ISS:226

26.6.1.2 BEND TEST

Bend Test specimen shall also be prepared in the same fashion as the tensile test specimen. The specimen shall stand being bent cold 180° around a pin that has a diameter equal to 4.5 times the plate thickness, without developing cracks. For this test face representing inside of the pipe shall be placed next to the pin.

26.6.1.3 TRE-PANED PLUG :

Tre-Panned plugs shall be taken out from any welded portion as pointed out by the Engineer. These plugs shall not show any defect in welding such as inclusion of slag, blow holes cavities, etc. the plug shall be 12 mm in dia and shall be taken out by means of suitable electrically operated holes. Such holes in the pipe shall either be filled back by inserting a steel stud and welding around or threading the hole and providing suitable G.I. plug. This test shall be done only if considered necessary by the Engineer.

26.6.1.4 PROCEDURE OF FAILURE OF TEST SPECIMEN

If the test fails in either tensile or bend test or in both, two additional test specimen shall be taken out from the section and shall be tested for tensile and bend tests. If any one of them fails, extensive gousing and rewelding shall be done for the welded joints in that section to the full satisfaction of the Engineer. However, if both the samples give satisfactory results, the joint from which the original sample was taken and had failed shall be repaired to the satisfaction of the Engineer by gousing and welding etc. at contractor's cost. Welder who has done the welding of the joint that has failed shall be solely held responsible for bad workmanship and failure. Since all other factors like electrodes, current, arc voltage etc. are already controlled, on negligence on the part of the welder only is responsible for such failure. For first such failure the welder shall be warned and if the welded joint done by him fails for the second time, he shall be removed from the job.

26.6.1.5 MEASUREMENT AND PAYMENT

Welding shall be paid in linear meter of welding done including the required number of runs. The welding shall be paid for in the relevant item of welding butt joint or lap joint in respective items in the Bill of Quantities and Rates. The rate shall include providing all labour, material and welding machinery including all ancillary preparations and testing, repairing retesting, gousing etc. complete in all positions and circumstances

prevailing in site. No extra payment on any account whatsoever may be admissible to contractor 10% of the amount under this item will be withheld till the satisfactory hydraulic testing is given.

26.7 GAS CUTTING

26.7.1 GENERAL

Gas cutting of MS Pipes may require to be adopted on site for fabrication of bends on site or for preparing distance pieces, straps etc. and for cutting holes in pieces for manholes, branches scour valves, Air Valves and other appurtenances and temporary manholes for cleaning welding etc..

After gas cutting the edges shall be made smooth and even so as to remove all the equalities ends of the pipe shall have „V_i edge from in side.

26.6.2 MEASUREMENT AND PAYMENT

Gas cutting shall be measure in linear meters of gas cutting done and shall be paid for in this item and rates shall include all labour materials and machinery for gas cutting irrespective of any circumstances, shall ancillary preparation and including chamfering the ends to form „V_i edges.

26.7.0 PROVIDING, FABRICATING AND TRANSPORTATION OF M.S SPECIALS

26.7.1 SCOPE

The scope or special specification shall cover the following works under the contract. Fabrication MS plates for specials for road crossing works, expansion joints and testing, etc. at the contractor's factory and testing the pipes.

These specials (detailed hereafter) specifications, supplement, standard specifications for civil construction works as per relevant IS Standard or standard as prepared by the Maharashtra Jeevan Pradhikaran or as per the relevant corporation.

26.7.2 DRAWINGS

Working drawings shall have to be prepared by the contractor taking into consideration the sizes and lengths of the MS plates, flats, etc. The contractor shall have no claim by whatever reason of sizes of material issued being different from those shown in the drawings, in case supplied by the NMMC to the contractor.

26.7.3 SUPPLY OF MATERIALS TO THE CONTRACTOR:

The Pradhikaran will not supply MS Materials such as plates, flats etc. required for the fabrication of pipes, specials, appurtenances, etc.

The conveyance of fabricated materials from workshop to site of work shall be deemed to have been covered in the relevant items of fabrication of pipes, specials etc. The contractor should note that the steel plates and

other structural steel required for fabrication of specials is to be procured by him from open market at his cost. The contractor has to procure such plates in several stages as the circumstances demand, or, as directed by Engineer-in-Charge.

The Corporation shall not however supply any steel or structural steel to the contractor for his use for preparing jigs, testing arrangements, platforms etc. in the factory or in the field. The contractor shall have to make his own arrangements for procuring them at his own cost immediately on receipt of work order and the Pradhikaran shall not entertain any request for extension of completion period of compensation on increase in cost etc.

26.7.4 HYDRAULIC TESTING OF FABRICATED PIPES

The pipe length fabricated shall be as specified earlier above. The contractor shall provide all the required machines and apparatus for testing all the pipes at the factory. The arrangements made by the contractor for hydraulic testing of pipes shall be subject to the approval by the Engineer. The contractor shall paint inside the serial number of pipe, the diameter and the plate thickness and letters NMMC as well as the date of the test etc. as directed by the Engineer. The pipes shall be inspected thoroughly before testing for any apparent defect in welding and the contractor shall repair such defects by gousing and rewelding. Such pipes will be laid only on approval of the Engineer-in-Charge. Necessary provisions for storage tank for water for testing water pumping arrangements, if necessary and making available the required water shall be made by the contractor. Hydraulic test shall be carried out under cover at the fabrication in the presence of and to the satisfaction of the Engineer-in-Charge or his authorized representative.

Accurate pressure gauge of approved make shall be mounted on one end of the pipe to indicate the pressure inside the pipe being tested. The Engineer at his discretion may accept untested pipes if the total length of fabricated pipes of that particular dia. is less than 50 meters.

The pressure shall be applied gradually by approved means and shall be maintained at least for 10 minutes or till inspection by EIL and Engineer-in-Charge during which time, the pipes be hammered throughout its length with sharp blows with 1 kg. Hand hammer. The pipe shall stand the test without showing any sign of weakness, leakage, oozing or sweating. If any leakage is observed, on approval of Engineer-in-Charge, it shall be repaired by gousing and rewelding or as directed by him. No separate/additional payment shall be made for dewatering, gousing, repairing and dewatering and the handling required to be done for such pipes.

26.7.5 HYDRAULIC TESTING OF PIPE LINE

The working pressure shall be not less than 12 kg/cm². The drop in pressure shall not exceed 0.7 kg/cm² within a period of 2 hours after the full test

pressure is built-up. Under this pressure no leak or sweating shall be visible at the welded joints. During the test, the pipe shall be struck sharp blows with 1.5 kg hammer. Water shall not spout, ooze or sweat through any part. In case of any leak observed anywhere in the field joints whether welded or bolted, the same shall be repaired entirely at the contractor's cost which shall include repairs to welding and regunitting etc. The repaired joint shall be subjected to retest. No section shall be accepted unless it is perfectly water tight.

The entire cost of testing, retesting including cost of water taken together shall be paid under relevant item or Bill of Quantities. The contractor shall make all the arrangements for all labour, pumps, pressure gauge equipment etc. The gauges should be got tested if insisted by the Engineer-in-Charge. The contractor shall arrange for labour required for operating air valves, scour valves etc. Any labour of Pradhikaran employed for the above activities of the test other than supervision shall charged to the contractor as per rules.

The hydraulic testing of the leading main will be carried out for entire length or part of it as directed by Engineer-in-Charge. If any leakages are observed even during defects liability period due to defective workmanship, the same shall be rectified immediately.

The charges of repairs if done departmentally will be recovered from the amount of retention money. Repairs on live water mains are to be carried out immediately to avoid wastage of water and other problems such as

disruption of water supply and traffic etc. In view of this, it will be very difficult to give prior intimation to concerned contractor. As such the cost of repairs, being the expenditure will be recovered from the contractor's retention money withheld in deposit without giving any prior intimation. The contractor will not challenge or claim any extra for such action on the part of the Department. Generally the contractor shall be required to test the pipe line sections of 1 km using necessary equipment. However, if the Engineer-in-Charge directs, to test full pipeline lengths in further suitable sections in the interest of the work, the tenderers will have to carry out the test in such sections as directed by Engineer-in-Charge.

26.7.6 MODE OF PAYMENT AND UNIT OF MEASUREMENT

The payment shall be on Rmt basis

23. PROVIDING AND SUPPLYING DI/CI/MS SPECIALS

The items include providing ,supplying DI/CI/MS Double flanged specials suitable for diameter as required and of required thickness and including all materials labour charges with epoxy paint from inside and outside including all taxes (Central & local) Octroi if necessary, inspection charges, transportation to stores/ sites & stacking etc complete. As per requirement a machine ends DI specials suitable for PCCP/BWSC/D.I .pipes will also be supplied under this item. The mode of measurement of payment shall be as specified in BOQ.

Scope: The item cover supply of DI/CI/MS double socket and flanged specials of various diameters including conveyance of specials from manufacture's works to site stores, stacking them properly and protecting till commissioning of work. **General:** The specials

shall confirm to relevant I.S.S.

Materials: The specials shall be manufactured from cast iron conforming to IS 210 Gr. 20.

Coating: The specials shall be coated by bitumen by not dipping process.

Tests: The specials shall be tested at factory for 25 kg/sq/cm/ Pressure.

Flanges: The flanges shall be drilled to IS-1538.

Tolerance: The tolerance in weight and dimensions shall be as per ISS. Only the specials fitting within tolerance limit shall be accepted.

27.1 DISMANTLING JOINTS**Providing and fixing Dismantling joints**

Providing dismantling joints of appropriate diameter of M.S.as per detailed drawing suitable for PCCP pipes including epoxy coating of approved make from inside, outside, transportation, loading, unloading octroi, inspection charges as per directions from Engineer-in-charge etc.

27.2 MODE OF MEASUREMENT

Diameter wise on No.& kg basis.

27.3 PERMANENT TEST POINTS

Providing permanent test points on the pipe line as per drawing and as directed by Engineer In Charge including providing and fixing sluice valves road box for sluice valve of Size 80mm to 250mm in one brick masonry chamber 300mm x 300mm clear C.M 1:5 with 12 mm thick 1:3 cement plaster both inside and outside on M -100 C.C 150mm thick etc complete as specified & directed.

27.4 MODE OF MEASUREMENT

On No. & kg basis

27.5 GAS CUTTING HOLES

Gas cutting holes up to 50 mm dia (for plugs) (either square Cut or „V^o cut) to pipe, plates etc. of required thickness including cost of Gas, tools, machinery, conveyance of labour and machinery etc. complete and as directed by Engineer-in-Charge..

27.6 MODE OF MEASUREMENT

On rmt basis

27.7 ALL CAST IRON SPECIALS**Material**

All Cast iron specials such as C.I. detachable joints shall confirm to I.S. 1538- 1993 (Part 1 to 24). The Supply at departmental stores shall be of various diameters as specified. The specials shall be free from any defects. It should be possible to cut/drill the special to suit site condition to fit in the position. The hardness of the external surface shall not exceed 210 HBS. Rings shall confirm to IS 5382- 1985. Ring shall be homogeneous and free from porosity, grit and surface defects ,such as pitting, irregularities. Dimension of rings shall be as per IS 10292-1988.

27.7.1 MANUFACTURE :

The dimensions of flanged sockets and flanged spigots shall be as per Tables 7 & 8 of IS 1538-1993, respectively. Supply and Stacking at Departmental

Store or Work Site : As specified under the agreement.

Markings :

Each fitting shall have cast stamped or indelibly painted on it the following markings :

1. Manufacturer's Name or trademark or identification mark.
2. The nominal diameter,
3. Mass of fitting,
4. Last 2 digits of year of manufacture,
5. Any other mark required by the purchaser.

Item to Include:

The item includes the supply of Cast Iron detachable joints, including all taxes, levies excluding octroi, transporting, loading, unloading and stacking at departmental store or work site as directed. The necessary test certificate also shall be provided along with the supply. Octroi paid shall be reimbursed on producing documentary evidence for the payment made.

27.7.2 MODE OF MEASUREMENT AND PAYMENT :

The item shall be measured as number of sets for the specified diameter of pipe. The rate shall be for supply of one number of detachable joint of specified diameter.

27.7.3 CAST IRON JIFFY COLLAR COUPLING WITH RINGS

The item provides to supply at departmental store the Cast Iron jiffy collar coupling with rings etc. complete as per the specified diameter of pipe / pipes. (Dia. between 80 mm & 750 mm). The joints shall conform the provisions of IS: 1538-1993 and IS 5382-1985.

27.7.4 MATERIAL

All Cast iron specials such as C.I. mechanical compression collar coupling shall confirm to I.S. 1538- 1993 (Part 1 to 24). The Supply at departmental stores shall be of various diameters as specified in supply order. The specials shall be free from any defects. It should be possible to cut it drill the special to suit the site condition and fit in position etc. The hardness of the external surface shall not exceed 210 HBS. Sealing Rings shall confirm to IS 5382-1985. Ring shall be homogeneous and free from porosity, grit and surface defects, such as pitting, irregularities. Dimension of rings shall be as per IS 10292- 1988.

Manufacture:

Generally as per item WS/B/2.3. The dimensions of jiffy collar coupling shall be as per Table 9 IS 1538-1993.

Supply and Stacking at Departmental Store :
Specified under agreement.

Markings:

Each fitting shall have cast stamped or indelibly painted on it the following markings:

Manufacturers Name or trademark or identification mark.

The nominal diameter,

Mass of fitting,

Last 2 digits of year of manufacture,

Any other mark required by the purchaser

Item to Include :

The item includes the supply of Cast Iron jiffy collar coupling, including all taxes, levies excluding octroi, transporting, loading, unloading and stacking at departmental store or work site as directed. The necessary test certificate also shall be provided along with the supply. Octroi paid shall be reimbursed on producing documentary evidence of payment made.

27.7.5 MODE OF MEASUREMENT AND PAYMENT:

The item shall be measured as numbers of collar couplings for the specified diameter of pipe. The measurement and payment shall be per No.

27.7.6 Flat rubber gaskets.

The item provides to supply at departmental store the flat rubber gaskets for flanged joints. Following two types of rubber gaskets, depending upon the hardness of rubber may be supplied as specified in the supply order:

1. Type A: 50 to 65 Hardness in IRHD and
2. Type B: 65 to 80 Hardness in IRHD.

In each of two types, 2 Grades, Grade 1 & 2 are again prescribed.

Material:

The rubber gaskets shall be manufactured from either a) Sheet Rubber or b) Sheet Rubber reinforced with fabric (Rubber insertion jointing). For manufacturing rubber gaskets, natural rubber or synthetic rubber or a blend thereof, shall be used, with suitable composition and vulcanization to attain the required degree of hardness.

The fabric for rubber insertion jointing shall have a minimum breaking strength of 120 N/mm², under test conditions according to IS: 1969- 1968.

Manufacture:

The rubber gaskets shall be free from porosity, grit and surface defects such as pitting and irregularities. The rubber shall be homogeneous. The manufacturing of sheet rubber and rubber insertion jointing shall be in accordance with the IS: 638-1979. The thickness and number of fabric plies shall be as per the IS. Unless mentioned in the supply order the size of each rubber sheet shall have suitable bolt holes conforming to IS 1538-1993, for the pipe diameter specified in the order.

Supply and Stacking at Departmental Store:
As specified under agreement.

Markings:

Each piece of rubber sheet jointing or rubber insertion jointing shall be marked with the following:

1. The name of manufacturer or the Trade Mark,
2. Type, Grade and Thickness,
3. Month and Year of manufacture,
4. Any other Marking as specified in the purchase order Item to Include:
The item includes the supply of flat rubber gasket at departmental store, suitable for flanged joints (3/6 mm thick) with bolt holes and nominal bore, pitch circle diameter as per IS: 1538- 1993 and gasket as per IS: 638-1979, including all taxes, levies except octroi, transporting, loading, unloading and stacking at departmental store as directed. The necessary test certificate also shall be provided along with the supply. Octroi paid shall be reimbursed on producing documentary evidence for the payment made. Mode of Measurement and Payment:

28. LOWERING, LAYING AND JOINTING DI PIPES OF GIVEN DIAMETER AND CLASS

Contractor shall take delivery of pipes from the stores and shall convey them upto work site for use after checking and testing for soundness of the pipes and shall be held responsible for replacement of such materials of cracked or damaged materials are in advertantly fixed and jointed.

The Department will issue pipes in available lengths and specials. Damages to departmental materials due to carelessness of the contractor during loading, unloading, transport, lowering, laying, cutting to required size, jointing, testing, etc. shall be at contractor's accounts and shall be recovered from him at the rates decided by the City Engineer.

During laying the pipe line some time it may be necessary to cut the pipe suit the site condition or to put in some special or valve or to have exact length of the section etc. The contractor at his cost shall do this cutting only. No claims for extra amount due to any particular type or individual length of cut pipes and specials being supplied or joints having been increased due to small lengths shall be entertained.

The payment for this item shall be admissible on the basis of actually laid at site including length occupied by all types of specials and incidental small pipe pieces or other types.

All the pipes and specials and valves to be taken into use shall be cleaned

and brushed clear or rust and paint at both the spigot and socket ends.

Before the pipes and specials are lowered and laid in trenches, the contractor shall see that the bedding is plane or the surface is brought to uniform grade and leveled with the help of cross sight rails and boning staff and approved in advance by the last 3 days by the sub-divisional officer.

The contractor shall provide, fix and maintain cross sight rails and boning staff whenever required until the time of completion without any extra claim for cost etc. and which shall be considered inclusive of the rates for excavation and lowering and laying. The contractor shall provide temporary benchmarks if called upon at a minimum distance every 150 M without any claim for extra cost. These benchmarks shall be either of stone masonry or mass concrete not less than 0.03 Cum.

The contractor shall provide ladder for inspection of works at least 2 Nos. at the time of inspection for all the trenches of depth greater than 1.2 M.

The pipes, specials and valves shall be lowered by means of ropes, rackles or pulley as ordered evenly and uniformly and shall be brought level with well consolidated hard murum or wooden sleeper as ordered.

All the S & S pipes and specials shall be laid with sockets facing direction of flow, as per manual.

Materials to be used for jointing such as spun yarn, etc. shall be first get approved in advance from the sub-divisional officer.

No jointing operations shall be started unless the sub-divisional officer approves the grade and levels.

The pipes shall be laid in a complete straight line with center line ranged accurately by mean of string stretched between marked centers in cross sight rails and no deviation will be permissible without the permission of the sub-divisional officer. For deviations proposed by the Department from marks on sight rails, the contractor shall postpone the work of jointing without claiming extra cost. The spigot end of the pipe or specials shall be inserted in socket and of the other pipe or special and shall touch squarely without any gap.

Under no circumstances, the D.I. pipes and other water mains will be laid in black cotton soil or rock surface without murum cushioning.

The above murum cushioning of a depth of 150 mm thick or as specified shall always be provided in all formation within the rate of laying pipe line unless an item for murum bedding is provided for separately in the tender.

The murum bedding shall be of the full width of the trench. Murum bedding will be necessary in rock formation boulder formation and soft soils and black cotton soil but not in murum formation itself.

No brickbats or hard stone metal bigger than 20 mm gauge shall be allowed beneath the pipe line directly in touch with the pipe as in the murum bedding.

All stakes such as electric wires, water and sewer mains, manhole, natural drainage, culverts, storm water drains, gutters, poles, etc. coming in the way shall carefully be looked after and any damage be prevented to the same. Any work of removing repairing and reducing such structures or obstacles in the process of laying, jointing and testing pipe line etc. should be carried out by the contractor wherever directed, without any claims for extra to the satisfaction of the Engineer-in-charge. Contractor shall foresee all such situation and make necessary arrangement to overcome those in advance.

The contractor shall not be allowed, any wastage and breakage in pipes brought by him for pipes issued departmentally, the total length of pipes laid and that returned to stores in cracked or unused conditions shall coincide with total length is used. The cost of pipes etc. cracked due to fault of contractor beyond the above permissible limit shall be recovered from him. All waste and broken pipe pieces shall be returned by the contractor to the store of issue at no extra cost. The contractor shall keep an upto date account of pipes, specials and valves etc. issued him free of cost showing quantity received vide unstamped receipt No. and date, quantity used giving chainages as and balance at hand and returned (supported by acknowledgements signed by the Sub-Divisional Officer) failing which the Engineer-in-charge shall reserve the right to keep final bill pending till this account is finalized and contractor shall not claim any compensation in that case for delay in settlement of final bill.

Pipes shall be laid in reasonably dry trenches. Under no circumstances pipes shall be laid in slushy, marshy or water logged and filled up or yielding strata before getting it inspected from Engineer-in-charge and providing proper foundations.

Contractor shall make his own arrangements for obtaining permission for stacking or pipes etc. on the road from land Owners whether it is belonging to any other Government Department or Municipal or Local Bodies or Private Land Owners.

For crossing obstacles natural or built up such as culverts, drains, gutters, cables, pipeline, poles etc. contractor shall approach respective authorities obtain permission for crossing them immediately at the time limit of acceptance of the tender and shall take into consideration all such difficulties for the time limit allowed for execution and completion of the

work. Any such work left remaining to be carried out due to want of the tender without any claim for extra cost or compensation due to non receipt of permission or any other natural or unforced and until the date of completion of the work shall be treated as incomplete. contractor shall also not claim compensation if work is delayed on account of permission for road crossing etc. not being received in time.

Before the work of laying pipe line is started the contractor shall see that all pipes are stacked length wise above the trench between road fencing in sufficient number and without causing any construction to the traffic.

Necessary road diversion as directed shall be provided without any extra claims by the contractor for excavation the roads till completion of work, so that the traffic shall not be hampered. Necessary guide stones duly painted with white wash shall be provided on both sides of temporary diversions. Necessary sign boards, indicating diversions and road closed etc. shall be provided at prominent places alongwith red flags and red letters at night time and maintained till the crossing work is over and road opened for traffic. The diversion shall be removed after road surfaces are brought to original condition. Necessary storing planks for crossing the trenches shall be provided on the open trenches in the towns and wherever required without claiming extra cost.

The contractor shall take utmost care in laying the pipe line alongwith roads and in towns in order to avoid accidents to human life and animal.

28.1 JOINTING OF PIPES

All the jointing work shall be carried out by the contractor after giving written due intimation in advance at least for 4 days before jointing operation starts and laid pipes are approved for grade and cleaned of all inside waste material such as mud etc. and in presence of responsible Government Servant not below the rank of Junior Engineer. Unless otherwise mentioned in the wording of the item in Schedule 'B' of the tender all labour and materials required for jointing (depending upon the type of joint mentioned in item) such as lead, spunyarn, grease, oil, SBR quality rubber rings and gaskets, cement, sand, water, fire wood, nut-bolts, washers, rubber packing, RCC collars, etc. shall be Produced and used by the contractor at his cost. All the materials to be used for jointing should be first got approved from the Sub-Divisional Officer.

No extra claims or compensation will be admitted for items of laying pipes etc. If the pipes are required to be laid upto a depth not greater than 3 times the maximum depth shown in the sectioned longitudinal sectional drawings or estimate so also no compensation shall be paid if class of pipes to be laid is changed during execution.

If the lines are laid in separate detached sections and not continuous length due to any of the reasons such as non availability of specials or due to obstacles etc. contractor shall see that no end of any pipe length is kept open even temporarily and that all open ends are immediately covered up either by suitable blank flange or cap, plug or by means of a double layer gunny cloth tied properly by means of mild steel wires and without any claim for extra cost or compensation.

The contractor shall take utmost precautions to see that no extraneous matters such as lead, stones, brick bats or animals such as rats, reptiles are allowed any access into the pipe line and in case of their existence being detected in the pipe line, the contractor shall remove them by means of rodding etc. to the complete satisfaction of the sub-divisional officer, without any claim for extra cost.

No extra cost will be allowed to fixing of specials and other accessories such as valves, washouts, etc. unless provided for separately in the tender. So also no extra cost will be paid for cutting the pipes and specials as and where required for negotiation of bend or fixing valve, branch tee or achieving exact length of the line etc. The cutting operation shall be carried out preferably by means of standard pipe cutter or hacksaw unless cutting by chisel and hammer is allowed by the Engineer-in-charge. The end of pipe to be used for gasket joint shall be chamfered by means of file and made perfectly true or like original chamfered and if portion of pipe or specials is damaged rendered use less due to careless cutting of the contractor the cost of the damaged portion as decided by the City Engineer will be recovered from the contractor.

If necessary the contractor shall have to carry out the work of laying pipes by keeping gaps here and there if some pipes, specials and valves to be supplied by the Department as per Schedule 'A' would not be made available in time and the contractor shall not claim any compensation for being required to lay the pipe line in gaps and for excavating gap portion if it gets refilled etc.

Insertion of gaskets shall be done by proper application of a thin film of lubricant (Vegetable oil only) to the butt seating inside the socket. The gasket shall be wiped clean, fixed and then the socket with the bulb towards the back of the socket. The groove in the socket must be located on the retaining board in the socket and retaining hole of the gasket firmly bedded in the seating. Contractor shall ensure to the satisfaction of the Sub- Divisional Officer that the gasket fits evenly around the full circumference removing any bulges which would prevent the proper entry of the spigot and for large diameter this operation should be assisted by forming a second loop in the gasket opposite to the first and then pressing the loops flat one after the other.

The thin film of lubricant (Vegetable oil only) shall be applied to the inside surface of gasket which will be in contact with the entering spigot. A thin film of lubricant shall be also applied to the outside surface of the entering spigot for a distance of 25 mm from pigot end. The pipeline to be jointed should be supported centrally by the tackle used for laying and balance just clear of the trench bottom. The spigot of the pipe must be aligned and entered carefully into the adjacent socket until it makes contact with the gasket. Final assembly of the joint is completed from this position.

The spigot end of the entering pipe shall be compressed until it reaches the bottom of the socket. If the assembly is not completed with reasonable force, the spigot end shall be removed and the position of the gasket examined and then the assembly is refitted properly to the satisfaction of the Sub-Divisional Officer. The work shall generally be carried out as per instructions given in manufacturer's pamphlets. All the tools and tackles required for jointing, such as rack and layer 3 mm dia, 5 m long wire rope with thimble, hook and rope adjuster should be procured by the contractor at his own cost.

The item includes all other necessary materials including rings, etc. and labour.

28.2 HYDRAULIC TESTING

The pipeline and valves should be tested hydraulically upto the required pressure as per IS satisfactorily and all the leakages if any should be repaired at the time of hydraulic esting. The 10% amount of the lowering, laying and jointing of pipeline shall be released after satisfactory hydraulic testing. Contractor should make his own arrangements at his own cost for water for hydraulic testing of pipeline. He should not rely upon completion of any other sub-works for such testing.

28.3 MODE OF MEASUREMENT

The item will be measured and paid on the Running Meter basis. The 10% payment will be with held for till satisfactory hydraulic testing is given.

29. HDPE Pipes

The specifications for HDPE pipes of various diameters are confirming to I.S.4984 - 1995.

Grade of Raw Material

Raw material used to manufacture the HDPE pipes shall be pre compounded at manufacturing stage. PE 100 is resin proposed to be used for manufacturing of the pipes.

General :-

- 1) The material used for the manufacturer of pipe should not constitute toxic hazard, should not support microbial growth and should not give rise to unpleasant taste and odour or discoloration of water. Pipe manufacturer shall obtain a certificate to this effect from the manufacturer of raw material.
- 2) High density polyethylene (HDPE) used for the manufacture to designation PEEWA - 45 - T - 006 of IS 7328 : 1992. HDPE conforming PEEWA - 45 - T012 of IS 7328 : 1992 may also be used with exception that met flow rating (MTR) shall not exceed 1.10 g/10 minutes - In addition the material shall also conform to 5.6.2 of IS 7328 : 1992.
- 3) The specified base density shall be 946.5 Kg/m³ and 946.4 Kg/m³ (Both inclusive) when determined at 27⁰ C according to procedure prescribed in IS 7328 : 1992. The value of the density shall also not differ than 3 Kg/m³
- 4) The melting flow rating (MFR) shall be between 0.41 and 1.10 (both inclusive) when tested at 190⁰ C with nominal load of 5 Kg & as determined by method prescribed in 7 of IS 2530 : 1963. The MFR of the material shall also be within 20% of the value declared by the manufacturer.
- 5) The resin shall be compounded with carbon black. The carbon black content in the material shall be within 2.5 0.5% and dispersion of carbon black shall be satisfactory when tested according to the procedure described in IS 2530 : 1963.
- 6) The percentage of the antioxidant used shall not be more than 0.3 percent by mass of finished resin.

Quality Assurance Certificate

Quality assurance certificate for the raw material proposed to be used for the project, from one of the certifying agencies such as Bodycoat or Slevan or Advantica or any other internationally reputed organization shall be submitted along with the supply.

The manufacturer should submit the above raw material certificates for proposed grade of material PE - 100 at time of supply of pipe.

Contractor shall submit the following Certificates from the manufacturer.

Pressure Rating

The pressure rating of HDPE pipes and specials shall be confirming to I.S. 4984-1995 for 6 Kg/cm² (working pressure) for material grade PE 100.

Colour of pipes

The Colour of the HDPE pipe shall be as specified in IS code is black. The pipe shall be designed for the temperature of 45⁰ C maximum.

Reworked material.

The addition not more than 10% of the manufacturer's own rework material resulting from the manufacturer of pipes is only permissible.

Dimensions

The pipe dimensions shall be as per latest revisions and amendment of specified in standards IS 4984-1995. The pipes shall be supplied in straight lengths of 20 m. Short length of 3 m (Min) upto maximum of 10% of total supply will be permitted.

The internal diameter, wall thickness, length and other dimensions of pipes shall be as per relevant clauses given in IS 4984 applicable, for different class of pipes. Each pipe shall be of uniform thickness throughout its length. The dimension to tolerances shall be as per specified I.S. standards.

Performance requirements

The pipe supplied should have passed the acceptance tests as per clause given in specified IS standards. The manufacturer should provide the test certificates for the tests conducted, as required in specified standards along with the supply of pipes. These acceptance tests can be performed in the in house laboratory of the pipe manufacturing factory of the successful Contractor. Third party inspection shall be carried from 1) M/s Central Institute of Plastic Engineering & Technology, Aurangabad. 2) M/s Dr.Amin Controler Pvt.Ltd, Mumbai 3) M/s WAPCOS Ltd., Gandhi Nagar shall have to submit to Department / Grampanchyat, after supply of pipe at site. Then only it can be measured and recommended for further payment.

Marking

As per the provisions of clause given in specified standards each straight length of the pipe shall be clearly marked in inedible ink/paint the following information shall be marked.

- a. ISI stamping with marking of IS 4984(or IS 14333)
- b. The manufacturer's name and /trade mark.
- c. Designation of the pipe as per IS 4984 (or 14333)
- d. Lot number /Batch number

BIS License

The pipe manufacturer who is going to supply the pipes for the project has to have a valid BIS license.

Bid without these licenses may be treated as non-responsive**Fittings/Specials**

All HDPE fittings/specials shall be fabricated in accordance with IS : 8360

(Part I & III). PE Injection moulded fittings shall be in accordance with IS : 8008 (Part I to IX). All fittings /specials shall be fabricated or injection moulded at factory only. No fabrication or moulding will be allowed at site, unless specifically permitted by the Engineer.

Fittings will be butt welded on to the pipes or other fittings by use of heat fusion.

Bends

HDPE Bends shall be plain square ended as per IS : 8360 part I & III specifications. Bend may be moulded shall be manufactured or fabricated from pipes elements.

Tees

HDPE Tees shall be plain square ended as per IS : 8360 Part I & II specifications. Tees may be equal tees or reduced bench off tees. Tees may be moulded or fabricated from pipes elements.

Reducers

HDPE Reducers shall be plain square ended as per IS : 8008 Part - I & VII Specifications.

Flanged HDPE Pipe Ends.

HDPE Stub ends shall be square ended as per IS : 8008 Part & VII Specifications. Stub ends will be welded on the pipe. Flange will be of slip on flange type as described below.

Slip on Flanged

Slip-on-flanges shall be metallic flanges covered by epoxycoating or plastic powder coating. Slip on flanges shall be conforming to standard mating relevant flange of valves, pipes etc. Nominal pressure rating of flanges will be PN 10.

Welding

Procedure

Jointing between HDPE pipes and specials shall be done as per the latest IS : 7634 Part II. Method of jointing between the pipes to pipes and pipes to specials shall be with butt fusion welding using semi automatic, hydraulically operated, superior quality butt fusion machines which will ensure good quality butt fusion welding of HDPE pipes.

Normally butt fusion welding shall include following activities.

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

Installation and Commissioning of HDPE

PIPES Installation

- a. Supplying, laying, jointing, testing and commissioning of pipes shall conform to relevant IS codes, as applicable.
- b. The alignment of pipelines shown in drawings of the tender documents is only indicative and the exact alignment will be as per drawings and /or as directed by the Engineer or his representative.
- c. The HDPE pipes shall be laid in accordance with the latest IS 7634 Part -2.

Hydraulic Testing of HDPE Pipe Line

- a. The Sectional Hydraulic Test shall be carried out after the pipeline section to be tested has been laid jointed and backfilled to a depth sufficient to prevent floatation.
- b. Each length of the pipeline to be tested shall be capped or blanked off at each end and securely strutted or restrained to withstand the forces which will be exerted when the test pressure is applied.
- c. Proposals for testing where thrusts on structures are involved even where thrust flanges on the piping are installed, shall be with the prior approval of the Engineer.
- d. The proper method of filling the pipeline with water shall be used. The length under test shall be filled making certain that all air is displaced through an air valve or any other appropriate mechanism. The test length shall then remain under constant moderate pressure as per testing method given in the IS 7634.
- e. As per IS code water required to built up allowable drop in pressure during test will be treated as a make up water.
- 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, have to be repaired at his own cost, replace the pipe or repair the pipe or remake the joint and repeat the hydraulic test is the responsibility of the contractor. The additional payment will not be made.
- g. Test pressures are to be measured in kg/cm² at the centre of the bank flange situated at the lowest end of the pipeline under test. HDPE pipes and Fittings

All the pipes specials and fitting of HDPE shall be supplied and shall be tested along pipeline as per relevant IS codes and specifications.

The Following code shall be used for:

- a. Site Test Pressure : as per IS 7634 Part I.

Suitable section length shall be 500 to 800 m as directed by the Engineer in charge shall be taken for such testing from time to time during progress of the work and satisfactory test given for that section. All testing apparatus, gauges, connections, etc. and water required for testing shall be arranged by the Contractor at his cost. The NMMC does not undertake any responsibility to supply water for testing, If there is delay in testing, the contractor shall refill the trenches for the time being and reopen them at time of testing at his own cost, failure of which shall entitle the NMMC to do the refilling the reopening of trenches at the risk and cost of the contractor. If the trenches are filled due to any reason whatsoever before testing the contractor shall have to open for testing at no extra cost.

Satisfactory hydraulic test shall be recorded when the section under test shall withstand the pressure as specified by the Engineer in charge for about 15 minutes without operating the test pump. The test pressure being maintained at the specified figures during that 15 minutes interval.

The field pressure to be imposed should be not less than the maximum of following

- a) 1.5 times the maximum sustained operating pressure.
- b) 1.5 times the maximum static pressure in the pipe line.
- c) Sum of maximum sustained operating pressure and maximum surge pressure.
- d) Sum of maximum pipe line static pressure and maximum surge pressure. Subject to the maximum equal to the work test pressure to any pipe fitting incorporated.
- e) The field test pressure should wherever possible be not less than 2/3 rd work test pressure and should be applied and maintained for atleast 15 minutes.

The test pressure shall be gradually raised at the rate of 1 Kg/ cm²/min. If the pressure measurement are not made at the lowest point of the section, an allowance should be made for the difference in static head between the lowest point and point of measurement to ensure that the maximum

pressure is not exceeded at the lowest point. If a drop in pressure occurs, the quantity of water added in order to re-establish the test pressure should be carefully measured. This should not exceed 0.1 lit/ mm of pipe dia. per Km. of pipeline per day for each 30 cm. head of pressure applied.

During testing if any joints are found leaking they shall be repaired and /or redone by the contractor at his cost till the test is found satisfactory. Similarly, any pipes, collars, specials, show hair cracks, leaks etc. during testing the contractor shall replace them with sound pipes and specials etc. free of cost. The hydraulic test shall be given in presence of the Engineer in charge.

15% payment of total subwork of pipe line work shall be withheld till hydraulic test is given which shall be released only on giving satisfactory test.

Mode of Payment : 60% payment shall be released against providing HDPE pipes, after submitting third party inspection certificate from 1) M/s Central Institute of Plastic Engineering & Technology, Aurangabad. 2) M/s Dr.Amin Controller Pvt.Ltd, Mumbai 3) M/s WAPCOS Ltd., Gandhi Nagar 25% payment will be made after lowering, laying, jointing of pipes. 15% payment will be released after satisfactory hydraulic testing is given by contractor. The cost all types specials required as per site conditions is on Lum-Sum basis.

30. GRP PIPE :-

The specification of GRP pipes of various diameter are conforming to IS12704-1994

Grade of Raw Material :-

Raw material used to manufacture the GRP pipes shall be as follows.

1. **Resin System** :- The manufacturer will use highest quality polyester resin in liner and structure of pipe conforming to IS 6746-1994.
2. **Glass reinforcements** :- Glass reinforcement shall be of commercial grade E-type and shall conform to IS 11273-1992, IS 11320-1985 or IS 11551-1986
3. **Fillers / Aggregate** :- Silica sand of size range 0.05 mm to 0.8 mm may be used as fillers / aggregates in the laminates.
4. **Elastomeric Sealing Rings** :- Electromenic sealing rings must be supplied by recognized to the provisions of IS 5382

30.1 Manufacture and Construction

30.1.1 Pipes

The pipes shall be supplied in accordance with the diameters and

tolerances specified as below. Large diameter pipe (700 and above) will be manufactured by a controlled reproducible continuous advancing mandrel process using the materials described as above to result in a corrosion resistant, composite structure to meet the operating conditions for this project. Structure of pipe must contain chemical resistance liner and reinforced structural layer. Liner should be at least 1.5 mm thickness, made of surface veil, chop glass and chemical resistance resin at the resin to glass ratio 80:20. Out of 1.5 mm 0.5 mm inner layer must be built with surface veil and resin. Rest 1.0 mm thickness will be built with chop glass and resin. Reinforced structural layer must follow I-beam principle. Sand layer can be incorporated in the centre of the reinforced structural layer and would be sandwiched by two glass rich skin layers. To avoid any delamination sand layer must contain at least 6 - 8% glass reinforcement. Pipe shall have to be provided with UV stabilized resin coat as external layer for above ground application. Pipe diameter less than 600 mm may be produced in helical winding process. But the reinforced structural wall must follow the I-beam principle without glass fiber reinforcements.

30.1.2 Joints

The large diameter (DN700 and above) pipe shall be field connected with GRP sleeve coupling that utilizes EPDM elastomeric Sealing rings to maintain joint water tightness. Below DN 600 pipe shall be jointed with double "O" ring bell and spigot joint only.

Depending on site condition butt and wrap joint is also permissible to some extent.

Flanged joints shall be used for connecting GRP pipes with valves and other type of pipes. Flanged joints shall be used with EPDM gasket and hot dip galvanized bolts as per IS: 1367

30.1.3 Fittings

Flanges, bends, reducers, tees, wyes and other fittings shall, when installed, be capable of withstanding all operating conditions. They may be contact molded or manufactured from mitered sections of pipe joined by glass fiber reinforced polyester overlays.

30.2 Dimensions

30.2.1 Nominal Diameters

Pipes will be supplied with the following nominal diameters in accordance as specified in 1994

30.2.2 Lengths

The pipe standard effective length will be 6, 9, 12 meters with a tolerance of ± 25 mm. A maximum of 10% of the pipe sections may be supplied in random lengths subject to the approval of the engineer.

30.2.3 Wall Thickness

The wall thickness shall satisfy the inside and outside diameters specified in IS: 1994. The wall thickness and outside diameter shall be measured to an accuracy of 0.1 mm

30.2.4 End Squareness

All pipe ends shall be square to the pipe axis $\pm 6\text{mm}$ or $\pm 0.5\%$ of thenominal diameter whichever is the greater.

30.2.5 Tolerance of Fittings

The tolerance of the angle of a bend and the angle between the main and leg of a wye or tee shall be $\pm 2^\circ$. The tolerance on the laying length of a fitting shall be + 50mm.

31. Qualification Testing

The physical properties and characteristics of the pipes shall be determined by prototype testing of the manufactured product. These tests need not be conducted specifically for this Project if prior tests on similar products have been previously completed. Testing may be conducted on one diameter and extrapolated to other diameters, the pipes are of similar composition and material arrangement and are manufactured from the same materials specification using a similar process.

31.1 Hydrostatic Design Basis HDB

The Hydrostatic Design Basis (HDB) will be obtained in accordance with IS 12709/IS 14402B or ASTM D2992 established at an extrapolated 50 year value.

31.2 Long Term Strain corrosion

The long term strain corrosion test shall be in accordance with AWWA C950for water Projects or ASTM D3262 Section 6.3 for sanitary sewer projects.

32. Inspection and Testing

The GRP pipes supplied by the contractor/manufacturer will be subjected tofollowing tests as per AWWA C950 / IS 12709/14402 for acceptance :

32.1 Workmanship

Pipes shall be free from all defect including indentations, de-Lamination, bubbles, pinholes, cracks, pits, blisters, foreign inclusions and resin starved areas. The pipe shall be a uniform as commercially practicable in color opacity, density and other physical properties as per ASTM 2563/BS 5480/ IS 12709/ IS 14402. Internally maximum 3% area and externally maximum 15% area can be reworked.

32.2 Hydrostatic Pressure Test

Each length of irrespective of diameter shall be tested for Hydrostatic testas per IS 12709 at Manufacturer's premises before dispatch

32.3 Longitudinal Tensile Strength

One in each batch of pipe shall be tested for longitudinal tensile strength as per AWWA C950/IS12709/14402.

32.4 Hoop Tensile Strength

One in each batch of pipe shall be tested for hoop tensile strength as per AWWA C950/IS12709/14402.

32.5 Stiffness test

One in each batch of pipe shall be tested for stiffness as per AWWA C950/IS12709/14402.

Any other tests required as per the provisions to which the supplied pipe confirms i.e. (AWWA C950/IS12709/14402)

The test reports for the rubber gaskets shall be as per acceptance test of the IS 5382

The sampling method for testing shall be as per the provisions of the standards to which they are manufactured.

Mode of Payment : 75% payment shall be released against providing GRP pipes, after submitting third party inspection certificate from 1) M/s Central Institute of Plastic Engineering & Technology, Aurangabad. 2) M/s Dr. Amin Controller Pvt. Ltd, Mumbai 3) M/s WAPCOS Ltd., Gandhi Nagar 10% payment will be made after lowering, laying, jointing of pipes. 15% payment will be released after satisfactory hydraulic testing is given by contractor. The cost all types specials required as per site conditions is on Lump-Sum basis.

33. LAYING AND JOINTING OF PIPE LINE

33.1 General

Where ever there is need for deviation, it should be done with the use of necessary specials or by deflection in pipe joints (limited to 5% of permissible deflection as per relevant standards).

33.2 Standards

Except otherwise specified in this technical specification, the Indian Standards and Codes of Practice in their latest version, National Building code, PWD specification shall be adhered to for the supply, handling, laying, installation, and site testing of all material and works. The laying pipeline shall be done conforming to the following standards : IS : 13916 for GRP pipeline.

34. VALVES/PEN STOCKS/SLUICE GATES

All the valves shall be C.I.D.F. type Valves shall be of approved make by NMMC or such other reputed and approved make. Valves shall have the certificate of I.S.I. and shall be as per the relevant IS codes. All valves

having diameter 300 mm and above shall have spur gear arrangement for manual operations. Dia below 300 mm shall be with hand wheel for operation.

All sluice gates shall be of approved make and with brass lining. It shall be provided with spur gear arrangement and hand wheel for easy manual operation.

All pen stocks shall be brass lined and provided with suitable arrangement for easy and smooth manual operation.

GAS CUTTING

GENERAL

Gas cutting of M.S. Pipes may require to be adopted on site for fabrication of bends on site or for preparing distance pieces, straps etc. and for cutting holes in pieces for manholes, branches scour valves, Air Valves and other appurtenances and temporary manholes for cleaning welding etc..

After gas cutting the edges shall be made smooth and even so as to remove all the equalities ends of the pipe shall have „V_i edge from in side.

MEASUREMENT AND PAYMENT

Gas cutting shall be measure in linear meters of gas cutting done and shall be paid for in this item and rates shall include all labour materials and machinery for gas cutting irrespective of any circumstances, shall ancillary preparation and including chamfering the ends to form „V_i edges.

MAKING CROSS CONNECTIONS :

Making cross connections, to existing distribution system of any type including excavation, breaking and removing existing pipes, lowering, laying of special and pipes and their position, refilling closing the water supply in that area dewatering and restoring the water supply etc. complete as directed by Engineer-in-charge.

The payment will be done on No. basis.

35. ROAD BOX

(Sub Work No.13, Item No.20)

The item includes providing and fixing 225x300 mm (20 Kg.) CI road box including necessary excavation, supporting B.B. Masonry etc. complete.

The mode of measurement shall be on basis of each number of completed item.

35A C.I. MECHANICAL JOINTS

Supply of C.I. Mechanical Compression collar coupling (popularly known as Jiffy Collar Coupling) suitable for C.I. spun pipes (as per IS:1536:2001)

and

D.I. pipes (as per IS:8329:2000) complete with sealing rubber gasket of SBR. C.I. Follower glands and MS Nit bolts. The whole assembly should be mechanically and hydraulically tested to the provisions as paid down in IS:1538:1993 and as directed by Engineer-in-Charge.

Mode of measurement : Per No.

36. COLOUR WASH

General

It item refers to providing and applying of approved colour wash to surfaces which are not given any finishing.

COLOUR WASH

This is prepared by adding necessary colouring matter of approved make to the white wash which has been stained. The colour shall be as approved by the Engineer. For all colour wash, a sample must first be applied, allowed to dry and approved by the Engineer-in-Charge before the work proceeds. It should be noted to large surface such as the walls of a room. Care must be taken to mix sufficient colour wash to complete the whole surface to be treated, otherwise it is taken to mix impracticable to obtain exactly the same shade of colour in two successive mixtures. Sufficient gum or rice size should be added to prevent the colour wash coming off when rubbed with fingers.

Preparation of surfaces : The surfaces shall be prepared by brooming down, brushing or other means as may be ordered by the Engineer-in-Charge. The surface shall be thoroughly cleaned down and freed from all foreign matter before the base coat is applied.

Sub-base: Sub-base of two coats of white wash shall be applied as specified in Item No. Bd.P-1.

Application of colour wash: The colour wash shall be applied over the base coat. It shall be applied in the same way as white wash. The number of coats shall be as mentioned in the item, each coat being applied after the earlier coat has dried.

Mode of measurement : Per sq m

36A POLISHED SHAHABAD/TANDUR/KOTAH STONE FLOORING

The specification for this item shall be same as for item No. B.M.1

1. All the stone slabs shall be square in shape. The dimensions shall be

0.60 x 0.60 m or other dimensions as specified in the special provisions or as directed by Engineer-in-Charge. Tolerance in thickness ± 3 mm

2. The exposed surface of the specified stone flags shall be machine polished to a smooth, even and true plane and the edges machine cutsquare and to the required shape when necessary. Samples shall be got approved by the Engineer-in-Charge who will keep them in his office for reference.
3. The thickness of joints shall not exceed 1.5 mm
4. Joints shall be grouted with neat cement slurry
5. When the bedding and joints of the flooring have completely set, the surface shall be machine polished to give a smooth, even and true plane to the floor and thoroughly cleaned.

Mode of measurement : Per sq meter

36 B GLAZED TILES FOR SKIRTING AND DADO

Plastering : Cement plaster of about 12 mm for brick walls and 20 mm for stone masonry walls shall be applied to the part of the wall where dado or skirting is to be fixed as per specification No. B.11. The proportion of mortar shall be as mentioned in the item.

Fixing tiles : Dado or skirting work shall be done only after fixing tiles on the floor. The white glazed tiles shall be soaked in water for at least 2 hours before being used for skirting or dado work. Tiles shall be fixed when the cushioning mortar is still plastic and before it gets very stiff. The back of tiles shall be covered with a thin layer of neat cement plaster and the tile shall then be pressed in the mortar and gently tapped against the wall with a wooden mallet. The fixing shall be done from the bottom of wall upwards without any hollows in the bed or joints. Each tile shall be fixed as close as possible to the one adjoining. The tiles shall be joined with white cement slurry. Any difference in the thickness of tiles shall be evened out in cushioning mortar so that all tile faces are in the vertical plane. The joints between the tiles shall not exceed 1.5 mm in width and they shall be uniform between the tiles in dado work, care shall be taken to break joints vertically. After fixing the dado, skirting etc. they shall be kept continuously wet for 14 days.

If doors, windows or other openings are located within the dado area, the sills, jambs, angles etc. shall be provided with white glazed tiles and appropriate specials according to the foregoing specification and such tiled area shall be measured net along with the dado.

Cleaning : After the tiles have been fixed the surplus cement grout that may have come out of the joints shall be cleaned off before it sets. After the complete curing the dado or skirting work shall be washed thoroughly clean.

Item to include : The rate shall include all labour, materials, tools and equipment required for the following operations to carry out the item as specified above.

- Plastering
- Fixing the tiles including all angles, etc., after applying neat cementpaste
- Jointing the tiles with white cement slurry
- Curing
- Cleaning the dado and skirting.

Mode of measurement and payment : Same as for item No. Bd.M-9.

ITEM: Micro Tunneling..... etc. complete.**1.1 Survey of Existing Utilities**

Prior to completion of the Contractor's Temporary Works designs and his Permanent Works designs the Contractor shall submit to the Engineer his survey of existing utilities as detailed in tender condition and site requirement.

1.2 Temporary and Permanent Works

The Contractor shall submit complete design details for all Temporary and Permanent Works including calculations and drawings for the acceptance of the Engineer. The Contractor shall be wholly responsible for the designs, drawings and calculations to be submitted as Contractor's Documents for acceptance by the Engineer. No work shall proceed unless these documents are accepted by the Engineer.

1.3 Site Layouts

Contractor's attention is drawn to work sites in extremely busy roads and space availability as well as presence of buried services in vicinity of the proposed alignment.

For all temporary and permanent shaft locations, the Contractor shall submit site layout plans showing the site boundaries, arrangement of various ancillary equipment required for works, spoil removal equipment and slurry tanks, lubricant systems/ mud recycling system, generators, control cabin, tracking facilities, crane, storage of pipes etc for each drive.

1.4 Jacking Pipe Design, Manufacturing and Procurement

The Contractor shall submit full details of the jacking pipe design and their applicability for the intended use and anticipated stresses including the jacking force. The design of jacking pipes shall take into account the jacking strategy proposed to be adopted by the Contractor.

Calculations shall clearly state:

1. Maximum calculated jacking resistance for installing complete casing.
2. Maximum allowable face pressure or slurry pressure that can be exerted at tunnel face without fluid loss to surface, other structures or features or heave of ground.
3. Relationship between hydraulic jacking pressure and force applied to casing pipe during jacking.

The Contractor shall, with the agreement of the Engineer, engage a reputable pipe manufacturer to design and manufacture the jacking pipes. In which case,

the Submission shall include the manufacturer's name, address, contact telephone and facsimile numbers and the manufacturer's quality assurance /control and testing plan for the jacking pipe. The manufacturer's representative's name shall be also included in the Submission. A dimensioned drawing of the jacking pipe with design calculations from the manufacturer shall be also submitted to the Engineer for acceptance.

No change in pipe manufacturer or procurement mode shall be permitted without the Engineer's agreement.

In case the Contractor intends to manufacture the pipes in his own facility set up for this purpose, he shall submit all details of equipment, design and process to the Engineer for acceptance.

When requested a certificate shall be provided to the Engineer to confirm that the jacking pipes comply in all respects with the relevant standards.

2. Construction

2.1. Contractor's Method of Construction

The Submission shall contain a detailed explanation of various steps involved in the construction process. It shall include detailed alignment plan he intends to employ and the drive segments whether curved or straight ones. It shall include details of the equipment, specific manufacturer's instructions and guidelines pertaining to the project, a methodology statement outlining the operation of the equipment and, details of materials including pipe materials, rubber ring, compressible packers and jointing of pipes.

The Submission shall also include construction details of all temporary structures such as jacking and receiving shafts or intermediate/ temporary/rescue shafts, thrust bed, thrust walls, and entry and exit arrangements.

The details of other equipment such as intermediate jacking stations, spoil removal system including slurry and feed pumps, control systems, slurry tanks, separation system and associated machinery, jacking frames, spacers, thrust ring etc shall also be included in the Submission.

2.2. Submission on Tunnelling / Microtunnelling System

2.2.1 General

The Contractor shall furnish complete details of the tunnelling/microtunnelling system covering the make, model, manufacturer's technical literature for the equipment and all other data on ancillary equipment and justification in support of the equipment proposed. The Submission shall include information to ensure that the tunnelling and microtunnelling equipment proposed for the project meet with the general requirements specified in these Employer's Requirements

and also the anticipated geological conditions as assessed by the Contractors.

The Submission shall also include a certification from the manufacturer of the equipment about adequacy in the anticipated geotechnical conditions as also design calculations showing maximum anticipated jacking force and torque needed for tunnelling/ boring and ensuring tunnel driving and pipe jacking to the required grade and alignment within permissible tolerance limits.

2.2.2 Procedures

The Contractor shall supply full details of procedures and resources that will be employed to carry out work including method and sequence of:

- i. Establishment of drive lines and elevation at base of shaft.
- ii. Casing pipe handling and connections.
- iii. Maintaining line and grade, and reestablishment of line and grade as required.
- iv. Spoil separation and disposal.
- v. Spoil and slurry containment during tunneling / microtunnelling work.

2.2.3 Installation of tunnel lining, including placement of grout between the lining and the walls of the excavation, and procedures to prevent floatation during grouting.

The Contractor shall submit to the Engineer for agreement a detailed method statement for instrumentation and monitoring, including instrumentation layout, trigger levels, design and allowable values and the procedures for evaluating the monitored data. The data to be captured shall be obtained from the computerized control unit and shall be supported with manually kept observations and readings as per agreed formats.

Submission on Monitoring of Ground Settlement and Upheaval

Monitoring of ground settlement and upheaval shall be carried out in accordance with the general requirements. micro tunnelling requirements in Section

Prior to commencing the Works, the Contractor shall submit for review a photographic survey of all existing structures within the zone of influence and a schedule of defects, along with the Contractor's surveying and monitoring plan with the location of settlement monitoring points, reference benchmarks, survey schedules and procedures, and reporting formats.

Throughout the excavation and tunnelling works the Contractor shall submit a copy of all recorded results of the monitoring of settlement or upheaval caused by excavation and tunnelling works to the Engineer on a daily basis or as agreed; however, movement greater than predicted shall be reported to the Engineer

immediately.

The Contractor shall keep records of all inspections of existing structures and a copy shall be submitted to the Engineer.

2.2.4 Submission on Remedial Measures to be adopted by the Contractor

The Contractor shall take each and every precaution to ensure that the tunnelling or drilling equipment will successfully excavate along the chosen pipeline alignment before he commences the operation. In the event of inability to complete the drive, due to break down or any other reasons, the Contractor shall be fully responsible to recover the equipment safely from the ground and restore the incomplete work to the original condition at his risk and cost by a method agreed with the Engineer and the concerned authorities within the time stipulated by the Engineer or the concerned authority.

The Contractor shall in his Submission clearly state the measures that he would implement to retrieve the shield without causing interruptions to traffic and public life and without causing any damage to the property belonging to the PMC or any other third party etc. The cost for such retrieval measures or any consequential expenditure or delays arising from thereof shall be entirely borne by the Contractor. Any failure of remedial measures shall be entirely at the risk and cost of the Contractor.

Any abandoned hole or tunnel must be backfilled to the top of the hard strata with concrete or gravel with grouting to provide a solid infill, or other method agreed with the Engineer completely at the Contractor's cost so as to prevent subsequent settlement.

3. Handover

3.1 Tests on Completion

The Tests on Completion shall not commence until relevant Contractor's Documents have been submitted and consent to commence tests has not been refused by the Engineer. Relevant Contractor's Documents shall include inter-alia:

1. Site installation, inspection and test certificates
2. Tests on Completion of method statement and programme
3. Test schedules and performance data schedules

3.2 As-built Documentation

The Contractor shall prepare and submit as-built documents including drawings and records during the construction works and shall submit them to the Engineer following completion of each part of the Works, or as otherwise agreed with the

Engineer.

As-built documents shall constitute a permanent record of the Works as completed or executed.

As-built documents shall consist of final versions of those Contractor's Documents as are necessary to fully record the design and construction of the Works, incorporating any additional information that will assist the operator of the facility. They shall include inter alia:

1. The final version of the design calculations
2. Key construction records and tests
3. Final versions of all drawings prepared
4. Quality control records for Materials
5. Asset sheets
6. Borehole records and soil test reports
7. Survey records
8. As-built records of service diversion
9. Any information requested to be provided in the form of as-built records elsewhere in the Employer's Requirements.

Final approved as-built drawings shall consist of one copy on CD in AutoCAD and pdf formats, three A1 and three A3 printed and durable copies.

4. SPECIFICATIONS FOR MICROTUNNELLING/PIPE JACKING

4.1. Scope

This specification covers general requirements of microtunneling method used for providing pipes.

4.2. General

Microtunnelling is a process of accurately excavating, non-man entry tunnels for installing underground pipelines, using laser guided remote controlled shields and installing product pipelines by jacking technique as the tunneling goes on simultaneously. The term microtunnelling is generally applied to small-diameter tunnels and pipelines installed by pipe jacking methods behind a remotely controlled tunnel boring machine.

Pipe jacking is defined as the installation of a tunnel lining by jacking pipes behind a shield, tunnelling machine or auger boring machine. It is customary to call the process of microtunnelling and pipejacking together as only

microtunnelling wherein pipejacking is an obvious integral component.

The microtunnelling machine shall be selected with regard to the ground conditions, length of drive and other relevant factors.

The Contractor shall be fully responsible for the selection, design, supply, operation and maintenance of tunnelling machines, shields, ancillary equipment, consumables, and any materials whatsoever required for the construction of the tunnels.

Microtunnelling machines shall comply generally with the provisions of covering TBMs, shields, slurry and earth pressure balance machines.

The supplementary system required for microtunnelling and pipejacking operation shall include muck disposal system and slurry separation system, automatic pipe lubrication system, grouting system, guide rails, entrance and exit seals. The entrance and exit seals shall be capable of withstanding anticipated hydrostatic loads plus the pressures exerted by the pressurized systems. Man, entry requirements are only applicable for internal diameters of 1,200mm or greater.

Pipe shall be provided at required location by microtunneling method for specified diameter and gradient as per drawing and as directed by engineer. The specifications are meant to provide general guidelines and compliance by the contractor. It does not however relieve the contractor from taking all other steps and precautions as deemed necessary to complete the installation of the pipelines successfully within the specified contract period and quoted cost. The work shall be executed in accordance with best modern practices and using special techniques of trenchless technology.

4.3. Applicable Codes

The following standards/codes, unless otherwise specified herein, shall be referred. In all cases, the latest revision of the standards/codes shall be referred to;

S.N.	IS Code	Title
1	456	Code of practice for plain and reinforced cement concrete
2	458	Specification for precast concrete pipes (with or without reinforcement)
3	516	Methods of test for strength of concrete
4	269	Specification for ordinary and low heat Portland cement
5	383	Specification for coarse and fine aggregates from natural sources for concrete
6	6432	Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement.
7	2062	Steel for General structural purpose specification.

- 8 2314 Steel sheet piling sections.
- 9 3589 Electrically welded steel pipes for water, gas and sewage.

5. Pipe Jacking/Pipe Pushing

5.1 General

The pipe jacking /pipe pushing method specified herein for installing the water pipelines shall not relieve the contractor in any way from his prima facie obligation and responsibility under the contract to successfully install the pipelines without causing interruptions to train and/ vehicular traffic and within specified contract period and amount. Contractor shall submit quality Assurance manual giving complete details of method adopted for pipe jacking /pipe pushing and pipe jacking including monitoring system, health and safety precautions taken and quality control.

5.2 Survey and Geotechnical Data

Contractor shall be deemed to be fully aware and conversant with the underground utilities, geotechnical data and ground water conditions. It shall be obligatory for contractor to carry out survey (GPR) and geotechnical investigation as considered necessary by him and satisfy himself of the adequacy of data/testing. He shall ensure that the method and equipment's proposed by him are in accordance with the geotechnical and other requirements pertaining to the site. The Engineer shall not be responsible for any changes in the method or equipment necessitated during execution of the work and it shall be Contractor's sole responsibility to ensure deployment of proper method and equipment's for the work. The Contractor shall ensure that the trenchless technology system including where pipe jacking /pipe pushing is specified shall successfully excavate in the wide-ranging ground conditions, from water charged clayey strata with boulders to rocky strata, likely to be encountered at site.

5.3 Jacking System

The jacking system comprises high thrust hydraulic jacks mounted in a jacking frame capable of exerting the required jacking force against a purpose-built thrust wall to push the pipes and the shield forward through the ground. The jacking force is transferred evenly to the jacking pipe through a push ring connected to the pipe.

5.3.1 Pull-back or telescopic Station

To permit tool changing on TBM's for 1,700mm tunnel ID or greater, a steel cylinder shall be located directly behind machine powerpack with either two or four 100t jacking cylinders, each with 1700mm stroke powered from the machine powerpack and fitted with stroke and pressure sensors on one cylinder to indicate on the main operators screen. This shall be with gripper devices to allow the machine to be retracted. Note when using this it is necessary to

secure all the lead pipes as there is a tendency to pull the machine off the end of the pipe. The main use of this is to ensure that even force can be applied to the cutters, in long distance pipe jacking the pipe packers tend to compress and a springing effect can occur whereby the machine jumps into the face causing shock loading to cutter bearings and shattering cutter discs.

5.3.2 Guidance System.

The guidance system shall meet the requirements of guidance system mentioned below. The device shall be installed in the jacking shaft and the beam is set to the desired level, gradient and alignment. The microtunnelling machine shall have photo sensitive cells on the target panel located at the rear of the shield which converts the laser position into digital data. The data are then electronically transmitted to the operator's control panel where digital readout of the location can be made.

On curved alignments additional laser stations inside the jacked pipeline are provided to ensure correct transfer of positional data.

The laser source or theodolite shall be firmly supported in the jacking pit so that it is independent of any movement that may take place during the jacking operation requiring reaction from the shaft walls.

a) General

An adequate guidance system shall be installed on tunnelling machines with a display to show the position and altitude of the machine relative to the design alignment. The display shall be visible to the machine driver at all times.

A secondary means such as a plumb-bob or other apparatus shall be used to check inclination, and to indicate roll. Shields shall be furnished with a means of controlling orientation.

Detailed guidance information shall be checked against the tunnel alignment control at regular intervals as agreed with the Engineer.

The system operation shall vary from totally manual to fully automated. Using the information from the laser system and other sensors, the operator controls various functions of machine-like cutter head RPM, thrust, directional steering, slurry operations, lubrication etc to ensure drive as per designated alignment.

The operator shall monitor all the information and continuously feed into the control panel as necessary. He shall be alert at all time and shall observe the crew's activities and other site activities, evaluate the information and make appropriate operational decisions. The Operator shall monitor and keep record of line and grade of the machine, cutter head torque, jacking thrust, RPM, steering pressures, slurry flow rate, pressures of slurry systems and rate of advancement.

b) Laser Guidance System

Conventional laser guidance systems may be adequate for individual drive lengths up to 400m and in straight alignment. However, for curved and longer drives properly designed guidance system must be used. It shall be suitable for curved and long-distance drives and be independent of the machine manufacturer if possible.

Anti-roll protection shall be with an external sensor giving fast reaction times to prevent machine roll should the cutter head 'snag' and cause a roll.

Moving station can be used which has a 3-stage installation, stage one launches the machine with the laser in the shaft as usual, after approx. 80m the station must be moved to the tunnel together with a rear reference station laser checking back to a reflector mounted on the original shaft laser station tunnel and uses a reference station mounted in the normal shaft laser position.

5.3.3 Remote Control System

All microtunnelling systems rely on remote-control capability. The control system monitors and controls the steering of the shield, spoil removal system (slurry or augur or vacuum), jacking system and guidance system, and shall meet the requirements set out in following sub sections

The control cabin shall be located near to the jacking pit so that the operator can visually monitor the activities in the pit. Where it is not possible to locate the control cabin near to the pit due to space limitations, a CCTV camera system shall be set up in the pit to allow the operator to monitor the activities in the pit.

5.4 Jacking Shaft /Driving Pit

Jacking Shaft /Driving Pit is an important temporary structure from where jacking operation is performed. The shaft can be rectangular or circular in shape and shall be securely supported to ensure safety of persons working inside as well as the equipment. and shall be of required depth as per invert level of pipe. These shall be constructed by providing MS sheet piles / concrete piles as approved by Engineer. The size of jacking shaft shall be such that it is capable of accommodating the jacking equipment (also the shield), jacking pipe and other paraphernalia and enable construction of the manhole or chamber as required. The requirement of jacking shaft shall take full cognizance of the available working space and intended equipment. The bottom floor of the jacking shaft shall be of concrete (M20) of minimum 300 mm thickness which will provide good base for placing jacking machine, sleeve pipe and pipes for jacking. It is usually constructed at locations where permanent manholes to be built.

It shall be the responsibility of the Contractor to design the jacking shaft, its supporting dewatering system, access system for personnel and materials and ventilation systems, besides all other functional requirements to allow it to function as a jacking shaft on a microtunnel system. Due consideration shall be given to the depth, hydrostatic and earth as well as surcharge loads due to equipment/ vehicles plying in vicinity of the shafts.

The shafts shall be provided with appropriate means of entry of workmen and staff which shall be separate from the hoists or lifts for the purpose of lowering of pipes, materials or equipment etc. The size of the shaft shall duly account for these requirements making due allowance for available working space on site.

5.5 Receiving Pit/shaft

The size of receiving pit/shaft shall be such that it is capable of receiving pipe jacking /pipe pushing machine and other paraphernalia and enable construction of manhole as required. The receiving pit shall be constructed in similar way as per driving pit.

It shall be the responsibility of the Contractor to design the receiving shaft including the number of such shafts required considering the drive strategy he intends to employ, its supporting, dewatering system besides all other functional requirements to allow it to function as a receiving shaft on a microtunnel system. Due consideration shall be given to the depth, hydrostatic and earth loads as well as surcharge loads due to equipment/vehicles plying in vicinity of the shafts.

The Contractor shall be responsible to ensure minimum number of temporary shafts and he will be required to erect any permanent structures at such locations as acceptable to the engineer at no extra cost to the Employer.

5.6 Thrust Wall

Thrust wall is temporary reinforced concrete wall or steel structure built within the jacking shaft / driving pit to transfer the jacking force to the ground during jacking operation. The jacking shaft will have a single thrust wall and shall be perpendicular and square to the pipeline to be jacked. The thrust wall shall be in good contact with soil / rock behind or anchored into bottom so that wall can transmit the jacking force effectively to the ground without affecting the shoring system and to provide the required jacking force.

5.7 Entrance Ring

A steel flange shall be fitted with rubber seal (10 mm to 20 mm thick circular rubber gasket whose outside diameter is same as that of the steel flange and the inside diameter is smaller than that of the jacking pipe) installed perpendicular to the pipelines at the entrance. The purpose of the rubber seal is to prevent the slurry or ground water from entering into the shaft through the

pipe entrance.

5.8 Exit Ring

This is similar to the entrance ring except that the internal diameter of the rubber seal is much smaller than that of the jacking pipe and is installed to prevent the slurry or ground water from escaping the tunnelling machine when it emerges at the receiving pit.

5.9 Guide Rails (Jacking Table / Frame)

To facilitate placing of the pipe jacking /pipe pushing machine and pipes in the jacking shaft, a set of guide rails assembly (also known as jacking table/ frame) shall be carefully set up in the shaft to correct alignment and gradient so that the pipe when placed on it stays in line with and square to the pipeline alignment. The guide rail assembly shall be independent of the thrust wall so that it is not disturbed due to jacking force exerted onto the thrust wall.

5.10 Thrust Pressure Plate

The thrust pressure plate usually of 50 mm to 100 mm thick mild steel plate shall be installed between the jack assembly and the thrust wall. The pressure plate enables the concentrated jacking load from the jacks to be transmitted evenly to the thrust wall.

5.11 Jacking Ring

Jacking ring or thrust plate is a purpose made structural fitting which shall be installed between the jacking assembly and the jacking pipe to transfer the point loads from the individual jacks into evenly distributed jacking force to the pipes being jacked. The ring shall be fabricated and machined, if necessary, so that it fits exactly onto end of the jacking pipe.

5.12 Automatic Water sprinkling system

An automatic water sprinkling system shall be provided by the Contractor to wet the jacking pipes immediately prior to the pipes being lowered down the jacking shaft.

5.12.1 Automatic Lubrication System

In order to maintain the frictional forces and resultant jacking forces to minimum, automatic lubrication system capable of operating the injectors in sequential or selective manner shall be provided with the system. This lubrication system must be integrated with the drive control system in the operator's console.

5.13 Intermediate Jacking Station.

For longer distance jacking (>100 m), intermediate jacking station, comprising a telescope type jacking pipe assembly (usually made of steel) shall be used. A set of inter jacks and push ring shall be installed around the inner side of the female pipe of the telescopic pipe assembly. The intermediate jacking pipe assembly shall be installed at appropriate point and jacked in along with the other jacking pipes. For railway crossing jacking and receiving stations shall be constructed outside the railway boundary.

Whether the alignment is made up of a series of straight sections or it will follow curvatures, it will be appropriate to be ready with Intermediate Jacking Stations to be inserted in the pipe train in a planned manner whether operated or not. Inter jacks shall be designed to minimize the jacking forces. The pipe manufacturer must have the capability to fabricate inter jack pipes as necessary.

Inter jacks need to be inserted into the drive at least 100m behind the machine and every 100m thereafter or as frequently as considered necessary by the Contractor considering his drive strategy and equipment.

The inter jack can either be of steel construction or purpose-built pipes. Exact circularity tolerances shall be strictly adhered to for ensuring a good working seal for the life of the drive.

A double seal arrangement shall be used on the lead pipe spigot fitting to the rear tail skin of the inter jack section.

Lubrication shall be provided to maintain a good lubrication of the sliding joint, an adjustable seal shall also be used as with the articulation seal on the machine. The cylinders shall be fitted with a stroke measuring device to indicate in the main control screen.

5.14 Cutter Head

It is usually a disc shaped wheeled mounted on the face of the micro tunneling machine (shield) and shall be driven by hydraulic or electric motor, located within the machine. The excavation capabilities of a pipe jacking /pipe pushing machine depends very much on the type of cutter head used, its speed of rotation and average and peak torque etc. In soft ground tunneling the cutter head shall have bits arranged in such a way to cleave and guide the soil into a chamber behind the cutter head through the openings provided in the cutter wheel. In case of rock or hard ground tunneling the cutter, head shall be equipped with suitable bits, roller bits or disc cutters for effective transfer of cutting energy to rock. The cutter head shall be configured appropriately considering geotechnical parameters such as compressive strength, elasticity, tensile strength, abrasively etc of the material to be excavated. The tunneling shall be equipped with a crushing chamber behind the cutter head with powerful crusher to crush the excavated rocks into smaller pieces. Moreover, the machine shall be capable of exerting a large thrust force/ torque on the

tunnel face to facilitate excavation of the rock. The speed of rotation, torque, bit arrangement (and its structural and mechanical characteristics to withstand rock excavation for longer drive) of the cutter head and the thrust force the tunneling machine is capable of exerting on the rock face are important features which shall be considered when selecting machines for tunneling work.

5.15 Jacking Ring

Jacking ring or thrust plate is purpose made structural fitting which shall be installed between the jacking assembly and the jacking pipe to transfer the point loads from the individual jacks into evenly distributed jacking force to the pipes being jacked. The ring shall be fabricated and machined, if necessary, so that it fits exactly onto end of the jacking pit.

5.16 Recirculating Slurry System.

In different ground conditions and high ground water heads, a recirculating slurry system shall be used. the slurry system requires a suspension of bentonite to be prepared at the surface. This suspension is pumped to the cutter chamber via a system of pipes arranged within the jacking pipe. If necessary, the slurry is to be pressurized to a level required to maintain face support. In the cutter chamber the slurry mixes with the excavated ground, and this mixture normally passes through an in-built crusher with an eccentric radial motion to ensure that no ground particle larger than the slurry system can handle enters the return side of the system. Contractor can use polymer to suit his methodology as approved by Engineer. The mixture is to be pumped to the surface where the soil particles are removed from suspension by simple gravity decantation or by using centrifugal forces within hydro cyclones or similar apparatus. Chemical flocculants may be added to improve efficiency of settling.

The newly cleaned slurry is monitored and reconditioned by the addition of further chemicals, to meet the quality required at the face, and recycled through the system. The slurry system has the advantages of being continuous.

5.17 Manual Excavation of Horizontal Bore for Pipe Jacking

In case of short lengths and depending on site conditions the contractor shall be required to be provide horizontal bore by manual excavation for gravity pipe jacking of required diameter which will function as a sleeve for gravity line of smaller diameter OR function as carrier pipe line of required diameter. For this purpose, only jacking pit is required to be provided which shall be constructed as per clause no 4.3 above. The base concrete, thrust wall and thrust pressure plate shall be provided in jacking operation.

The excavation and jacking of pipe operation shall be done to required alignment and gradient. The excavation of required dia as per the outer diameter of jacking pipe shall be made manually by suitable tools followed by jacking of pipe sequentially such that entire length of pipe jacking is covered.

Grouting in CM (1:3) shall be done to completely fill the annular space around outside surface of pipes. Suitable ventilation system shall be provided within pipeline. The provision of health and safety measures shall be as per clause nos6 of this specification.

5.18 Disposal of Excavated Material

The muck / excavated material shall be disposed off free of cost to required place as directed by Engineer. Dewatering if required shall be done as per site condition. The road surface excavated for driving and receiving pit etc shall be reinstated to its original condition as directed by Engineer.

6. PIPE JACKING

6.1 Pipes

MS pipe shall be of required internal diameter conforming to Standards to IS 3589

MS pipes of required diameter is to be provided as sleeve to the pipeline of smaller diameter it shall conform to IS 3589. The minimum thickness of plate for MS shall be as per specification mentioned in Schedules.

The consecutive MS pipe shall be joined with butt joints by welding.

6.2 Pipe Jacking

The system shall comprise of high thrust hydraulic jacks mounted in jacking frame capable of exerting the required jacking force against the thrust wall to push the pipes and the shield forward through the ground. The jacking force shall be transferred evenly to the jacking pipe through a push ring connected to the pipe. The guiding system shall be comprised of a laser beam device or a theodolite with laser beam attachment. The device shall be installed in jacking shaft and the beam to be set to desired level, gradient and alignment. The data for micro tunneling and pipe jacking system shall be electronically transmitted to the operators control panel where digital read out of the location can be made. The laser torch or theodolite shall be firmly supported in the jacking pit so that it is independent of any movement that may take place during the micro tunneling operation. The control cabin shall be located on ground near the jacking pit so that the operator can visually monitor the activities in the pit.

Analysis & Design

The Contractor shall be responsible for design of the jacking pipes as per the drive strategy intended to be adopted by him. The pipes shall be designed to account of the anticipated curvature. Precast concrete pipes shall be designed against internal and external loadings including: Jacking forces, ground pressure, water pressure and handling forces. The precast concrete pipes shall be sufficiently reinforced to withstand all stresses induced by the loads

mentioned, without cracking, spalling and distortion

6.3 Hydraulic Test

After completion of pipe jacking operation, the entire pipeline is to be tested for water tightness as per IS 783 and as directed by Engineer before handing over it to owner.

7. HEALTH AND SAFETY

The contractor shall provide proper safety precautions including proper barricading of pits at work site to ensure that no accidents/ mishaps occur at site. Locations, if any across railway and express highway, no open excavations within railway and express highway premises would be permitted. All health and safety precautions shall be observed by workmen at site as per the safety manual submitted by contractor and as approved by Engineer.

8. MEASUREMENT AND PAYMENT

8.1 Pipe jacking /pipe pushing

The length of the micro tunneling shall be measured in running metre nearest to a cm as executed from inside face of jacking pit on upstream side to inside face of receiving pit on downstream side along the alignment of pipe. The payment for micro tunneling shall be on running metre basis and shall include boring in any type of underground strata, providing jacking and receiving pits including excavation, shoring of any type, dewatering, disposal of muck / excavated material to any place as directed by Engineer and paraphernalia work, back filling and reinstatement of excavated surface to its original condition as specified and directed by Engineer.

8.2 Pipe Jacking

MS Pipes

The length of MS pipe jacking shall be measured and paid in running meters nearest to a cm as provided and jointed from inside face of upstream jacking pit to outside face of downstream manhole. The payment shall include MS pipes with butt joints, the jacking platform and thrust wall etc. complete as specified and directed by Engineer.

8.3 Construction Works

8.4 Construction of Jacking and Receiving Shafts

Thrust and reception pits and shafts shall be designed and constructed to allow the safe operation of plant, equipment and handling of materials and to withstand all loadings imposed by ground pressure, superimposed loads from surface structures and the maximum anticipated thrust forces. Where

Permanent Works accommodate the thrust arrangements, these shall be designed to ensure that the Permanent Work is not damaged.

Before work may start on any thrust pit, it shall be demonstrated that the design will withstand the maximum jacking force of which the jacks are capable.

In all cases the Contractor shall submit his proposals including calculations to the Engineer for his agreement as required.

If applicable, the jacking equipment shall have a jacking capacity of 20% greater than the maximum calculated allowable jacking load required to install the pipe. The jacking system shall develop a uniform distribution of forces on the end of the casing and / or pipe by the use of cushioning material and / or thrust rings.

A pipe lubrication system shall be used to lower friction developed on the surface of the pipe

/ casing during jacking as detailed in following subsections

The thrust block shall be designed to safely withstand the maximum jacking pressure to be used, with a factor of safety of at least 2.0 without excessive deflection or displacement.

Each shaft shall have a separate means of access or ladder bay for access which shall be isolated from the part of the shaft used for hoisting materials. The shaft support system shall be watertight and shall prevent any pressurised slurry from the tunnel face reaching the shaft.

The shaft shall be kept dry at all times and shall have a drainage sump to pump out the ingress water. The Contractor is deemed to be fully aware of the serious consequences to the tunnelling equipment and other accessories if the shaft is flooded. He shall take every precaution to avoid flooding in the shaft. The shaft shall be well protected against surface runoff getting into the shaft. The Contractor shall be solely responsible for any consequential delays and expenditure arising as a result of flooding the shaft.

The shaft floor shall be designed to withstand the load of the tunnel machine and other accessories.

The Contractor shall be solely responsible for providing and subsequent removal of shoring to the shafts or pits and ensuring stability of the sides of such excavations and safety of adjoining structures.

8.4.1 Design Loads

a) The design shall take at its minimum the following loads-

Full hydrostatic pressure (water table assumed at surface) in combination with zero internal pressure (i.e., tunnel drain down)

- b) Ground loading according to standard practice
- c) Dynamic loading as a result of earthquake forces.
- d) Transportation, handling and installation forces for pipes.
- e) Installation stresses- i.e., stresses due to driving or due to intentional and non- intentional curvatures

8.4.2 Construction of Thrust Wall

The thrust wall shall be designed and constructed by the Contractor to the agreed details. The thrust wall shall be reinforced or unreinforced concrete constructed against the wall of the jacking shaft. The Contractor shall ensure that the thrust wall is constructed as an independent structure and it shall not interfere with the jacking shaft or the floor when jacking force is applied on to it. Contractor shall indicate in his Documents the construction details of the thrust wall showing details on how the wall be made independent of the jacking shaft structure.

The Contractor shall ensure that the thrust wall and the soil behind are in complete contact and there is no gap between them. The Contractor shall further ensure that the thrust wall shall effectively transfer the jacking force on to the soil behind and that the ground behind is capable of withstanding the jacking force.

In the event that there is gap between the thrust wall and the soil behind, the Contractor shall arrange the gap to be filled with accepted cement grout before loading the thrust wall.

The thrust wall shall be demolished fully or partly after completion of the jacking operation involving that wall.

8.4.3 Jacking Frame

The Contractor shall provide a jacking frame in accordance with the microtunnelling equipment manufacturer's details and install it firmly onto the floor of the jacking shaft. He shall ensure that the Jacking frame is installed to the correct grade, levels and alignment. It shall be also square to the pipeline alignment at all times and not disturbed due to forces arising from the jacking operation. The Contractor shall arrange with the Engineer to check the level, alignment etc. of the guide rail and obtain the Engineer's endorsement before commencing the pipejacking work.

8.4.4 Entrance and Exit Arrangement

One of the most critical microtunnelling operations is the launching and retrieval (entry and exit) of the microtunnelling machine. It is critical that the Contractor implements adequate engineering measures including stabilisation of unstable soil by grouting or other means to prevent soil and water inflows into the shaft.

An elastomeric seal shall be provided in the entrance and exit ring. The seal is to prevent the flow of ground water or lubricant through the shield/pipe entry opening on the shaft wall.

The Contractor shall plan this work well in advance and fabricate the fittings and rubber seal as per agreed method and details.

8.4.5 Soil Stabilisation at the Tunnel Entry and Exit

In addition to the seal, it may be necessary to stabilise the soil behind the entrance wall or exit wall. Chemical grouting, cement grouting, jet grouting, piles, ground freezing or temporary shoring are some methods commonly used by the Contractors to prevent the soil flow into the shaft.

8.4.6 Cement Grouting

The Contractor shall be fully responsible for preventing the occurrence of voids outside the pipe and if they occur he shall fill them with cement grout in accordance with following grouting methods/techniques of the Employer's Requirements. Immediately following the jacking operation the Contractor shall pressure grout the jacked section to fill all voids existing outside of the pipe. Grouting shall be from the interior of the pipe through grouting holes as specified.

Systems of standard pipe, fittings, hose, and special grouting outlets embedded in the pipe walls shall be provided by the Contractor. Care shall be taken to ensure that all parts of the system are maintained free from dirt. Grout composed of cement, sand and other accepted compounds and water shall be forced under pressure into the grouting connections at the invert and shall proceed until grout begins to flow from upper connections. Connections shall then be made to these holes and the operation continued to completion.

Apparatus for mixing and placing grout shall be of a type accepted by the Engineer and shall be capable of mixing effectively and stirring the grout and then forcing it into the grout connections in a continuous uninterrupted flow.

After grouting is completed, pressure shall be maintained by means of stop cocks, or other suitable devices until the grout has set sufficiently. After the grout is set, grout holes shall be completely filled with dense concrete and finished neatly without evidence of voids or projections.

8.4.7 Cavity Grouting

8.4.7.1 General

The term cavity grouting shall mean the grouting required to fill the cavities or voids between the excavated profile and the permanent linings of underground works including that due to ground relaxation and any void between permanent and temporary linings.

Primary grouting is the initial cavity grouting which is applied immediately after a unit of lining has been built.

Where primary grouting does not completely fill all cavities, secondary grouting shall be carried out.

The Contractor shall provide a grouting method statement for the Engineer's agreement. The proposals shall include details and location of the mixing plant and grout pump, mix design and constituents, pumping rates and pressures, injection points, methods of monitoring, recording and controlling the sequence, preventing grout leakage and reconciling the volume of grout placed with the theoretical volume required.

For each ring the Contractor shall record at each stage of the grouting process the quantity and type of grout, and the pressure applied at each injection point in a format agreed with the Engineer. The records shall be kept in the Contractor's offices and shall be available for inspection by the Engineer.

Grout shall be used within one hour of mixing.

The annulus between the tunnel lining and the ground shall be grouted immediately after leaving the shield tail skin, or as otherwise agreed with the Engineer. Where grouting through the tail skin is being adopted, this shall be concurrent with the TBM advance.

Grout shall be prevented from entering the space between the tail of the shield and the lining, and from flowing into the face around the cutting edge of the shield or otherwise being wasted.

8.4.7.2 Primary Grouting

Primary grouting shall be undertaken at a pressure sufficient to place the grout properly but not greater than 1 bar above the prevailing hydrostatic pressure at the location of grouting unless the lining and equipment have been designed for higher pressures, and agreed with the Engineer.

Primary grouting shall be timed so as to minimise ground movement.

Primary grout shall be injected through grout holes provided in the linings. Valves shall be connected into the grout holes in order to allow the grout to set

under pressure when the grout hose is disconnected. After the grout has set, permanent plugs shall be installed.

Any sealing material or device installed at the leading edge of the ring to prevent grout loss shall be removed upon completion of primary grouting.

The Contractor shall ensure that grouting pressures do not result in ground heave or overstress or distortion of lining or distortion or damage to gaskets or damage to other structures.

Grouting equipment shall be fitted with a pressure gauge. Grout pressure is to be measured at the nozzle with a suitable gauge.

Grouting shall be carried out at pressures to completely fill the cavity with grout.

Where the primary void filling is by pea gravel injection, subsequent grouting shall be carried out in stages to the agreement of the Engineer.

8.4.7.3 Secondary Grouting

Secondary grouting shall be undertaken in selected rings by means of removing grout plugs from the tunnel lining and drilling a hole to the back of the existing grout.

Secondary grouting is the regrouting of lining and shall be completed as soon as practicable but within 14 days of the primary grouting or when the face has advanced 50 m from the location of primary grouting whichever first occurs. Secondary grouting shall be at a pressure consistent with filling all voids but shall not exceed the design pressures.

Upon completion of grouting, threaded grout plugs shall be fully tightened into the lining.

8.4.8 Deleted

8.4.9 Cement Grout for Cavity Grouting

8.4.9.1 General

General-purpose cement grout shall be mixed in accordance with the proportions given in the table below. The water content shall be kept to the minimum required to ensure a smooth, fluid mix

Mix Proportions for Cement Grout

Class	Proportions by Mass		
	Cement	Sand	PFA
G11	-	-	
G21	3	-	

G31	10	-
G41	-	10
G51	-	4
G61	-	0.5

Pulverised fuel ash (PFA) shall not be used as a constituent of grouts which contain sulphate- resisting cement. Grout shall be used within 1 hour of mixing.

8.4.9.2 Special Grouts

Special grouts supplied by proprietary manufacturers may be used subject to agreement with the Engineer.

Details of accelerating and retarding agents for proposed inclusion within the grout mix shall be submitted to the Engineer for agreement. Any such proposal shall be submitted in conjunction with a statement which outlines the Contractor's interpretation of ground behaviour during tunnel construction.

Primary grout for machine-driven tunnels shall be special grout injected through the tail skin of the machine as it advances.

The Contractor shall propose details of the primary grout, including the required setting times and strength gain to support the weight of the tunnel boring machine (TBM) and the backup and prevent ring distortion. As a minimum the initial set of the grout shall be achieved within 45 minutes of injection at 20°C. The minimum strength requirement from the grout as measured from testing 100mm cubes shall be 1.5 N/mm² in 24 hours. The proposals shall be submitted to the Engineer for agreement prior to commencement of the Works.

Preconstruction grout trials shall be undertaken to demonstrate that the required setting times and strength gains will be achieved. Details of the trials and results shall be submitted to the Engineer.

Records of batching and batcher calibration shall be maintained to demonstrate that grout batching is in accordance with the design mix. Alternatively, grout strength tests may be used.

8.4.9.3 Mixing

Grouts containing polymer additives shall only be mixed in a colloidal-type mixer.

Special grouts from proprietary manufacturers shall be mixed and used in accordance with the manufacturers' instructions.

8.4.9.4 Storage and Delivery

Bagged grouts shall be stored under cover in dry surroundings and on a suitable platform, clear of the ground. Bulk deliveries of grout constituents shall be

stored in appropriate silos with suitable dust control and batch weighing equipment.

8.4.10 Jacking System

The hydraulic jacking system shall be installed against a purpose-built thrust wall in the jacking shaft. The substantial force required for jacking pipes and the tunnelling machine shall be provided by high pressure jacks driven by hydraulic power packs. The ram diameter and stroke of the jacks may vary according to individual Contractor's technique and to suite site conditions.

The jacks shall be mounted on jacking frames as detailed. so that the jacks are square to the pipe alignment. The jacking frame shall be firmly supported to the floor so that it does not move during jacking operation. A push ring shall be used to transmit the jacking force evenly to the pipe.

8.4.11 Jacking Force

The Contractor shall calculate the expected jacking load for each microtunnel drive well ahead of designing the jacking pipes. Accurate estimation of the jacking load is necessary to determine the pipe wall thickness, the need for intermediate jacking stations and lubrication requirements, types of jacking system and thrust block design. The overall jacking force depends on the type of surrounding soil, depth of cover, pipe materials, diameter and the overall length of the pipeline.

The total jacking force essentially consists of two components, "Frictional force around the pipeline" and the balancing force at the tunnel face called "Face Pressure". The Contractor shall use appropriate geo-mechanics formulae and guidelines for computing the jacking force. The Contractor shall calculate the anticipated jacking force for each drive and submit his calculation to the Engineer for acceptance.

The Contractor shall be solely responsible to ensure that the pipes are not subjected to excessive jacking force or torsional force so as to crush them. If such thing occurs the Contractor shall have to remedy the situation at his risk and cost.

In case the anticipated jacking force is expected to be higher intermediate jacking stations must be inserted in the jacked pipeline in a planned manner. For this purpose special interjack stations and interjack pipes shall be provided as specified considering the drive strategy adopted by the Contractor.

8.4.12 Pipe Lubrication System

The boring machines shall be designed to overcut around the external diameter of the pipeline to the required minimum extent only. The Contractor shall carefully monitor the jacking force and use an appropriate automatic lubrication system, in accordance with Section automatic lubricating system section, to

bring down the jacking force within the allowable jacking force for the pipe.

8.4.13 Operation

All key personnel shall be experienced in the pipe jacking process and hold relevant skills accreditation.

Before any particular pipe jack length commences, sufficient pipes and, if required, intermediate jacking station assemblies shall be available to ensure continuous operation.

The agreement of the Engineer shall be sought for inclusion in the Permanent Works of repaired pipes.

The jacking force applied by the thrust pit jacks, or an intermediate jacking station shall not exceed the allowable distributed or deflected design load for any pipe being jacked.

Thrust loads shall be transferred to pipes through a thrust ring which shall be sufficiently rigid to ensure even distribution of the load.

Changes to line and level shall be gradual. The manufacturer's stated permitted draw or angular deflection on any individual joint shall not be exceeded.

Intermediate jacking stations shall be inserted to a predetermined plan. Operation shall commence when loading reaches a predetermined level, which shall be less than the allowable distributed and deflected jacking loads as determined by the manufacturer.

To avoid excessive loading it may be necessary to undertake continuous jacking until completion of the drive. Where this is necessary the Contractor shall put in place appropriate measures to minimise noise and disturbance.

Where necessary means shall be provided to ensure that the pipeline remains stationary when face balance pressure is maintained and when any jacking rams are retracted.

Installed joints shall be prevented from opening when the jacking loads are removed.

Pipes which have been jacked through a pipe jack shall not be used elsewhere on the Works. Cut pipes shall not be jacked.

The annular space between the sides of the excavated tunnel and the jacking pipes shall be constantly filled with an appropriate lubricant as agreed with the Engineer as part of the operational method statement. This lubricating fluid shall be maintained under pressure until completion of the drive. The lubrication injection points shall consist of a minimum of three holes equally spaced around the circumference of the pipe.

Where necessary, the lubricant may contain an accepted additive to limit water loss.

Daily records of the quantity of lubricant used for each length of pipe thrust and the point at which the lubricant was injected shall be kept.

Where the quantities of lubricant injected significantly exceed the theoretical volumes, this shall be investigated and reported to the Engineer.

On completion of pipe jack, the annulus shall be filled by displacing the lubricant with grout. All lifting holes and grouting holes shall be sealed.

On completion of the drive, intermediate jacking stations shall be left fully closed. All jacks, props, thrust rings and packing shall be removed, the ends of the pipes cleaned, and a new packing ring glued to the receiving face. An 'O' ring seal shall then be inserted into the sliding joint and the joint jacked fully closed. The order of closing the stations shall be from the tunnelling shield working back.

8.4.14 Level and Alignment Accuracy

The pipes shall be installed into place, true to line and level. Pipe jacking shall be carried out in accordance with the following alignment tolerances:

- Line +/- 50mm
- Level +/- 25mm

The maximum angular deflection between the pipes shall not exceed 0.5 degrees or the maximum deflection recommended by the manufacturer of the pipes at the jacking force necessary for construction of the tunnel

The pipes shall be installed within the above tolerances from the proposed sewer elevations and locations provided on the Drawings.

Notwithstanding the specified alignment tolerances, the rate of change of direction in any plane, or combination of planes, shall be agreed with the Engineer, taking into account the pipe length, diameter, over-cut, jacking loads, and the manufacturer's recommendations.

No combination of tolerances resulting in a reverse fall will be permitted where the invert of the tunnel is required to convey sewage by gravity flow.

8.4.15 Monitoring of Micro tunnelling Works

In addition to the requirements of following sections the Contractor shall monitor and maintain site records of jacking loads, line and level measurements, the distance moved, the jacking forces and quantity, type, consumption and pressure of injected lubricants. Where applicable, hydraulic pressure of interjacks shall be monitored and recorded by the Contractor. Line

and level monitoring shall be carried out in conjunction with monitoring of the pipe deviation angle.

A graphical relationship between the jacking force and the distance moved shall be produced to ensure that the necessary measures are taken to avoid exceeding the maximum permitted jacking forces.

The jacking force instrumentation shall be calibrated for each drive by the Contractor. The calibration certificate shall be made available to the Engineer.

Copies of all records shall be available to the Engineer at intervals to be agreed.

NAVI MUMBAI MUNICIPAL CORPORATION

CITY ENGINEER DEPARTMENT

Name of work : 24 X 7 WATER SUPPLY SCHEME OF BELAPUR WARD NAVI MUMBAI
UNDER AMRUT-2. DIST. THANE

SPECIFICATION ROAD REINSTATING

Unit	Item of work	Reference to standard Specification		Additional Specification if Any
		No	Pages	
Cum Meter	Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam for..... specification including spreading in uniform thickness, hand packing rolling with 3 wheeled steel/vibratory roller 8-10 tones in stages to proper grade and camber, applying and brooming requisite type of screening/ binding Materials to fill up the interstices of coarse aggregate, watering and compacting to the required density to protect edges, lighting, guarding, barricading and maintenance of diversion etc. complete. as per technical specification Cl. No. 405A.	MoRT & H Cl. 401.8 (I) to(V)	475 /2012	The work shall be done As directed by Engineer - in - Charge

Contractor

No. of correction

City Engineer

Square Meter	Providing 50 mm. thick full grout bituminous road surface including supplying all materials, preparing the existing road surface, laying the required thickness of metal layer, heating & spraying bitumen spreading chips laying with seal coat @ 125 kg/100 Sqm. and compacting etc. complete with bulk asphalt 60/70 grade. Without seal coat.	Rd.47	397/2012	1. The work shall be done As directed by Engineer - in - Charge. 2. Mode of measurement shall be per one square meter.
Square Meter	Providing and laying bituminous tack coat, @ 50 Kg/100 Square meter by manual sprayer including supplying all materials, preparing the existing surface, heating bitumen and applying tack coat evenly on the surface etc. complete. (using 60/70 grade)	MoRT & H Cl. 503	168/2012	1. The work shall be done As directed by Engineer - in - Charge. 2. Mode of measurement shall be per one square meter.
Cum Meter	Providing and laying hot mix hot laid bituminous macadam 50/75 mm average thickness with 3.3% bitumen content by weight of total mix on prepared surface with specified graded crushed aggregates for the base / binding course including loading of aggregates with F.E. loader, heating of stone aggregates and bitumen and mixing in modern drum mix type of hot mix plant, transporting the mixed material to work site laying the mixed material with sensor paver finisher to the required grade, level and camber, rolling by power roller and vibratory roller to achieve the desired density (Grade of Bitumen should be 60/70) and cost of all	MoRT & H Cl. 507,508 ,509. RD-67	423/2012	1. The work shall be done As directed by Engineer in charge. 2. Mode of measurement shall be per one cubic meter. Bitumen of I.S. Grade of 60/70 for penetration should be used.

	materials, bitumen from refinery etc. complete. (excluding tack coat)			
Square Meter	Providing 25 mm thick premix bituminous carpet of 60/70 grade of bitumen including supplying all materials, preparing and cleaning the base heating bitumen , mixing hot bitumen and chips, laying the carpet layer and compacting etc. complete.(using Bulk Asphalt).	Rd. 49	398/2012	<p>1. The work shall be done As directed by Engineer - in - Charge.</p> <p>2. Mode of measurement shall be per one square metre.</p>

**NAVI MUMBAI MUNICIPAL CORPORATION
CITY ENGINEER DEPARTMENT**

Name of work : 24 X 7 WATER SUPPLY SCHEME OF BELAPUR WARD NAVI MUMBAI UNDER AMRUT-2. DIST. THANE

DETAIL OBLIGATORY CONDITIONS FOR BRIDGE

ITEM: PROVIDING, FIXING RSJ AND OTHER STRUCTURAL STEEL WORKS

This item includes design, providing, fabricating and testing of MS bridge with proper structural steel. The agency has to design and get approved from IIT Bombay the entire design before fabrication considering entire considered and planned future load etc. complete as per directives of the engineer in-charge. This item covers MS/RS girders, MS angle, channels, flats, base plates, gusset plates, cleat, bracket etc. and other accessories as per requirement and as directed and fabricating the assembly by cutting, drilling holes, etc. and erecting and fixing item as site with necessary riveted or welded joints, fixtures with nuts and bolts, etc. wherever necessary together with their proper fixing and embedding in masonry or slabs of concrete as directed. Structural steel works materials shall be procured by the contractor from the open market at his cost. The item includes 3 coats of oil paint of shade as directed to all structural work.

All above operations including cost of materials and labour thereof are included in the tender item. The measurement and payment shall be on the weight basis in the unit as mentioned in Schedule 'B' actually erected at site as directed shall be admissible for payment. RSJ channels, angles, flats, gusset plates, brackets, base plates, cleats, packing pieces actually used as directed shall be admissible for payment but not the rivets, nuts, bolts etc. The riveted or welded joints or fixing with nuts are included in the tendered rates. The specification for this item given in the Standard Specification Book (Red Book) published by the B & C Department will be followed. The measurement and payment shall be on the weight basis in the unit as mentioned in Schedule 'B' actually erected at site as directed shall be admissible for payment.

MODE OF MEASUREMENT AND PAYMENT

Item shall be measured and paid on weight basis apply to above items

EPOXY PAINTING

Contractor

No. of correction

City Engineer

Surface preparation for applying Epoxy Paint:-

The Surface should be cleaned by wire brush, surface should be clean by solvent degreasing and derusting by applying chemical method and scaffolding if necessary. The surface should be cleaned, dry, free from rust and mill scale, blast cleaning should be done second quality BS 4232, minimum surface profile not to exceed 100 microns. Where a highly corrosive condition exists, blasting to first quality should be applied Mill scale should be removed for optimum performance. Remove all other contaminants, oil, grease etc. by use on an aromatic solvent like xylol. The surface should be clean and dry before priming, Priming: Blast cleaned surface should be primed within four hours of blasting. Two coats of primer should be applied. For airless spraying tip size 0.38 to 0.48 mm and pressure should be in the range of 110 to 150 kg per square meter, and pump rating 23:1. It should not be applied when temperature falls below 10 degree centigrade relative humidity rises above 90% or during rain, fog or mist. Brushes and spray equipment should be or when cleaned with thinner. For conventional spraying use only standard equipment, providing pressure 2.5 to 1 kg per square centimeters, stir base well before and after adding catalyst.

Application of paint: The paint should be equivalent such as Dr.Bake, Krishna, Conchem, Asian Paint, Atul Limited. Berger Paint. Epoxy primer 50 to 60 microns thick and covering two coats of 30 microns thick each should be applied to the new M.S. Pipe as per instructions given by the Manufacturer. For airless spraying tip size 0.61 mm and pressure should be in the range of 110 to 160 Kg per square centimeters, with pump ration 23:1. After mixing bate & catalyst the mixture should be allowed to mature for 30 minutes before being used. Due health and safety care of labour and painters should be taken by contractor. Testing: Epoxy paint should be tested as per standards and results should be submitted to MIP at agency's own cost

MODE OF MEASUREMENT AND PAYMENT

Payment will be made on Sqm. basis after satisfaction of Engineer-in-charge. 90% payment proposed against completion of paint work satisfactory and 10% cost of work shall be retained till laboratory & Manufacturer test certificate.

ITEM: Piling Work..... Complete.**1.0 PILE FOUNDATIONS****1.1. DESCRIPTION**

This work shall consist of construction of all types of piles for structures in accordance with the details shown on the drawings and conforming to the requirements of these specifications.

The construction of pile foundations requires a careful choice of the piling system depending upon sub-soil conditions and loading characteristics and type of structure. The permissible limits of total and differential settlements, unsupported length of pile and any other special requirements of project are also equally important criteria for selection of the piling system. The method of installing the piles, including details of the equipment shall be submitted by the Contractor and got approved from the Engineer.

The work shall be done as per IS: 2911 except as modified herein.

1.2. SUB-SURFACE INVESTIGATION

The complete sub-surface investigation of strata in which pile foundations are proposed shall be carried out in advance and by in-situ pile tests. The detailed geotechnical sub-surface explorations shall be carried out in accordance with IS 1892. Borings should be carried up to sufficient depths so as to ascertain the nature of substrata around the pile shaft and below the pile tip. However, depth of boring shall not be less than:

- i) 1.5 times estimated length of pile in soil but not less than 15m beyond the probable length of pile
- ii) 15 times diameter of pile in weak/jointed rock but minimum 15m in such rock
- iii) 4 times diameter of pile in sound, hard rock but minimum 3m in such rock

The sub-surface investigation shall define adequately stratification of substrata including the nature and type of strata, its variation and extent and specific properties of the same. The investigation shall be adequate for the purpose of selection of appropriate piling system and for estimating design capacities for different diameters and length of piles.

Pressure meter tests may be used in the case of rock, gravel or soil for direct evaluation of strength and compressibility characteristics. Though these tests are of specialized nature they are most appropriate for difficult/uncertain sub-strata especially for important projects. For piles socketed into rocks, it is necessary to determine the uniaxial compressive strength of the rock and its quality.

The investigation shall also include location of ground water table and other parameters including results of chemical tests showing sulphate and chloride

content and any other deleterious chemical content in soil and/or ground water, likely to affect durability.

1.3. TYPE OF PILES

The piles may be of reinforced concrete, prestressed concrete, steel or timber. The piles may be of solid or hollow sections or steel cased piles filled with concrete.

Concrete piles may be driven cast-in-situ or precast or bored cast-in-situ or precast piles driven into preformed bores. The shape of piles may be circular, square, hexagonal, octagonal, "H" or "I" Section.

1.4. MATERIALS

The basic materials shall conform to the specifications for materials given in Structural Concrete Work. The specifications for steel reinforcement, structural concrete, prestressed concrete and structural steel to be used in pile foundations shall be as given Structural Concrete Work.

1.5. CONCRETE IN PILES

Grade of concrete to be used in cast-in-situ piles shall not be less than M 35 and the cement content shall not be less than 400 kg per cubic meter of concrete. Grades of concrete for precast reinforced and prestressed concrete piles shall not be less than M 25 and M 35 respectively. Maximum water cement ratio shall be 0.5 for cast-in-situ piles and 0.45 for precast piles. (Clause 709.1.9 of IRC:78: 2000 was amended as IRC notification No: 54 dated 28.05.2009)

For both precast and cast-in-situ-piles, the values regarding grade of concrete, water cement ratio, slump shall be as follows:

TABLE 1100-1 PROPERTIES OF CONCRETE

	Concrete Cast-in-situ by Tremie	Precast Concrete
Grade of Concrete	M 35	M 35
Min. cement concretes	400 kg/m ³	400 kg/m ³
Max. WC ratio	0.45	0.45
Slump (mm)	150-200	50-75

The minimum slump of concrete for driven cast-in-situ piles shall be 100 mm to 150 mm and that of bored cast-in-situ piles 150 mm to 200 mm. The slump should not exceed 200 mm in any case.

Concrete mix should have homogeneous mixture with required workability for the system of piling adopted. Suitable and approved admixtures may be

used in concrete mix where necessary.

Where piles are exposed to action of harmful chemicals or severe conditions of exposure due to presence of sulphate, chloride etc, it may be preferable to opt for higher grades of concrete restricting water cement ratio to 0.45. Special types of cement, such as sulphate resistant cement may be used where considered appropriate.

1.6. TEST PILES

Test piles which are shown on the drawings or specified in the contract or installed by the Contractor on his own to determine the lengths of piles to be furnished shall conform to the requirements for piling as indicated in these specifications, if they are to be incorporated in the completed structure.

Test piles that are to become a part of the completed structure shall be installed with the same type of equipment that is proposed to be used for piling in the actual structure.

Test piles which are not to be incorporated in the completed structure shall be removed to at least 600 mm below the proposed soffit level of pile cap and the remaining hole shall be backfilled with earth or other suitable material.

The piles shall be load tested in accordance with provisions laid down in this section.

1.7. PRECAST CONCRETE PILES

1.7.1. General

Precast concrete piles shall be of the size and circular or square shape as shown in the approved drawings. If a square section is employed, the corners shall be chamfered at least 25 mm unless otherwise specified on the drawings. The length of pile shall not normally exceed 25 metres. However, where special equipments for handling and installation are available to the satisfaction of the Engineer, longer length could be permitted.

Piles shall be cast with a driving point and for hard driving, shall be shod with a metal shoe approved by the Engineer.

1.7.2. Stacking, Storing and Handling

Care shall be taken that at all stages of transporting, lifting and handling, piles are not damaged or cracked. During transport and stacking of piles, they shall be supported at the same points as those provided for lifting purposes. If the piles are put down temporarily during handling, they shall be placed on trestles or blocks located at the same points.

Piles shall be stored at least 300 mm above firm level ground which is not liable to unequal subsidence or settlement under the weight of the stack of piles. They shall be placed on Umler supports which are level and spaced so

as to avoid bending. The supports shall be vertically one above the other. Spaces shall be left round the piles to enable them to be lifted without difficulty. The order of stacking shall be such that the older piles can be withdrawn without disturbing newer piles. Separate stacks shall be provided for different lengths of piles. Where piles are stacked in layers, the number of layers shall not exceed three.

Whenever curing is needed during storage, arrangements shall be made to enable the piles to be watered. For detailed precautions with regard to curing operations specifications for structural concrete shall apply.

Before the operation of handling and driving the piles, the minimum periods counted from the time of casting shall be allowed for as indicated in Table 1. Pre-stressed piles shall not be lifted or handled until fully stressed.

TABLE 1 TIME FOR CURING PRECAST PILES

Type of cement used In casting, the pile	Minimum periods from time of casting			
	Strike side- shutters (hours)	End of wet curing (days)	Lift from casting bed (days)	Drive (days)
Ordinary Portland	22	7	10	28
Rapid hardening Portland	12	7	7	10

1.7.3. Lengthening of Piles

Where a pile is to have another length cast on it during driving, the longitudinal reinforcement shall preferably be joined by full penetration butt welding. The concrete at the top of the original pile shall be cut down to expose not less than 200 mm of the bars to avoid spalling of the concrete by heat. The added bars have to be held accurately and rigidly in position during welding. Where facilities on site are insufficient to make proper butt welding practicable, the joint may be made by lapping. The reinforcement at the head of pile will need to be exposed for full anchorage length or 600 mm whichever is greater and the new bars over-lapped for this distance. Unless otherwise specified, the extension of the pile shall be formed to the same cross-sectional profile and with concrete of at least the same strength as that specified for the original pile. The stirrup spacing shall in no case be greater than 150 mm. Not more than one extension shall be permitted. In case more than one extension is permitted by the Engineer, only approved mechanical couplers shall be used.

Driving shall not be resumed until:

- (i) The strength of the concrete in the extension is at least equal to the specified characteristic strength of concrete in pile, and
- (ii) The approval of the Engineer has been obtained.

1.7.4. Removal of Surplus length

Any length of pile surplus to that required for incorporation in the structure shall be cut off neatly and removed. During the process of cutting off, it shall be ensured that projecting reinforcement to be anchored into the pile cap and the pre-stressing strands/wires are not damaged. When stripping pre-stressed concrete piles, shock release of tendons shall be avoided. Reference may also be made to clause 7.7.1. of IS:2911 (Part I Section 3) in this connection.

1.7.5. Risen Piles

Level reading should be taken on each pile after driving and again after all the piles are driven. Piles which are found to have risen due to ground heave or as a result of driving adjacent piles, shall be re-driven to the original depth or resistance unless re-driving tests on adjacent piles have shown this to be unnecessary.

1.7.6. Manufacture

The pile should be cast in one continuous operation from end to end of each pile. Manufacture of precast concrete piles shall conform to the guidelines contained in clause Nos. 7.1, 7.2 and 7.3 of IS:2911 (Part I, Section 3).

Pile shall be provided with suitable shoe for protecting the point of the pile during driving in hard ground.

In case of precast piles to be lowered in the prebored holes, M.S. tube of 30 to 50mm has to be casted at the centre for injecting grout material.

Piles shall not be moved from casting bed until the concrete has hardened sufficiently.

Piles shall not be driven in less than 28 days after casting or unless their strength at the time of driving is at least that specified for 28 days.

1.7.7. Pre-stressed Concrete Piles

Additional specifications for precast pre-stressed concrete piles shall conform to those contained in clause 8 of IS:2911 (Part 1 Section 3).

1.8. CAST-IN-SITU CONCRETE PILES

Cast-in-situ concrete piles may be either installed by making a bore into the ground by removal of material or by driving a metal casing with a shoe at the tip and displacing the material laterally. The two types of piles are termed as "bored piles" and "driven piles" respectively. Cast-in-situ concrete piles may be cast in metal shells which may remain permanently in place. However, other types of cast-in-situ concrete piles, plain or reinforced, cased or uncased, may be used if in the opinion of the Engineer the soil conditions permit their use and if their design and the methods of placing are satisfactory.

The metal casing shall be of sufficient thickness and strength to hold its original form and show no harmful distortion after it and adjacent casings have been driven and the driving core, if any, has been withdrawn. Cast-in-situ concrete driven piles shall be installed using a properly designed detachable shoe at the bottom of the casing.

Any liner or bore-hole which is improperly located or shows partial collapse that would affect the load carrying capacity of the pile, shall be rejected or repaired as directed by the Engineer at the cost of the Contractor. The minimum thickness of liner shall be 6mm. (Clause 709.1.4 of IRC:78: 2000 was amended as IRC notification No: 54 dated 28.05.2009) Wherever practicable, concrete should be placed in a clean dry hole. Where concrete is placed in dry and there is casing present, the top 3 m of the pile shall be compacted using internal vibrators. The concrete should invariably be poured through a tremie with a funnel so that the flow is directed and concrete can be deposited in the hole without segregation.

Where the casing is withdrawn from cohesive soils for the formation of cast-in-situ pile, the concreting should be done with necessary precautions to minimize the softening of the soil by excess water. Where mud flow conditions exist, the casing of cast-In-situ piles shall not be allowed to be withdrawn.

Care shall be taken during concreting to prevent as far as possible the segregation of the ingredients. The displacement or distortion of reinforcement during concreting and also while extracting the tube shall be avoided.

If the concrete is placed inside precast concrete 'tubes or consists of precast sections, these shall be free from cracks or other damage before being installed.

The concrete shall be properly graded, shall be self-compacting and shall not get mixed with soil, excess water, or other extraneous matter.

Special care shall be taken in silty clays and other soils with the tendency to squeeze into the newly deposited concrete and cause necking. Sufficient head of green concrete shall be maintained to prevent inflow of soil or water into the concrete.

The placing of concrete shall be a continuous process from the toe level to the top of the pile. To prevent segregation, a tube or tremie pipe as appropriate shall be used to place concrete in all piles.

To ensure compaction by hydraulic static heads, rate of placing concrete in the pile shaft shall not be less than 6 m (length of pile) per hour.

Bored cast-in-situ piles in soils which are stable, may often be installed with only a small casing length at the top. A minimum of 2.0m length of top of

bore shall invariably be provided with casing to ensure against loose soil falling into the bore. In cases in which the side soil can fall into the hole, it is necessary to stabilise the side of the bore hole with drilling mud, or a suitable steel casing. The casing may be left in position permanently specially in cases where the aggressive action of the ground water is to be avoided, or in the cases of piles built in water or in cases where significant length of piles could be exposed due to scour.

For bored cast-in-situ piles, casing/liner shall be driven open ended with a pile driving hammer capable of achieving penetration of the liner to the length shown on the drawing or as approved by the Engineer. Materials inside the casing shall be removed progressively by air lift, grab or percussion equipment or other approved means.

Where bored cast-in-situ piles are used in soils liable to flow, the bottom of the casing shall be kept enough in advance of the boring tool to prevent the entry of soil into the casing, thus preventing the formation of cavities and settlements in the adjoining ground. The water level in the casing should generally be maintained at the natural ground water level for the same reasons. The joints of the casing shall be made as tight as possible to minimize inflow of water or leakage of slurry during concreting.

Boring shall be carried out using rotary or percussion type equipment. Unless otherwise approved by the Engineer, the diameter of the bore-holes shall be not more than the inside diameter of the liner. Prior to the lowering of the reinforcement cage into the pile shaft, the shaft shall be cleaned of all loose materials. Cover to reinforcing steel shall be maintained by suitable spacers.

The diameter of the finished pile shall not be less than that specified and a continuous record shall be kept by the Engineer as to the volume of concrete placed in relation to the pile length cast.

Before concreting under water, the bottom of the hole shall be cleaned of drilling mud and all soft or loose material very carefully. In case a hole is bored with use of drilling mud, concreting should not be taken up when the specific gravity of bottom slurry is more than 1.2. The drilling mud should be maintained at 1.5m above the ground water level.

Concreting under water for cast-in-situ concrete piles may be done either with the use of tremie method or by the use of an approved method specially designed to permit under water placement of concrete.

General requirements and precautions for concreting under water are as follows:

- a) The concreting of a pile must be completed in one continuous operation. Also, for bored holes, the finishing of the bore, cleaning of the bore, lowering of reinforcement cage and concreting of pile for full height must be accomplished in one continuous operation without any stoppage.

- b) The concrete should be coherent, rich in cement with high slump and restricted water cement ratio.
- c) The tremie pipe will have to be large enough with due regard to the size of aggregate. For 20 mm aggregate the tremie pipe should be of diameter not less than 150 mm and for larger aggregate, larger diameter tremie pipes may be necessary.
- d) The first charge of concrete should be placed with a sliding plug pushed down the tube ahead of it to prevent mixing of water and concrete.
- e) The tremie pipe should always penetrate well into the concrete with an adequate margin of safety against accidental withdrawal if the pipe is surged to discharge the concrete.
- f) The pile should be concreted wholly by tremie and the method of deposition should not be changed part way up the pile to prevent the laitance from being entrapped within the pile.
- g) All tremie tubes should be scrupulously cleaned after use.

1.9. DRIVING EQUIPMENT

Piles or their casings may be driven with any type of drop hammer, diesel hammer or single-acting steam or compressed air hammer, provided they penetrate to the prescribed depth or attain the designed resistance without being damaged. The weight or power of the hammer should be sufficient to ensure a penetration of at least 5 mm per blow, unless rock has been reached. It is always preferable to employ the heaviest hammer practicable and to limit the stroke, so as not to damage the pile. The minimum weight of the hammer shall be 2.5t. In the case of precast concrete piles the mass of the hammer shall be not less than 30 times the mass of 300 mm length of pile.

Steam or air hammers shall be furnished along with boiler or air compressor of capacity at least equal to that specified by the manufacturer of the hammers. The boiler or air compressor shall be equipped with an accurate pressure gauge at all times. The valve mechanism and other parts of steam, air or diesel hammers shall be maintained in first class condition so that the length of stroke and number of blows per minute for which the hammer is designed, will be obtained. Inefficient steam, air or diesel hammers shall be removed from the work.

1.10. DRIVING

1.10.1. General Procedure

Details of the equipment and the method proposed for driving the piles shall be submitted with the tender for scrutiny and approval of the Engineer.

Piles shall be installed from firm ground or from temporary supports or from

fixed platform. The arrangement shall provide sufficient rigidity to ensure accuracy of pile driving under all conditions of tide, stream flow or hammer drop.

During driving the top of pile shall be protected by a suitable helmet of substantial steel construction. The helmet shall provide uniform bearing across the top of the pile and shall hold the pile centrally under the hammer. No pile shall be driven unless inspected and approved by the Engineer.

Piles shall be driven from a fixed frame of sufficient rigidity to ensure accuracy of driving within specified tolerances. Forces producing undue bending or torsional stresses in piles shall not be applied during driving. The force of the hammer shall be directed centrally and axially during driving.

The stroke of a single acting or drop hammer shall be limited to 1.2 m unless otherwise permitted by the Engineer. A shorter stroke may be necessary when there is danger of damaging the pile.

Piles shall not be bent or sprung into position but shall be effectively guided and held on-line during the initial stages of driving. Attempts to correct any tendency for the pile to run off-line by the application of significant horizontal restraint will not be permitted. Shortly after the commencement of driving and at regular intervals throughout the driving operation, checks shall be made to ensure that the pile frame does not exert any undue lateral force on the pile due to restraint within the helmet.

If the indications are that a pile will finish outside the specified tolerances, driving operations on that pile will cease. The pile shall be withdrawn, the hole filled and the pile re-driven at no extra cost.

To avoid the possibility of premature "set-up" pile driving shall be continuous in the later stages, without any deliberate stops. (Delays of an hour or less may lead to significant "set-up" in piles i.e. resistance to further driving increases after driving is stopped).

If any pile is damaged in any way during driving, it shall be repaired or replaced as directed by the Engineer, at no extra cost. If during driving, the head of a pile is damaged to the extent that further driving is not possible, the head shall be cut off and driving continued. The cost of cutting off shall be borne by the Contractor and where, as a result of such cutting off the head, the pile is too short, the Contractor, shall, at his own cost, supply and splice on sufficient length of pile to restore the pile to its correct length.

Piles should be driven to the minimum acceptable penetration shown on the drawings. This may require pre-boring and/or jetting as indicated in these specifications with the full approval of the Engineer.

Piles shall be driven to nominal refusal or the required ultimate dynamic

capacity nominated on the drawings or until the top of the pile is at the level required and specified on the drawing whichever gives the lowest toe elevation. The Engineer's decision in these matters shall be final. Nominal refusal shall be taken as equivalent to 25 mm total penetration for the final 20 blows using a hammer of driving energy as specified and shall be used as the criterion for acceptance for piles founded on rock. Severe driving which results in an average set per blow less than 0.5 mm will not be permitted.

Where hard drilling is encountered because of dense strata or obstructions located above the predetermined pile tip level, nominal refusal shall not be considered to have been achieved unless the Engineer is satisfied that the total number of blows, as the average driving resistance specified for nominal refusal, indicates that further driving will not advance the pile through dense strata or obstructions.

The pile shall be driven as accurately as possible to the vertical or to specified batter. Straining the pile into position can damage it and the driving equipment should be adjusted as much as possible to follow the position of the pile. Any deviation from the proper alignment shall be noted and promptly reported to the Engineer. If the deviation is to such an extent that the resulting eccentricity cannot be taken care of by strengthening the pile cap or pile ties, such a pile shall, at the discretion of the Engineer, be replaced or supplemented by an additional pile. Unless otherwise specified, the permissible positional deviation for piles shall be limited to those indicated in Clause 2.8.

Care shall be taken not to damage the pile by over-driving. Any sudden change in the rate of penetration which cannot be ascribed to the nature of the ground shall be noted and its cause ascertained, if possible, before driving is continued.

When employing a tube which is subsequently withdrawn for the formation of cast-in- situ pile, consideration shall be given to the possibility of doing harm to a pile recently formed by driving the tube nearby before the concrete has sufficiently set. The danger of doing harm is greater in compact soils than loose soils. No pile shall be bored or driven within 3 m of a newly cast pile until at least 24 hours after completion of its installation.

Driving piles in loose sand tends to compact the sand which in turn increases the skin friction. Therefore, driving a number of friction piles in a group shall proceed outward from the centre as otherwise it will be difficult to drive the inner piles to the same depth as the others.

In the case of stiff clay also, the driving for a group of piles shall proceed outward from the centre. However, in case of very soft soil, the driving may proceed from outside to inside, so that the soil is restrained from flowing out during driving operations.

If there is a major variation between the depth at which adjacent

foundation piles in a group meet refusal, a boring shall be made nearby to ascertain the cause of this difference. If the boring shows that the soil contains pockets of highly compressive material below the level of the shorter pile, it will be necessary to enforce penetration of all the piles to a level below the bottom of the zone which shows such pockets.

1.10.2. Pre-boring and Jetting

Driving of the piles may be assisted by pre boring holes or by the use of jets or both subject to the approval of the Engineer. These may be used essentially to achieve the minimum penetration shown on the drawings where such penetration is not reached under normal conditions of driving indicated in Clause 1.10.1.

The diameter of the hole shall not be greater than the diagonal dimension of the pile less 100 mm.

The maximum depth of the pre-boring shall be such that the specified set (or less) is obtained when the toe of the pile is at founding level.

Pre-boring shall be as approved by the Engineer and shall not extend below one meter above the founding level and the pile shall be driven to at least one meter below the pre-bored hole. To ensure that the pile is properly supported laterally in the hole, any space remaining around the pile at the ground level after driving is finished shall be backfilled with approved granular material.

When water jetting is used, at least two jets shall be attached to the pile symmetrically when this type of technique is used. The volume and pressure of water at the outlet nozzles shall be sufficient to freely erode material adjacent to the toe of the pile. The maximum depth of jetting shall be such that the specified set (or less) is obtained when the toe of the pile is at founding level. Jetting shall cease as directed by the Engineer and shall not proceed below one meter above the founding level and the pile shall be driven at least one meter below the pre-bored hole.

To avoid very hard driving and vibration in materials, such as sand, jetting of piles by means of water may be carried out only by express permission of the Engineer and in such a manner as not to impair the bearing capacity of piles already in place, the stability of the soil or the safety of any adjoining buildings. Details of the arrangement for jetting shall be approved from the Engineer in advance.

If, for jetting, large quantities of water are used, it may be necessary to make provision for collection of water when it comes to the ground surface, so that the stability of the piling plant is not endangered by the softening of the ground.

Jetting shall be stopped before completing the driving which shall always be

finished by ordinary methods. Jetting shall be stopped if there is any tendency for the pile tips to be drawn towards the pile already driven owing to the disturbance to the ground.

1.11. RAKER (INCLINED) PILES

The maximum rake to be permitted in piles shall not exceed the following:

- i) 1 in 8 for large diameter cast-in-situ piles viz 0.75 m diameter and above
- ii) 1 in 5 for smaller diameter cast-in-situ piles
- iii) 1 in 4 for precast driven piles

2.0 PILE TESTS

2.1. GENERAL

The bearing capacity of a single pile may be determined from test loading a pile. The load test on a concrete pile may not be carried out earlier than 28 days from the time of casting of the pile.

There shall be two categories of tests on piles, namely, initial tests and routine tests. Initial tests should be carried out on test piles which are not to be incorporated in the work. Routine tests shall be carried out as a check on working piles. The number of initial and routine tests on piles shall be as determined by the Engineer depending upon the number of foundations, span length, type of superstructure and uncertainties of founding strata. In any case, the initial load tests shall not be less than 2 in number, while the routine load tests shall not be less than 2 per cent of the total number of piles in the structure not less than 2 in number.

The above stipulations hold good for both vertical as well as lateral load tests on pile foundations.

However, both initial and routine tests may be suitably increased for important structures or cases with large variation in the subsurface strata.

The methodology of carrying out load tests and of arriving at safe load on piles shall conform to IS:2911 (Part IV).

In case of any doubt of workmanship or load carrying capacity of working piles not subjected to routine tests, or when ordered by the Engineer, or when provided in the contract, load tests on working piles may be supplemented by non-destructive testing. Such tests may include "Integrity Testing" of concrete in the installed pile and utilisation of "Pile Driving Analyser" which gives an indication of pile capacity in end bearing and side friction.

2.2. INITIAL LOAD TEST

Immediately on mobilization to site, the CONTRACTOR shall prepare to install piles for conducting initial vertical load (downward and pull-out) and lateral

pile load tests.

In case the cut-off is below ground level, a suitable excavation shall be made to provide access to the level after breaking off the unsound concrete.

For the compression type of test, the pile head shall be cut off level and capped by a R.C. cap to provide a horizontal plane bearing surface upon which a steel plate shall be placed. Earth from under the pile cap shall be scooped out so that pile cap has no soil support. Thereafter, the kentledge and all other accessories outside the pit pertaining to and necessary for conducting the test shall be set up. An easy access to the pile test head shall be provided.

If the pile test head is below the ground water level, the CONTRACTOR shall provide suitable sumps and dewater the pit so as to render the pit dry enough to enable conducting the test. Any dewatering will be considered as part of the test and the CONTRACTOR shall not be separately paid for the same.

The test load shall be so applied that it reaches the pile in a static manner. The loading may be applied directly by kentledge or jacking against a reaction system provided by means of kentledge, tension piles or ground anchors. Where kentledge is used it shall be supported on a properly designed frame or gantry such that there is no possibility of the load tilting or collapsing. The foundations of this frame or gantry should be sufficiently far away from the test pile so as not to affect its behaviour to any significant extent. Where tension piles or ground anchors are used, they shall be located a minimum distance of three times the test pile size from the centre of the test pile to the centre of the pile/ anchor.

The displacement of the test pile shall be related to a fixed datum. This may consist of a reference beam (datum bar) supported by two foundations positioned outside the zones of influence of the reaction support area. The deflection measuring equipment must be set up in such a way that any tilting of the test pile will not cause errors in the measurements. Dial gauges shall be used for measuring deflection. The least count of the dial gauges shall be at least 0.02mm. At least two but preferably four dial gauges shall be used and shall be placed at diagonally opposite corners.

The reference bars for the strain gauges shall be adequately rigid and on firm supports. The supports for the reference bars shall be so located that they are beyond the zone of influence of the loaded test pile (equal to three times the pile size from pile edge) and the zone of influence of kentledge supports. The bars shall be adequately stiffened and placed on supports in a manner such that any effect due to ambient temperature variations and vibrations due to traffic etc. are minimised. The reference bars and strain gauges shall not be exposed to direct sun and the pit shall be protected by tarpaulin sheets while the test is in progress.

The total test load shall be two and half (2.5) times the estimated safe load carrying capacity of the pile or failure, whichever is earlier, and shall be applied in equal increments of 20 percent of the estimated safe load. Unloading may however be in higher decrements with total number not less than five. At each load increment, pile deflection shall be observed accurate to 0.02mm at an interval of 1, 5, 10, 15, 25, 35, 50 and 60 minutes and thereafter at half hourly intervals, upto a time when the rate of deflection of the pile top reduces to 0.1mm in half hour or 0.2mm in one hour. The load increment in any case shall be maintained for 1 hour at least. The design load as well as the final load shall be maintained for 24 hours at least or as directed by Engineer. At these load increments, after the first hour, deflection readings shall be taken at every one hour interval.

During the release stage, each load decrement shall be maintained at least for 30 minutes and readings of deflection noted. When the load is fully released to zero, measurements of rebound shall be continued till the deflection of the pile top is not more than 0.1 mm per half hour.

Initial cyclic tests shall be carried out to determine skin friction and point resistance of piles. This shall be carried out as per IS: 2911 (Part-IV). However, each cycle of loading and unloading shall be repeated allowing a time interval of 10 minutes between the end of one cycle and the beginning of the next.

For the initial lateral pile load test pairs of piles for lateral load tests shall be driven. Lateral load test shall be conducted as per IS: 2911 (Part-IV) with horizontal loading increment as directed by Engineer, stagewise till failure occurs. Load shall be applied at cut-off level.

Piles specified for pull out test shall be subjected to pull-out force in equal increments of not more than 2.5 tonne till the rise exceeds 12mm or specified ultimate pull-out force is reached whichever is earlier. A graph of pull out force and the corresponding rise of pile top shall be plotted immediately.

If the initial test pile(s) which is (are) load tested fails (fail) to attain the specified safe structural capacity of piles and if this can be attributed to defective workmanship and/or negligence on the part of the CONTRACTOR, the OWNER reserves the right to terminate the contract and to award the contract to other parties. In such an event, all costs of mobilization, installation and testing of test pile(s) and any other work in connection with the test piles, shall be borne entirely by the CONTRACTOR.

While executing the pile bore for all test piles, a record of bore log and Standard Penetration Tests shall be maintained over the continuous length of boring in an approved format. Subsoil samples and rock cuttings shall be collected and systematically preserved.

2.3. ROUTINE LOAD TEST

These tests shall be carried out on piles selected by the ENGINEER after they have been cast. Tests to be carried out on working piles shall essentially be ordinary compression type. The test will be similar to that conducted on initial test piles, except that the capacity of the pile shall be limited to 1.5 times the safe pile capacity, the maximum settlement during test loading not exceeding 12mm.

The working pile shall be considered to have stood the test satisfactorily if total settlement under final test load is not more than 12mm and net (residual) settlement after removal of test load not more than 6 mm.

If the pile does not satisfy these requirements and if this can be attributed to defective workmanship or negligence on the part of the CONTRACTOR, all costs of the load test, the cost of providing and installing additional piles, cost of additional or enlarged pile caps and other work necessitated because of the defective pile, shall be at the cost of the CONTRACTOR.

2.4. LOW STRAIN NON-DESTRUCTIVE TEST

Piles shall be subject to low strain non-destructive testing. The Contractor shall appoint an approved agency for conducting these tests. The Bidder shall indicate the name of the agency for conducting these tests along with the tender. The scope of the tests shall include conducting the tests, with properly calibrated equipment, submission of all the test records and a report giving the interpretation of the test results. Testing of a pile shall be done 21 days after it is cast. All testing shall be done in the presence of the Engineer or his representative. The report shall be submitted after all the piles at the Site have been tested. However, in case any deficiency is observed, while the testing is in progress, it shall be brought to the notice of the Engineer, forthwith.

Digital data processing technique shall be used for monitoring of stress wave. The test shall be conducted by striking pile head by a small hand held hammer. The reflections shall be picked up by an accelerometer pressed on pile top, close to the location of hammer blow. The observed signal is amplified by the computer controlled amplifier. Tests results shall be immediately submitted to the Engineer.

2.5. CROSS HOLE ULTRASONIC MONITORING (CHUM) OF PILES

This test shall be carried one test for each piling rig and operator. Whenever the operator has been changed the test shall be conducted within three days from the date of installation of pile and report shall be submitted within two days from the date of completion of test.

2.5.1. Installation of pipes

Minimum numbers of pipes as directed by Engineer against each diameter of piles, pipes of 40mm ID and having wall thickness not less than 4mm shall be

provided inside the pile shaft during the pile installation for the full length of pile at diametrically opposite point, also pipes shall be long enough to protrude about 200 mm above the ground level. The pipes shall be closed at both the ends by caps to prevent the possible entry of soil or concrete. For convenience the pipes shall be filled up with water while lowering and it will remain water filled all through as the test shall be conducted in that condition by a specialised agency. PVC pipes shall be of Oriplast PVC 1120 make conforming to ASTM D1785 or equivalent. Pipes shall be joined by threaded sockets and attached strongly to the main reinforcement bars through binding wires. The piling contractor shall be responsible for proper installation of these pipes and its maintenance till the tests are over. The Pile shall be cast with the pipes intact. It is the responsibility of the piling contractor to ensure that all the access pipes are free from any obstruction. Moreover, installed pipes protruding above ground level shall be protected by the piling contractor for carrying out the integrity tests. Since ensuring the integrity of the piles is extremely important the entire responsibility of installation and protection of all the access pipes shall lie with the piling contractor. No payment for the test and nor for pipes shall be made to the contractor if access pipes are found either chocked or inaccessible at ground level. The pipes shall be filled with sand on completion of test.

2.5.2. Testing Agency

Contractor shall engage a firm experienced in conducting CHUM test and the same shall be approved by the Engineer for conducting ultrasonic test. The site work and interpretation of the results shall be carried out by an experienced Geotechnical Engineer.

2.5.3. Equipment

The ultrasonic test equipment shall consist of two transducers. An emitter sending not less than one pulse per second with a frequency of not less than 50 KHz. a compatible receiver and a suitable computer for control, measurement and recording functions. All components shall be in good working order. All software of the latest released version shall be used.

2.5.4. Preparations

Before commencing the test, the Contractor shall ensure that there is adequate access to the pipes. The piling contractor shall then open the top of the pipes and ensure, with an approved dummy probe having a length of 300mm and diameter of 25mm, that the pipes are straight and free of obstacles throughout its length. The Contractor shall keep them full of water until all testing on site is concluded. Test shall be conducted after 3 days of the installation of piles.

2.5.5. Testing Method

Testing shall consist of inserting the transducers in parallel into two pipes of

the same pile, using a pulley with an automatic depth meter. The transducers shall be lowered to the bottom, brought to the same level, activated and then pulled back with arrival times versus depth continuously recorded. The output for all tests shall clearly identify the project, pile designation, date, time, depth scale, defect if any and all other relevant information.

2.5.6. Report

A final report for each testing stage shall be presented not later than three working days after completion of test. The report shall consist of a printout of the original output, as well as a summary table including, for every panel tested, the depth and the Engineers' interpretation regarding its integrity. The report shall also recommend the suitable corrective measures for the identified defects.

2.5.7. High Strain Dynamic Load Test

Conducting routine vertical load test for 1.5 times safe load carrying capacity by means of High strain Dynamic Load Test including provision and erection of crane- hammer-drop mechanism, acceleration and displacement velocity transducers to record both force and velocity including excavation, dewatering, preparation, preparation of pile head including building up of pile, additional reinforcement if any etc. all complete as per approved method (ASTM D4945-89) and instructions of the engineer. Hammer shall be of suitable weight which is 1 to 2% of test load or 7 to 10% of the dead weight of the pile whichever is higher is used unless specified otherwise by Test Engineer. The fall height generally varies from 0.5m to 3.0m.

2.6. PILE CAP

Pile Caps shall be of reinforced concrete. A minimum offset of 150 mm shall be provided beyond the outer faces of the outer most piles in the group. If the pile cap is in contact with earth at the bottom, a levelling course of minimum 100 mm thickness of M 15 nominal mix concrete shall be provided.

The attachment of the pile head to the cap shall be adequate for the transmission of loads and forces. A portion of pile top may be stripped of concrete and the reinforcement anchored into the cap. Manual chipping may be permitted after three days of pile casting, while pneumatic tools for chipping shall not be used before seven days after pile casting. The top of pile after stripping shall project at least 150 mm into the pile cap. A layer of surface reinforcement may be provided with a cover of 25 mm to retain the integrity of concrete below the main cap reinforcement which is to be laid 25 mm above the pile top.

Concreting of the pile cap shall be carried out in dry conditions. The bottom of the pile cap shall be laid preferably as low as possible taking account of the water level prevalent at the time of casting.

The top of concrete in a pile shall be brought above cut-off level to permit

removal of all laitance and weak concrete before pile cap is laid. This will ensure good concrete at the cut-off level.

The minimum thickness of pile cap should be atleast 1.5 times diameter of pile. Such a cap can be considered as rigid. Casting of pile cap should be at level higher than water level unless functionally it is required to be below water level at which time sufficient precaution should be taken to dewater, the forms to allow concreting in dry condition. In marine condition or in areas exposed to the action of harmful chemicals, the pile cap shall be protected with a suitable anti-corrosive paint. High alumina cement, i.e. quick setting cement shall not be used in marine constructions (Clause 709.5.4 of IRC:78: 2000 was amended as IRC notification No: 54 dated 28.05.2009).

2.6.1. IMPORTANT CONSIDERATIONS, INSPECTION/ PRECAUTIONS FOR DIFFERENT TYPES OF PILES

2.6.2. Driven Cast-in-Situ Piles

Specialist literature and the guidelines from the pile construction industry shall be consulted regarding the method of installation, equipment and accessories for pile driving and recording of data.

During installation of piles the final "set" of penetration of pile per blow of hammer shall be checked taking an average of last 10 blows.

The pile shoes which may be of either cast iron conical type or mild steel flat type shall have double reams for proper seating of the removable casing tube inside the space between the reams.

Before commencement of pouring of concrete, it shall be ensured that there is no ingress of water in the casing tube from the bottom. Further adequate control during withdrawal of the casing tube is essential so as to maintain sufficient head of concrete inside the casing tube at all stages of withdrawal.

Concrete in piles shall be cast upto a minimum height of 600 mm above the designed top level of pile, which shall be stripped off at the time of construction of pile cap.

2.6.3. Bored Cast-in-situ piles

While concreting uncased piles, voids in concrete shall be avoided and sufficient head of concrete is to be maintained to prevent inflow of soil or water into the concrete. It is also necessary to take precautions during concreting to minimise the softening of the soil by excess water. Uncased cast-in-situ piles shall not be allowed where mudflow conditions exist.

The drilling mud such as bentonite suspension shall be maintained at a level sufficiently above the surrounding ground water level to ensure the stability of the strata which is being penetrated throughout the boring process until

the pile has been concreted.

Where bentonite suspension is used to maintain the stability of the bore-hole, it is essential that the properties of the material be carefully controlled at stages of mixing, supply to the bore-hole and immediately before concrete is placed. It is usual to limit:

- i) The density of bentonite suspension to 1.05 g/cc
- ii) The marsh cone viscosity between 30 and 40
- iii) The pH value between 9.5 and 12
- iv) The silt content less than 1 per cent
- v) The liquid limit of bentonite not less than 400 per cent

These aspects shall act as controlling factors for preventing contamination of bentonite slurry for clay and silt.

The bores shall be washed by bentonite flushing to ensure clean bottom at two stages viz. after completion of boring and prior to concreting after placing of reinforcement cage. Flushing of bentonite shall be done continuously with fresh bentonite slurry till the consistency of inflowing and out-flowing slurry is similar.

Tremie of 150 mm to 200 mm diameter shall be used for concreting. The tremie should have uniform and smooth cross-section inside, and shall be withdrawn slowly ensuring adequate height of concrete outside the tremie pipe at all stages of withdrawal. Other recommendations for tremie concreting are:

- (i) The sides of the bore-hole have to be stable throughout
- (ii) The tremie shall be water-tight throughout its length and have a hopper attached at its head by a water-tight connection
- (iii) The tremie pipe shall be large enough in relation to the size of aggregates. For 20 mm aggregate the tremie pipe shall be of diameter not less than 150 mm and for larger size aggregate tremie pipe of larger diameter is required.
- (iv) The tremie pipe shall be lowered to the bottom of the bore-hole, allowing water or drilling mud to rise inside it before pouring concrete.
- (v) The tremie pipe shall always be kept full of concrete and shall penetrate well into the concrete in the bore-hole with adequate margin of safety against accidental withdrawal if the pipe is surged to discharge the concrete.

For very long or large diameter piles, use of retarding plasticiser in concrete is desirable.

For large diameter piles, it may be essential to conduct nondestructive pile integrity tests to evaluate integrity of the pile.

Where possible, it may be desirable to grout the base of pile with cement slurry under suitable pressure after concrete in the pile attains the desired strength. For this purpose, conduit pipes with easily removable plugs at the bottom end should be placed in the bore along with reinforcement cage before concreting.

2.7. TOLERANCES

2.7.1. Permissible Tolerances for Pile

i) Precast Concrete Piles:

- a) Variation in cross-sectional dimensions : $\pm 5\text{mm}$
- b) Variation in length : $\pm 25\text{mm}$
- c) Surface irregularities measured with 3 m straight edge : 5mm
- d) Bow for length in mm Pile length in mm 1000

ii) Driven Piles

- a) Variation in cross-sectional dimensions : +50mm, -10mm
- b) Variation from vertical or specified rake : 1 in 50
- c) Variation in the final position of the head in plan : 75mm
- d) Variation of level of top of piles : $\pm 25\text{mm}$

iii) Bored Piles

- a) Variation in cross-sectional dimensions : +50mm, -10mm
- b) Variation from vertical or specified rake : 1 in 50
- c) Variation in the final position of the head in plan : 50mm
- d) Variation of level of top of piles : $\pm 25\text{mm}$

2.7.2. Permissible Tolerances for Pile Caps

- (a) Variation in dimensions : +50 mm -10 mm
- (b) Misplacement from specified position in : 15mm
- (c) Surface irregularities measured with 3 m plan straight edge : 5mm
- (d) Variation of levels at the top : $\pm 25\text{ mm}$

2.8. TESTS AND STANDARDS OF ACCEPTANCE

The materials shall be tested in accordance with these Specifications and shall meet the prescribed criteria.

The work shall conform to these Specifications and shall meet the prescribed standards of acceptance.

2.9. MEASUREMENTS FOR PAYMENT

For supply of precast concrete piles of specified cross-section, the

measurement shall be in meters of the length of piles ordered in writing by the Engineer measured from the head to the butt of the shoe or the tapered point. Reinforcement, in precast concrete piles shall not be measured for payment.

For cast-In-situ driven and bored concrete piles of specified cross-section, the measurement shall be the length in meters of the accepted pile that remains in the finished structure complete in place. Reinforcement in cast-in-situ driven and bored concrete piles shall be measured for payment as per specification of Structural Concrete Work.

Routine and Initial Pile load Tests shall not be measured for payment

For installation of the pile, i.e. by driving in the case of precast concrete and cast-in- situ driven piles, and by boring in the case of cast-in-situ bored piles the measurement shall be the length in meters that remains in the finished structure complete in place, limited to that shown on drawings or ordered by the Engineer. No distinction shall be made for penetration through hard strata or rock and socketing into rock.

For steel liners/casing shown on the drawings to be permanently left in place, the measurement shall be by weight in tonnes that remains in the finished structure complete in place, limited to that shown on drawings or ordered by the Engineer.

For the pile cap, the quantity of concrete and reinforcement shall be measured in cubic meters and in tones respectively as per specification of structural concrete work.

3.0 SHEET PILE

3.1. SUBJECT

This document describes in general the salient features of Steel Sheet Piling system being proposed to be used for (NAME OF APPLICATION) in (NAME OF PROJECT) in (LOCATION). The sheet pile system is an installed vertical pile elements connected through row of interlocking; forming a continuous wall, retaining soil and / or water.

Permanent and or temporary retaining walls and cofferdams erected for the purpose of excavation, protection, diversion of soil/ water are the major applications of steel sheet piling.

For installation of steel sheet piles, Vibrating hammers and or impact hammers, crane, driving template are generally used.

There are permanent and temporary applications. Permanent sheet piles remain in the ground and serve as permanent retaining structures. Temporary sheet piles are designed to provide safe access for construction and are then removed.

For permanent sheet pile application, the work shall include supply, installation of sheet pile, arrangement strutting system/ anchors/ connecting hardware.

For temporary sheet pile application, the work shall include supply, installation of sheet pile, arrangement strutting system/ anchors/ connecting hardware when required to attach the system to an existing substructure unit and/or facilitate stage construction.

3.2. MATERIAL

Steel Sheet Piles shall be produced in Hot Rolled process and conforming to EN10248 (I & II) or equivalent ASTM standards. The interlocks of sheet piling shall be Larsen type free-sliding, provide a swing angle suitable for the intended installation but not less than 5 degrees when interlocked and maintain continuous interlocking when installed.

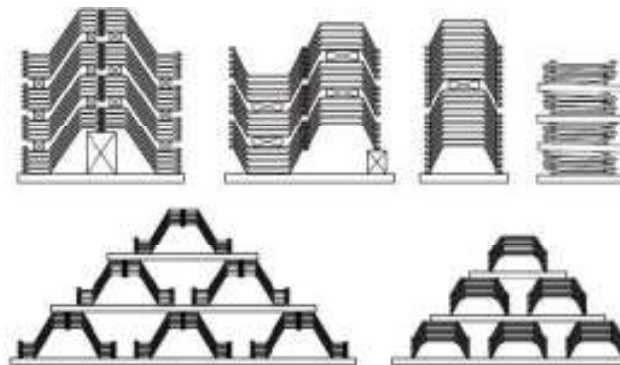
The properties of sheet piling sections including dimension shall conform to the profiles as shown in Annexure A & Annexure B. Sheet piling shall be provided with standard pulling holes.

Accessories, e.g., Metal plates, shapes, bolts, nuts, rivets, and other appurtenant fabrication and installation materials shall conform to manufacturer's standards and to the requirements specified in the respective sheet piling.

3.3. INSTALLATION

3.3.1. Material Storing

Sheet piles should be stored in such a way that they can be lifted easily in sequence of use. Spacers shall be inserted between the individual sheet piles in a stack, if required.

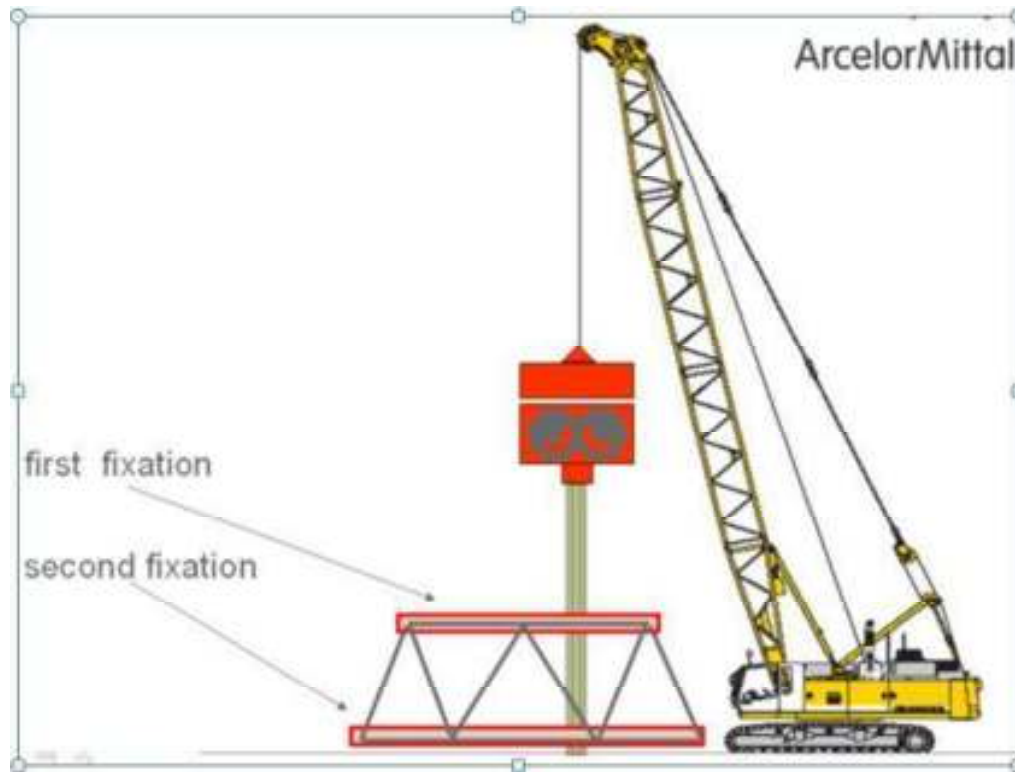


The Contractor shall verify locations of all underground utilities before driving any sheet piling. Any disturbance or damage to existing structures, utilities or other property, caused by the Contractor's operation, shall be repaired by the Contractor in a manner satisfactory to the Engineer at no

additional cost to the Department. The Contractor shall be responsible for determining the appropriate equipment necessary to drive the sheeting to the tip elevation(s) specified on the plans or according to the Contractor's approved design. The Contractor shall be responsible for determining the appropriate equipment necessary to drive the sheeting to the tip elevation(s) specified on the plans or according to the Contractor's approved design. The sheet piling shall be driven, as a minimum, to the tip elevation(s) specified, prior to commencing any related excavation. If unable to reach the minimum tip elevation, the adequacy of the sheet piling design will require re-evaluation by the PMC/ Owner prior to allowing excavation adjacent to the sheet piling in question. The Contractor shall not excavate below the maximum excavation line shown on the plans without the prior permission of the Engineer. The sheet piling shall remain in place until the Engineer determines it is no longer required.

The sheet piling shall be removed and take away from site by the Contractor when directed by the Engineer. When allowed, the Contractor may elect to cut off a portion of the sheet piling leaving the rest in place. The remaining piling shall be a minimum of 12 in. (300 mm) below the finished grade or as directed by the Engineer.

Removed sheet piling becomes the property of the Contractor. When an obstruction is encountered, the Contractor shall notify the Engineer and upon concurrence of the Engineer, the Contractor shall begin working to break up, push aside, or remove the obstruction. An obstruction shall be defined as any object (such as but not limited to, boulders, logs, old foundations etc.) where it's presence was not obvious or specifically noted on the plans prior to bidding, that cannot be driven through or around with normal driving procedures, but requires additional excavation or other procedures to remove or miss the obstruction.



3.4. INSTALLATION PROCEDURE

The following are the general installation procedure:-

a) Pile Driving Equipment

Pile driving equipment shall conform to the following requirements.

- Driving Hammers

Hammers shall be impact / vibratory type as per manufacturer's specifications.

- Jetting Equipment

Jetting equipment shall have a minimum of two removable or fixed jets of the water or be a combination of air a water type. The water jets shall be designed so that the discharge volume and pressure are sufficient to freely erode the material under and adjacent to the piling. Use of jetting equipment shall be as per manufacturer specifications and design requirement

b) Placing

Pilings shall be carefully located as directed. Pilings shall be placed plumb with out-of-plumbness as per tolerance limit specified to manufacturer EN / ASTM specifications. Temporary wales, templates, guide structures shall be provided to insure that the pilings are placed and driven to the correct alignment. At least two templates shall be used in placing each piling and the maximum spacing of templates shall not

exceed 6m. Pilings properly placed and driven shall be interlocked throughout their length with adjacent pilings to form a continuous diaphragm throughout the length or run of piling wall.

c) Driving

Adequate precautions shall be taken to insure that pilings are driven plumb. If the forward or leading edge of the piling wall is found to be out-of-plumb, the piling being driven shall be driven to the required depth and tapered pilings shall be driven to interlock with the out-of-plumb leading edge. If approved, other corrective measures may be taken to insure the plumbness of succeeding pilings. Pilings in each run or continuous length of piling wall shall be driven alternately, in increments of depth, to the required elevation. No piling shall be driven to a lower elevation than those behind it in the same run, except when the pilings behind it cannot be driven deeper. If the piling next to the one being driven tends to follow below final elevation, it may be pinned to the next adjacent piling. If obstructions restrict driving, a piling to the specified penetration the obstructions shall be removed or penetrated with a chisel beam. If the Contractor demonstrates that removal or penetration is impractical, the Contractor shall make changes in the design alignment of the piling structure as directed to insure the adequacy and stability of the structure. Pilings shall be driven to depths shown and shall extend up to the elevation indicated for the top of pilings.

d) Cutting-off and Splicing

Pilings driven to refusal or to the point where additional penetration cannot be attained and are extending above the required top elevation in excess of the specified tolerance shall be cut off to the required elevation. Pilings driven below the required top elevation and pilings damaged by driving and cut off to permit further driving shall be extended as required to reach the top elevation by splicing when directed at no additional cost to the Owner

e) Inspection of Driven Piling

The contractor shall inspect the interlocked joints of driven sheet piles extending above ground. If contractor find out that the sheet piles are out of interlock, then the sheet piles have to be removed.

f) Pulling and Re-driving

In the pulling and re-driving of piles, the Contractor shall pull selected pilings to determine the condition of the underground portions of pilings. Any piling pulled and found to be damaged to the extent that its usefulness in the structure is impaired shall be removed and replaced at the Contractor's expense. Pilings pulled and found to be in satisfactory

condition shall be redriven when directed

g) Removal for temporary application

The removal of sheet pilings shall consist of pulling, sorting, cleaning the interlocks, inventorying and storing previously installed sheet pilings as shown and directed.

3.5. MEASUREMENT

The Steel Sheet Piling will be measured for payment in Square Meter. Any cut off, left in place, or driven to dimensions other than those shown on the contract plans without the written permission of the Engineer, shall not be measured for payment but shall be done at the contractor's expense. If the Contractor is unable to drive the sheet pile to the specified tip elevation(s) and can demonstrate that any further effort to drive it would only result in damaging the sheet pile, then the Contractor shall be paid based on the plan quality of sheet piling involved. However, no additional payment will be made for any walers, bracing, or other supplement to the steel sheet piling, which may be required as a result of the re-evaluation in order to insure the original design intent was met.

3.6. REPORT/DOCUMENTATION

- Sheet Pile Profile Shop Drawing
- Interlock Drawing
- Material Test Report
- Driving Plan
- Equipment Details
- Driving Records

**NAVI MUMBAI MUNICIPAL CORPORATION
CITY ENGINEER DEPARTMENT**

**BASIC DESIGN REQUIREMENT & OBLIGATORY LEVELS OF ESR
AND
SPECIAL OBLIGATORY CONDITIONS FOR WATER RETAINING STRUCTURE**

The basic design requirements, criteria and dimension mentioned hereafter shall be strictly adhered to.

The intending tenderer should acquainted himself thoroughly with the site conditions as well as needs of NMMC before tendering and designing the schedules. The contractor should make his own arrangement about probable depth and strata for resting foundations.

OBLIGATORY LEVELS AND REQUIREMENTS (Parameters)

(As per Annexure-I)

DETAILS OF RCC BPT/MBR/ESRs AT VARIOUS LOCATIONS TABLE

R.C.C. BPT/ MBR:-

S.No	Location of GSR/ Sump / BPT	Cap. in Liters	Avg. Ground Level	Low supply level and Full supply level and Numbers
The details will be provided during execution of work.				

Note: No change in these levels will be permitted & RCC design will not be accepted by NMMC if changes are made.

Note: No change in these levels will be permitted & RCC design will not be accepted by NMMC if changes are made.

DESIGN CRITERIA & ASSUMPTIONS

DESIGN STANDARDS

The structural design of the tank shall confirm to the following standard specifications and code of practice of the BIS, IS:456-Code of practice of plain and reinforced

Contractor

No. of correction

City Engineer

cement concrete (latest revision),

IS:3370 -Code of practice for concrete structures for storage liquids Part-I to IV(latest revision),

IS : 875-Code of Practice for structural safety of building, loading standards (latest edition),

Part-I..... Dead Load
Part-II Imposed Load
Part-III... Wind Load

IS : 1893-Criteria for earthquake resistance design of structures (latest edition)

IS:1682-1985 -Code of Practice for criteria for design of RCC staging for overhead water tanks (latest edition) and various standards issued by BIS.

DESIGN OF STRUCTURES

The above Indian Standards current on the date of tender shall be applicable to the design of structure. Item which is not specifically covered by Indian Standard Code of Practice, reference shall be made to the relevant standard specifications.

Construction of various capacities RCC MBR/ESR / SUMP

1. The reservoir will be a covered RCC container supported on RCC column footing and termed ate braces, etc as per drawing.
2. Suitable RCC spiral stair case should be provided with landing parapet, RCC pardi for approach to the Gallery and top of the ESR,RCC cantilever catwalk (gallery) of 1.20 m width, GI pipe railing shall be provided at floor level, preferably at junction of floor slab and vertical walls and GI pipe railing with RCC post of 1.0 m c/c interval at the roof slab level of the container.

Ventilators shall be provided on top slab of ESR. One number of C.I.manhole frame and cover shall be provided and fixed in the roof of the tank. One S.S. ladder shall be provided and fixed for access into the tank through manhole left in the Roof. Ladders shall be provided as per specifications. Water level indicator (Mercury) assembly of approved type shall be provided and installed.

Lightening arrestor as per IS specifications and confirming to IE rules shall be provided and fixed. Vertical & horizontal pipe of CI,D/F flanged pipes,M.S./C.I.specials of required sizes for inlet, outlet & overflow arrangements together with suitable Sluice Valves shall be provided as per drawings. For washout , one tee shall be fixed on the outlet pipe with one

valve of suitable .. Sluice Valves of required size shall be fixed for inlet, outlet & washout. These valves shall be supplied by the contractor ,confirming to relevant IS code and of makes approved by NMMC.

Required no. of B.B. masonry chambers of suitable sizes directed with C.I.manhole frame & covers shall be provided & constructed at suitable locations for Sluice Valves. Water proof cement plaster of CM(1:2) proportion ,20 mm thick shall be provided for inside surface of water tank ,including roof slab bottom & epoxy painting in two coats be provided as per specifications.

Outside surface of tank, exposed faces, columns, braces, catwalk bottom portion of slab & exposed surface of the tank shall be provided with cement plaster of CM(1:3) proportion ,20 mm thick with smooth finish\and then 3 coats of water proof cement paint approved by NMMC shall be rendered. Letters indicating capacity of tank, name of scheme and the year of construction shall be either embossed or engraved on vertical wall of tank and shall be painted with suitable shade of oil paint in 2 coats.

On the completion of work hydraulic test or water -tightness test shall be given as per standard specification. Therefore required water arrangements shall be made by the contractor at his own cost.

Since this a lump sum offer, the interim payments will made at different stages of works contract, as per break-up schedule enclosed. Which is to be approved by the competent authority.

Since this is water retaining structure,contractor shall give a satisfactory hydraulic test of the tank. This test shall be considered as water tightness test and accepted if the structure appears bone dry from outside after filling the water up to full supply level & the drop in water level is not more than 40 mm in 7 days. For this purpose the water filling arrangements shall be made by the contractor at his own cost,including cost of water pumping arrangements; etc.

If during testing any damage occurs to the structure, it will be responsibility of the contractor to rectify the same. Until satisfactory water tightness test is given on completion of work, interim payments to be made at different stages of works as per break-up of payment schedule enclosed.

MATERIALS REQUIRED FOR CONSTRUCTION

1. ***Sand, Metal & Bricks***

Sand, metal & bricks of best quality will be insisted. Samples of these will have to be got approved prior to use on work.

2. ***Cement***

OPC of 43 grade in jute/polyethylene bags (weighing 50 Kg each) shall be used for all water retaining Structures & for all works. The cement shall be used of following brands (1) Ultratech, (2) Birla and (3) Ambuja. Super plasticizer in the proportion of 0.5 % (0.25Kg/cement bag) should be used.

3. ***Reinforcement***

Tor steel of 415 grade & mild steel grade-I shall only be used as per design. /The steel to be used shall be of grade Fe-250, Fe-450 as per design.

The Contractor shall have to procure the steel from open market. The steel procured by Contractor shall be only tested one and the Contractor shall produce manufacturer's test certificate without which it shall not be accepted. Further the Contractor shall arrange to get tested any sample from steel brought at site by him in laboratory at his cost and results should be submitted to the NMMC. Defective steel brought by Contractor shall be rejected and will not be allowed to be used. Test certificate stating the chemical composition & characteristics of the product should also be produced.

At least three samples of each diameter should be tested from every 5 tons (MT) or part thereof. Tested lots only will be permitted to be used.

4. ***Concrete***

The PCC and RCC work shall be as per IS 456:2000.(OR LATEST REVISION) Concrete mixer shall be used for preparing concrete.

Vibrator shall be used to consolidate concrete while placing in position. Mix design will be allowed only if required for minimum infrastructure like weigh batching plant, Needle vibrator and proper form work is provided.

While concreting, representative samples in form of Test Cubes shall be taken by the NMMC Engineer and shall be tested under his supervision, charges of testing shall be borne by the Contractor. Frequency of taking cubes (sampling, accepting criteria, standard deviation values, carting of concrete cubes, test procedure etc.) should be followed by contractor as per IS:456.

5. *Water Level Indicator Assembly*

Mercury water level indicator with 15 mm dia. required GI pipes (medium duty), stop cocks (2 nos.), necessary fixtures suitable for staging height upto 15 M and water depth up to 5 M to represent depth of water in tank, etc. shall be provided and fixed by the Contractor as per direction of NMMC. The indicator should be fixed to exterior face of column at about 1.5 M above ground level at site or as per requirement of Engineer-in-charge.

6. *Lightening Arrestor*

Lightening arrestor conforming to IS and Indian Electricity Rules shall be provided. The lowermost portion of tape for 2 metres above ground level and 2 meters below ground level shall be enclosed by 50 mm GI pipe of 'M' class.

7. *Pipe Railing at free end of Catwalk*

Railing shall be of GI pipes 'A' class not less than 25 mm diameter in two rows and shall be fixed in position to RCC posts or M.S. angle posts of size 65 mm x 65 mm x 6 mm, 1.0 metre in height, located at a maximum distance of 1.5 M C/C. The railing and the posts shall be provided with two coats of oil paint of approved shade.

8. *M.S. Ladder*

M.S. Staircase with one meter width from ground level to bottom slab, gallery to roof slab with intermediate platforms. The ladder should be fabricated from heavy angles, steps & railing as directed by Engineer-in-charge.

9. *S.S. Ladder in container*

Two nos of heavy type S.S. Ladder & of required length & design as approved by Department shall be provided by the contractor for each ESR. This shall be for the access inside the tank. The contractor shall furnish to the NMMC the various manufacturers of the ladder.

10. *Centering Work*

Before starting the work of ESR, the Contractor should submit design of centering and its detailed drawing for approval by NMMC. This set of drawings shall be kept at site. This condition shall be applicable for the ESR with Contractor's design.

**Designing, Providing & Constructing RCC ESRs Own Design
Specification and Design Criteria for RCC ESR/MBR/GSR/Sump with
Contractor's own Design-Designing, Providing and Constructing RCC
ESR/MBR**

1. General Note

- 1.1** The Contractor shall quote his offer in Schedule 'B' for the complete work of constructing RCC ESR to be carried out as per his own design based on given data i.e. he shall tender the offer in Schedule 'B' for construction of elevated tank of required capacity including fixing pipes, specials, valves and providing and fixing, lightning conductor, C.I. manhole frame and cover, water level indicator ventilator, etc. complete with his own design and drawings.

The design shall be got checked from the institutes like Government Engineering College. Remarks shall be complied and scrutiny charges shall be borne by the Contractor.

- 1.2** The Contractor shall submit the name, qualifications and experience of Design Engineer who has prepared detailed RCC calculations or how will prepare design and drawings on acceptance of the tender. The authorised representative of the designer will have to inspect and certify the works at foundation level and every beam level.
- 1.3** The design Engineer has to prepare and submit a note on design methodology and construction and drawings in two copies through the contractor. The note should indicate general description, and salient features of the design covering the following points
- a) Capacity
 - b) Shape and type
 - c) Staging height of tank indicating various levels
 - d) Safe bearing capacity assumed in the design of safe bearing capacity of strata based on actual investigation report of laboratory and type of foundation provided with proper justification.
 - e) Maximum and minimum subsoil water level.
 - f) Site plan showing location of ESR.
 - g) Line diagram showing dimensional and sectional elevation with important levels.
 - h) Design parameters proposed to be adopted for detailed design.

- 1.4** This not on design will be subjected to through check by the Engineer-In-Charge of the owner and the tender will be accepted and work order issued by the competent authority only after verification that the design to be offered

will fulfill the requirements of the design as per tender specifications.

- 1.5 After acceptance of tender, the Contractor will have to submit three copies of detailed design and drawings of the structure within 15 days of acceptance of the tender.
- 1.6 The Design Engineer will be required to attend the office of Engineer-in-Charge for preliminary discussion for scrutiny remarks, etc. whenever required with all reference data, books, IS specifications, etc. at his own cost.
- 1.7 It will be binding on the Design Engineer of contractor to clarify, modify, redesign and prepare drawing after compliance of scrutiny remarks by the owner or his representative such as an Engineering College, within 15 days of communication of remarks. Even though design will be approved by owner, it will be the entire responsibility of the Design Engineer and the Contractor.
- 1.8 On approval of the design, contractor shall supply, free of cost, eight sets of design and drawing duly bound for use of the Owner. The Contractor shall also furnish the details of steel requirement along with programme of execution for completion of work within the time limit stipulated in the tender.
- 1.9 Security deposit of the tenderer shall be forfeited if he fails to modify his design as per scrutiny remarks within specified time after levy of compensations as per tender agreement.
- 1.10 Even though the design and drawing submitted by the Contractor are approved by the Owner/Engineer-in-Charge, the Contractor will not be relieved of his contractual obligations to hand over the structure in sound condition, duly tested.
- 1.11 In case of any damage/failure either during construction, testing or after commissioning, whether due to faulty design or defective construction, all repairs or reconstruction of the structure shall have to be carried out by the contractor, entirely at his risk and cost. No claim for such repairs/reconstruction shall be entertained.
- 1.12 The design should be with consideration of uplift pressure & seismic pressure.

Design Conditions

The Contractor shall quote with his own design with following conditions:

1. The design of R.C.C. ESR shall be carried out by a designer having minimum Qualification of Post Graduate in Structural Engineering. He shall sign the design and affix his name and stamp.

Contractor

No. of correction

City Engineer

2. The design shall be carried out in conformity with following IS code.
 - a) IS 456:2000
 - b) IS 3370 -Part I and IV
 - c) IS 875: 1987 Part I to Part IV
 - d) IS 11682:1985 for RCC staging of overhead tanks.
 - e) IS 1893:1984 with inclusion of seismic zones as per latest circular.
 - f) IS 1786 for cold worked steel high grade deformed bars
(Tor steel of Fe-415 grade & mild steel grade-I shall only be used.)
 - g) IS 13920:1993 -for ductile detailing, applicable for ESRs under seismic zone III, IV and V. (Recent editions of IS shall be referred.)
 - h) B.S.I. publication S.P. 34 (S and T) 1987.
 - i) IS:13928:Ductile detailing of RCC structure.

3. Foundation for ESR

The foundation should have the required safe bearing capacity. Minimum depth of foundation shall satisfy the following criteria.

- a) Depth in soft rock shall not be less than 1M or depth in hard rock shall not be less than 0.5 M.
- b) The total depth in all strata put together shall not be less than 1.50M.
- c) In B.C. Soil, raft shall be provided at minimum of 3M, No extra payment shall be given to the contractor on increase in depth of foundation.
4. The free board shall be included in the depth of water for design purposes.
5. Minimum free board shall be 300 mm; measured below bottom of roof beam.
6. Maximum actual water depth shall not exceed 5.0 M.
7. Clear cover for reinforcement shall be provided as below :
 - a) Footing/Raft 50 mm. at bottom and sides & 40 mm. at top
 - b) Columns 40 mm.
 - c) Braces, beams, slab (Bottom and roof), 40 mm vertical wall, gallery.
8. Minimum thickness of container members shall be as below.
 - a) Bottom slab and vertical wall 200 mm.
 - b) Roof slab 120 mm.
9. The design and casting of container members which includes bottom and roof beams, bottom slab, roof slab, vertical wall and gallery, shall be done in M-30 grade of concrete
10. The staging of ESRs (Columns, braces, footing/Raft) shall be designed in M-25 Grade of concrete, however, casting shall be done in M-300 grade of concrete. The concrete of grade M-15 shall be used for PCC work.
11. The staging shall be designed for ductile detailing as per IS 13920/1993, wherever applicable.
12. The width of braces shall be maximum of the following in case of Earth Quake Zone (as applicable) and above.
 - a) 250 mm.
 - b) There shall be a minimum distance of 75 mm between two adjacent reinforcement bars provided in the braces as well as beams.
13. Minimum width of brace - 300 mm.

14. Width to depth ratio in case of braces shall preferably be more than 0.30
15. Increase in permissible stresses in braces, for Earth Quake/ Wind force design, will not be allowed.
16. The centre to centre distance between braces shall not exceed 4.50 M for ESR/MBR of capacity less than 5 lakh liters and 6.0 M for ESR/MBR of capacity above 5 lakh liters. At the joints of braces and columns, the links to the column bars shall be tied properly and this shall be thoroughly checked before concreting.
17. Wherever annular raft is provided, the inside and outside width of raft shall be provided in such a way that the centre of gravity of upward reaction shall co-inside with column/raft beam centre.
18. Uplift pressure on the foundation of structure should be considered as per available water table at site in rainy season However, minimum uplift up to 50% of depth of foundation below ground level should be considered in the designs.
19. Epoxy paint as per specifications & 20 mm. thick cement plaster with CM 1:2 proportion with water proof compound shall be provided to the container from inside (including roof beams and roof slabs/dome, etc.)
20. The shape of container may be square or circular. Similarly the column shape may also be square or circular.
21. Minimum size of column (width or diameter) shall not be less than 400 mm. columns, if required to be provided inside container, for supporting roof ring beam/ dome/ slab, may be provided as per design requirements, with minimum size (width or diameter) requirements of 200 mm. Centering should be designed by the contractor . Same should be approved by the Competent authority before construction. Only steel/ plywood centering shall be used. For design having more than 6 columns, provision of internal bracing is obligatory. All columns shall have the same foundation level as far as possible. In any case the foundation level difference between any two columns shall not exceed 1.50. In such case 'Sway Analysis' of the staging shall be done and additional reinforcement or increase in sizes shall be provided if necessary. When safe bearing capacity of foundation is less than 15Tones/m² only raft foundation should be provided.
22. Minimum dia. of main bars in the footing shall be 10 mm. and minimum clear distance between reinforcing bars shall not be more than 180 mm.
23. Water density shall be taken as 1000 Kg./Cum and live load on gallery shall be considered as 300 Kg./ m². Minimum load of water proof treatment on roof slabs be taken as 100 Kg./ m²
24. The diameter, weight per metre, tensile strength and minimum elongation properties of steel, brought by the contractor/supplied by the department, shall be got tested from the approved laboratory before using it. It shall be used only when the test report indicates that the steel is in accordance with the I.S. specifications and design presumptions.
25. i) The inlet, outlet, overflow and bypass piping shall be of cast iron D/F. pipes only.
ii) Spout type overflow arrangement shall not be allowed. Overflow

arrangement shall be from top to bottom as a vertical pipe assembly with proper drainage arrangement.

- iii) For all duck foot bends for inlet, outlet and overflow arrangements, individual columns with footings resting at foundation level of ESR, columns/raft shall be provided.
 - iv) The manhole frame and covers, provided in the roof slab, shall be of cast iron only. Mild steel covers shall not be allowed.
The above four conditions i.e. 25 (i), 25 (ii), 25 (iii), 25(iv) shall be followed without substitutes and equals. No M.S. piping and spout type overflow arrangement shall be accepted, even if rebates, etc. are offered.
 - v) Inlet, outlet, bypass and scour valves with chambers shall be provided. The horizontal piping for inlet, outlet, overflow, bypass upto 8 M from outer brace shall be provided \ and laid without any extra cost.
 - vi) Lightening conductor, water level indicator, central ventilator and M.S. ladders/RCC staircase shall be provided as per department specification.
26. The design submitted by the Contractor, shall be got checked from the nearest Government Engineering College/ Government Polytechnic/ reputed Engineering College/reputed Consultants, for which the scrutiny charges shall be borne by the contractor. The delay in checking designs from third party as above shall be treated as the delay on the part of contractor for operation of tender clauses.
27. Size of inlet, outlet, overflow, bypass piping and valves including scour valve shall be specified as per actual requirements & makes of valves shall also be approved by the Engineer-In-Charge.
28. Capacity of the container of the tank shall be the volume of the water it can store between the designed full supply level and the lowest supply level.
29. Height of staging shall be the vertical difference between lowest supply level and the average ground level and the site of tank.

30. Rectification of Defective Members

If it is found that certain members are defective and are found giving acoustical or vibration disturbances even though these may be structurally sound, rectification of such members should be done by the contractor free of charge and to the satisfaction of Engineer-In-Charge.

CRITERIA FOR DESIGN OF RCC ESR

1. The structural design of water tank shall confirm the following standard specification & codes of practice of IS. (latest revisions or editions).
IS:456-Code of practice for plain & reinforced concrete
IS:875-Code of practice for structural safety of building standards
IS:3370-Code of practice for concrete structures for storage of liquids (Part-I to IV)
IS:1893-Criteria for earthquake resistant design of structures.
2. Capacity of the container of the tank shall be the volume of the water it can store between the designed FSL & LSL.

- 2.1 Free board is the indication of space provided above FSL & shall be measured at a vertical distance above FSL up to soffit of beam supporting the roof slab/dome. Free board shall be minimum 30 cm below soffit of beam or slab, in case of domed roof ; Free board may be reduced up to 15 cm.
- 2.2 The walls of the container shall be designed for free board full condition.
- 2.3 The tank foundation & other members of the structure shall also be designed for free board full condition.
- 2.4 Part of the tank in contact with stored water & enclosing water vapor above FSL shall also be constructed in M30 grade of concrete.
- 2.5 The allowable bearing pressure or safe bearing capacities are indicated in the annexure. The tenderer is, however advised to verify actual strata before tendering & designing the structure & offer suitable modification with full justification.
- 2.6 Notwithstanding anything mentioned above if directed by Engineer-in-Charge the contractor Shall carryout strata exploration mentioned in Para 0.2 of IS:1892:1979 through a Govt. Lab. And adopt bearing capacity so arrived for design.
- 2.7 The factor of safety shall be adopted as per clause 6.1 of IS:6403:1971.
- 2.8 If the foundation consists of individual column footing, minimum clear distance between center of column shall be equal to the twice the width of footing & clear distance between edges of footing shall not be less than width of footing. All columns shall have same foundation level as possible. In any case the foundation level difference between any 2 columns shall not exceed 1.50 M . In such a case sway analysis of the staging shall be done & additional reinforcement or increase in size shall be provided if necessary.
- 2.9 The foundation should be checked for negative pressure on soil due to combined direct & bending stresses .Negative pressure shall not be allowed on the foundation soil. 2.10 Classification of soil & characteristics of soil relevant to SBC & ABB shall be as per soil investigation reports of Govt.institution/Govt.approved investigators.
- 2.11 For the design of foundation of the solid raft type, the plate theory shall be adopted.
- 2.12 In normal circumstances, min 100 mm thick PCC with 100 mm projection all around in M10 with coarse aggregate as metal shall be provided as leveling course. Where injurious soils aggressive water anticipated the leveling course shall be of not weaker than M15 & if necessary Sulphate resisting or other special cement shall be used & the thickness of leveling course shall not be kept less than 150 mm.The ground level within the foundation area of structure shall be consolidate properly with suitable slope to drain out rain water outside the foundation zone.
- 2.13 In the vicinity of mines, collieries & blasting sites or areas which may be subjected to blast or shock,the tank shall be designed for dynamic forces adopted to shock.
- 2.14 Column may be assumed as fixed at the top of footing,
- 2.15 Following shall be the minimum thickness of various members of the tank container.

Roof Slab	120mm
Bottom slab.....	200mm
Roof Dome	100mm
Vertical Wall container	200mm

3. Loads

- 3.1 For all RCC & PCC components unit weight of concrete shall be taken as 2500 Kg/M3 & 2400Kg/M3 respectively.
- 3.2 Water load as snow load shall be taken as per IS: 875:1964 or Latest revision, Seismic forces shall be as per IS:12893(its latest revision).

4. Design

- 4.1 Shape of the structure shall be most economically as directed by Engineer-in-charge. & shall be selected depending upon site conditions.
- 4.2 Design shall be based on worst possible combination of various loads, moments, shears & resultant stresses in the tank in following cases:
- 1) tank full
 - 2) tank empty
 - 3) uplift pressure, if any.
Tank full means depth of water inside the container is up to full height of container including free board.
- 4.3 Design shall be based on accepted bases & methods of design as well as the provisions of IS:3370,IS:456,IS:1343,code of practice for pre-stressed concrete IS:2210 (all latest editions shall be referred.)
- 4.4 Design of members more than those excluded by Cl.5.4 above (i.e.roof walls, floors etc. of the container) shall be based on consideration of adequate resistance undertaking as well as adequate strength. Calculation of stresses shall be as per Para 3:3:2 of IS:3370,Part-II (latest version)

5 Permissible Stresses in Concrete for resistance to Cracking.

- 5.1 For calculation resistance of members to Cracking the permissible stresses tension (direct & due to bending) & shear shall conform to the values specified in table 1 of IS:3370 (Part-II)" The permissible tensile stresses due to bending apply to the face of the member in contact with the liquid". In members with thickness less than 225 mm & in contact with the liquid on one side, these permissible stresses in bending shall apply also to the face remote from liquid.

5.2 For Strength Calculation

For Strength Calculation, the permissible concrete stresses shall be in accordance with Para 44 of IS: 456:2000 where the calculated shear stress in concrete alone exceeds the permissible value, reinforcement acting in

conjunction with diagonal compression in concrete shall be provided to take the whole of the shear. The maximum reinforcement shall conform Cl.25.5.1.1&25.5.1.2 of IS: 456:2000.

6. Permissible stresses in steel.

- 6.1 For Strength Calculation,(concrete assumed to be cracked)the Permissible stresses in steel reinforcement shall be as per Table II of IS:3370(PartII)(its latest revision).For Tor steel the stress shall be as per IS:1786:1979 for cold worked steel high strength deformed bars for concrete reinforcement or its latest revision.
- 6.2 The modular ratio 'm' for different concrete mixes shall be as under.

Grade of Concrete	Modular Ratio 'm'
M15	19
M20	13
M25	11

- 6.3 Modulus of Elasticity of concrete E_c shall be taken as $5700 E_{ck}$ where E_c is the characteristic cube strength of concrete in N/mm^2 as per Cl.5.23.1 of IS:456.

7. Age Factor

- 7.1 Age Factor for increasing strength shall not be considered for the design.

8. Units

Design should be in Metric units only.

9. Detailing

- 9.1 Minimum reinforcement for water retaining members Minimum reinforcement in walls, floors, roofs in each of 2 directions at right angles shall have an area of 0.3% of the concrete section in that direction for sections up to 100 mm thick. For thickness greater than 100 mm & less than 450 mm the minimum reinforcement in each of the 2 directions shall be linearly reduced from 0.3% for sections of 100 mm thick to 0.25 for 450mm thick section. For section of thickness greater than minimum reinforcement in each direction shall be kept at 0.2% .In concrete sections of thickness 225 mm or greater, two layers of reinforcing steel shall be placed one over each face the section in make up the minimum reinforcement specified in the clause.
- 9.2 The minimum reinforcement specified in 9.1 above may be decreased by 20%

in case of high yield strength deformed bars conforming to IS: 1786 or IS 1139 (latest version of IS shall be followed).

9.3 Covers to Reinforcement

- 9.3.1 Minimum clear to reinforcement shall be per IS: 456 and IS: 3370 (latest version of IS shall be referred).
- 9.3.2 For members of structures in contact with water effective shall not be more than 60 mm. for bars subjected to pure tension the effective cover shall not be more than 75 mm

9.4 Spacing of Reinforcement

- 9.4.1 Spacing of reinforcement shall be as per Para 25.3 of IS:456-1978
- 9.4.2 Spacing of lateral ties of column shall satisfy the provisions of Para 25.5.3.2 of IS:4562000.
- 9.4.3 Reinforcement steel which accounts for resisting moment, tension etc. i.e. other than temperature and shrinkage steel, shall comprise minimum 8 mm diameter, For ribbed bars and 10 mm diameter or mild steel bars, for compressive members, the minimum diameter of main reinforcement shall not be less than 12 mm.

NOTES

In case of dispute regarding interpretation of any of the above classes, the decision of the owner or his representative will be final and binding on the designer and contractor. In case of any clause not included in the above criteria, the decision of the owner or his authorized representative will be final and binding on the designer and contractor.

**SCHEDULE OF INTERMEDIATE PAYMENTS
FOR SUB-WORK OF MASTER BALANCING / ELEVATED SERVICE
RESERVOIR**

On approval of design	2%
Excavation and PCC	2%
On completion of Footing	5%
Staging half height	13%
Staging full height	14%
Bottom slab complete	22%
Vertical wall half height	7%
Roof slab	7%
On completion of spiral staircase / M.S ladder	7% 3%
On completion of plastering and finishing	1%
On erection of pipes valves and constructions of chambers	3%
Hydraulic testing	4%
Other Miscellaneous items as per A/T including snowcem, painting water level indicator, lighting Conductor, M.S. ladder and name plate etc.	4%
Total	100 %

Note: This is tentative and is to be approved by competent authority

**SCHEDULE OF INTERMEDIATE PAYMENTS
FOR SUB-WORK OF BPT / SUMP/
MBR**

On approval of design	2%
Excavation and PCC	2%
On completion of Bed concrete & Footing	10%
Vertical wall half height	17%
Vertical wall Remaining height	18%
Roof slab	10%
On supply pipes valves and specials	15%
Plaster finishing	5%
On erection of pipes valves and constructions of chambers	3%
Hydraulic testing	10%
Other Miscellaneous items as per A/T including painting water level indicator, lighting Conductor, M.S. / SS ladder and nameplate etc.	5%
Total	100 %

Note:

- 1) As provision for hydraulic testing is made in Sr. No. 9 above no further deduction from any of the other percentages is necessary towards hydraulic testing.
- 2) This is tentative and is to be approved by competent authority

DESIGN CRITERIA AND ASSUMPTIONS

DESIGN STANDARDS

The structural design of the tank shall conform to the following standard specifications and code of practice of the ISI, IS:456, codes of practice of plain and reinforced cement concrete (latest edition).

IS:3370 _ Code of practice for concrete Part-I to IV structures for storage of liquids (latest edition) ISI, IS:875 (Revised-1984).(Latest edition)

Part - I	Dead Load
Part - II	Imposed Load (87)
Part - III	Wind Load (87)

IS:1682-1985 Criteria for design of RCC staging for overhead water tanks issued by Bureau of Indian Standards.

DESIGN OF STRUCTURES

The above Indian Standards current on the date of tender shall be applicable to the design of structure on item not specifically covered by Indian Standard Code of Practice Reference shall be made to relevant standard specifications.

Construction of Various capacities RCC ESR

1. The reservoir will be a covered RCC container supported on RCC column with footing and intermediate braces, etc. as per drawing.
2. Suitable RCC spiral stair case should be provided with landing parapet RCC pardi for approach to the gallery and top of ESR. RCC cantilever catwalk (gallery) of 1.20 M width G.I. pipe railing shall be provided at floor level, preferably at junction of floor slab and vertical walls and G.I. pipe railing with RCC post of 1.0 M c/c interval at the roof slab level of container.

Ventilators shall be provided on top slab of ESR.

One number of C.I. manhole frame and cover shall be provided and fixed in

the roof of tank.

One M.S. ladder shall be provided and fixed for access into the tank through manhole left in the roof. Ladders shall be provided as per specifications.

Water level indicator (Mercury) assembly of approved type shall be provided and installed.

Lightening arrestor as per IS specifications and confirming to IE Rules shall be provided and fixed.

Vertical and horizontal pipe of CID/F flanged pipes, M.S./C.I. specials of required sizes for inlet, outlet and overflow arrangements together with suitable sluice valves shall be provided as per drawings. For washout one tee shall be fixed on the outlet pipe with one valve of suitable diameter.

Sluice valves of required size shall be fixed for inlet, outlet and washout. These valves shall be supplied by the contractor, confirming to relevant IS and of makes approved by Maharashtra Jeevan Pradhikaran.

Required number of B.B, masonry chambers of suitable size as directed with C.I. manhole frames and covers shall be provided and constructed at suitable locations for sluice valves.

Water proof cement plaster of CM 1:2 proportion 20 mm thick shall be provided for inside surface of the tank, including roof slab bottom and epoxy painting in two coats be provided as per Specifications.

Out side surface of tank, exposed faces columns, braces, catwalk bottom portion of slab and exposed surface of the tank shall be provided with cement plaster 20 mm thick with CM 1:3 with smooth finish and then 3 coats of approved water proof cement paint by the Maharashtra Jeevan Pradhikaran shall be rendered.

Letters indicating capacity of tank, name of scheme and year of construction shall be either embossed or engraved on vertical wall of tank and shall be painted with suitable shade of oil paint in 2 coats.

On completion of work hydraulic test or water tightness test shall be given as per standard specification. Therefore, required water arrangements shall be made by contractor at his own cost.

Since this is lump-sum offer, the interim payments will be made at different stages of works contract, as per break-up schedule enclosed. Which is to be

approved by competent authority.

Since this is water-retaining structure, contractor shall give a satisfactory hydraulic test of the tank. This test shall be considered as water tightness test and accepted if the structure appears bone dry from outside after filling with water upto full supply level and the drop in water level is not more than 40 mm in 7 days. For this purpose the water filling arrangements shall be made by the contractor at his own cost, including cost of water pumping arrangements etc.

If during testing any damage occurs to the structure, it will be the responsibility of the contractor to rectify the same. Until satisfactory water tightness test is given on completion of work, interim payments to be made at different stages of works, as per schedule of break up of payment enclosed.

NAVI MUMBAI MUNICIPAL CORPORATION
CITY ENGINEER DEPARTMENT

Pumping Machinery:

Due to Geographical situation the levels may vary, while execution of work. Hence, the agency is requested to get the levels confirmed. The material shall be procured after confirming and approval of actual head of pumps, make and size of all respective equipments by the City Engineer, NMMC. The pumping machinery and allied equipments will be allowed to supply after completion of head works, WTP so as to synchronize the commissioning of the scheme.

Agency has to submit the layout drawing of pumping machinery, sub-station and individual drawing of all equipments for approval well in time or as directed by the City Engineer.

The installation of following equipments shall be done under the guidance & supervision of representative of Manufacturer.

- 1) V.T. Pumps
- 2) VSS Motors
- 3) Transformers
- 4) VCB
- 5) Flow meters

Test Certificate and Manuals

The successful tenderer shall submit the test certificate for various components as called for in the specification if necessary and required by the Engineer.

Certificate for material of construction of equipment shall be furnished. The successful tenderer shall also submit instruction manual in duplicate covering operation, maintenance and repairs of all equipments including wiring diagrams and charts in duplicate for periodical maintenance of equipment.

Rectification of any defects during guarantee period of pump, motor, transformer and all allied electrical and mechanical, civil work shall be carried out immediately, so that water supply should not be hampered.

The necessary opening required for erection of pump set, cable, entry pocket, cable duct etc. shall be discussed during joint visit, so that during casting of floor, beams suitable arrangement is made.

The guarantee period starts from date of commissioning of the equipment. The defect liability period for the pumping machinery will be counted from the date of Trial Run of entire scheme for a period of 12 months. During this period all wear and tear to pumping machinery is to be borne by the Contractor. Considering this offer may be quoted

Contractor

No. of correction

City Engineer

Mode of Payment

Break-up of the payment admissible for pumping machinery and other Electrical, Mechanical items shall be as under :

- a) 70% against supply of material as per approval
- b) 15% after completion of erection at site
- c) 10% after satisfactory commissioning of equipments
- d) 5% after satisfactory operation of 12 months.

NAVI MUMBAI MUNICIPAL CORPORATION
CITY ENGINEER DEPARTMENT

Name of work

Designing, providing, erecting, testing and commissioning of Pumping Machinery with allied Electrical and Mechanical equipments for water supply scheme of 24 X 7 WATER SUPPLY SCHEME OF BELAPUR WARD NAVI MUMBAI UNDER AMRUT-2. DIST. THANE

DETAILED ITEMWISE SPECIFICATIONS

The scope of work includes providing approved make pumps & allied Mechanical & Electrical equipments for the scheme as per requirement of the Department. The essential design features and detailed specifications of each and every item are as under. The layout drawing of pumping machinery & allied equipments shall have to be submitted to the city engineer for approval before actual procurement.

ITEM NO..... VERTICAL TURBINE PUMP (WATER LUBRICATED)
ESSENTIAL DESIGN REQUIREMENTS

The Vertical Turbine Pump offered shall satisfy the following basic design features.

- ◆ It shall have a rising head characteristic.
- ◆ The impeller adjustment shall be such that, the impellers run free in any installed condition in spite of the extension of line shaft caused by hydraulic down thrust and weight of shafting and impellers.
- ◆ It shall be designed for non-overloading of prime mover.
- ◆ It shall be designed to run with closed sluice valve condition without overloading the prime mover.
- ◆ The pumps shall run smooth without noise & vibration. The magnitude of peak to peak vibration at slip will be limited to 100 microns at the bearing housing.

Necessary NPSH curve shall be submitted and minimum submergence required shall be stated. The system head curve and performance curve for all level conditions is to be enclosed.

The pump shall be suitable for satisfactory operation at the duty conditions, the head range stipulated.

The pumps shall have following technical parameters and particulars. (As specified in BOQ)

- | | | |
|-----|--|---|
| 1) | No. of pumps to be | .(As specified in BOQ)Nos |
| 2) | Discharge. (As specified in BOQ) | |
| 3) | Duty head. (As specified in BOQ) | Working head range |
| 4) | Shut off head | Not less than 10% more than higher head range. |
| 5) | Pump efficiency at duty point | Not less than 80 % |
| 6) | Speed | 1470 RPM |
| 9) | Column pipe dia | Not less than 150 mm |
| 10) | Column pipe wall thickness | Minimum 8 mm |
| 11) | Column pipe flange thickness | Minimum 20 mm |
| 12) | Pump/Line shaft material | Stainless steel AISI - 316 |
| 13) | Total column length as per sump depth (Including bowl assembly) | |
| 14) | Strainer | Basket type, fabricated out of stainless steel bars |
| 15) | No of Stages of Bowl Assembly | Not more than 2 stages. |
| 16) | Column assembly & other fasteners | Stainless steel AISI 316 |
| 17) | M.S. Sole plate | Minimum 32 mm |
| 18) | Base frame size. | Fabricated with ISMC 100 mm |

- 19) Pump and column shaft S.S. Not less than 32 mm

V.T. PUMP SETS (Water Lubricated)

The Vertical Turbine pump sets shall be (self water lubricated) suitable for following conditions and specifications.

- ◆ The pump shall be of approved by the Superintending Engineer (M) and shall conform to IS: 1710 & shall satisfy test & trial as per IS:5120 with latest modifications from time to time.
- ◆ Pump efficiency shall not be less than 80% at duty point under all circumstances & shall be maintained for 3 years from date of commissioning of the pumps.
- ◆ Constructional and design details of the set shall be as follows.

a) Impeller

Impellers shall be Stainless Steel CF8M shall be statically and dynamically balanced. Balancing holes in impeller are not acceptable.

b) Wearing Rings

It shall be of Bronze conforming to IS: 318 and suitable Grade and shall be of renewable type. It shall be held in place against rotation by screw in or locking with pins press fitted locked with pins. The wearing rings shall be provided on both impeller and casing.

Composite design of line shaft material and diameter and bearing centers shall ensure that the entire rotating assembly is brought from stand still to full speed without any vibration, whipping and shaft deflection and to ensure that first critical speed is not within 75% to 125% of full speed.

c) Column Pipe Assembly

Column pipe shall be of M.S. ERW Fabricated heavy duty flanged type. Thickness of column pipe shall not be less than 6 mm. Each length of

column pipe shall be designed to accommodate guide bearing holders and in Standard length of 1.5 Mtr. and matching distance piece pipe required for the total length of sump depth Mtr. column length. Spider shall be provided with nitrile rubber bushing.

d) Suction Bell Mouth

Entrance dia of Bell mouth shall be such that the suction velocity shall not exceed 1.5 m/sec. and shall be of M.S. heavy duty/C.I. The shape and curvature of the bell mouth shall be designed for streamlined flow of bowl suction, the thickness of bell mouth shall not be less than 12 mm.

e) Strainer

Suction strainer shall be of flanged type heavy duty made from S. S AISI 410 plate of thickness not less than 10 mm. Total area of perforations shall not be less than 300% of entrance area of bell mouth. Stainless steel hardware shall be provided.

f) Bowl Assembly

The pump bowl / bowls shall be flanged type with machined matching of faces. The suction bell mouth, bowl assembly, column pipe and all Joints shall be of flange joints. The bowls shall be capable of withstanding a hydrostatic pressure equal to twice the duty-head or 1.5 times shutoff head whichever is greater.

g) Discharge Head

Discharge head shall be fully flanged type fabricated from M.S./C.I. It shall incorporate full diameter radial branch (same as that of column pipe) stuffing box with renewable bushing and tapping for pressure gauge. It shall be of robust construction and shall be designed to support VHS or VSS motor & entire loading of pump assembly, water column etc. and shall withstand all static, dynamic, torsional loads hydraulic thrust imposed during operation from shutoff to stipulated operating conditions and thrust due to change in direction of flow without any vibration. The discharge head shall be capable of withstanding hydrostatic pressure equal to twice the duty head or 1.50 times shut off head whichever is greater. The discharge head

shall be properly supported to eliminate vibration. An air cock of 50 mm dia with same size of „B“ class G.I. pipes, bend shall be fixed to the discharge head. The G.I. B Class pipes shall be suspended vertically in the well with adequate length to release air.

h) Sole Plates

M.S. Sole Plate of minimum 30 mm or above thickness machined from both the sides shall be provided. The size of sole plate shall cover entire pump supporting girders (base frame). Suitable opening shall be provided at the center, considering diameter of bell mouth bowl assembly and strainer.

The Sole Plate shall be fixed with nut bolts on 200 mm. ISMC frame and shall be machined. The sole plate shall be kept on girders and blue matched to the extent of least 60 % of contact area. If necessary uneven surface shall be smoothened with polish paper / smooth file. The sole plate shall be perfectly leveled with straight edge and precision level. The sole plate shall have tapped holes to receive discharge head. The bottom and top of sole plate shall be blue matched to have at-least 60% contact area. Use of shims will not be permitted for pump leveling.

- i) The pump shall be driven by vertical hollow shaft Or Solid shaft motor and shall be provided with non-reversible ratchet, check nut, flexible coupling etc. complete.
- j) Special tools i.e. two pairs of erection clamps for the column and line shaft as recommended by manufacturer, adjusting nut spanner & impeller collate hammer shall be supplied with each pump set.
- k) Pre Lubrication Tank & Other Accessories : - In order to lubricate line shaft bearing of the pump, lubrication arrangement comprising the following shall be provided.
- l) Lubrication tanks 2 Nos. interconnected with each other common for all pumps fabricated from M.S. sheet metal of thickness not less than 5 mm and of capacity not less than 1 m³. The tank shall be cylindrical and shall be installed on pump mounting floor with concrete saddles or as directed during execution by Engineer-in-charge.
- ii) Each lubrication tank shall be equipped with the following :

- a) W. L. side gauge
- b) Over-flow lead to sump
- c) Drain valve lead to sump
- d) "B" Class G.I. pipe connection with isolating valve and non-return valve to each pump column assembly for lubrication. The valve shall be located near the tank. The size of individual pipe and valve to pump shall be 40 mm diameter.
- e) Inlet connection with solenoid operated valve and suitable removable strainer by suitable tapping from common header.
- f) Float valve in the tank for control of overflow.
- g) Any other item necessarily required for proper functioning of water lubrication arrangement.

TESTING

All the pumps shall be subject to factory test in presence of Mechanical Engineer (M) and third party inspection agency approved by NMMC.

FACTORY TEST

- a) Hydrostatic Test

Following item shall be tested at hydrostatic pressure equal to twice duty head or 1.5 times shut off head of bowl assembly whichever is higher as per IS : 5120.

Bowl assembly	-	Each.
Discharge Head.	-	Each.
Column Pipes	At least 20% of total quantity	

- b) Performance Test

Performance test of each pump should be carried out. The test shall generally be carried out as per IS:10981 of acceptance test for pumps Class - B. The test shall be carried out at full speed & full load at manufacturers work. The test shall cover six points i.e.

- i) duty point.

- ii) Two points above duty point.
- iii) Two points below duty point.
- iv) Shutoff head
- v) Power consumption at all above points.

The test at reduced speed will not be accepted.

- c) Strip Inspection

Two pump sets out of five of pure water after completion of its performance test and as selected by the Engineer or inspector at random will be offered for strip-inspection and dimensional checking. The manufacturer/contractor shall submit all required dimensional drawings. Minimum points as under shall be checked.

- Original dimensions of impeller, neck ring etc.
- Condition of all components particularly bushes, bearing, and wearing rings to examine for undue rubbing, wear etc. and verification of dimensions after performance test.
- Dynamic balancing of (a) Impeller, (b) Flexible coupling, shall be carried out as per relevant IS.
- Verification of clearance and tolerance between :
 - a) Wearing rings
 - b) Impeller shaft and bearings
 - c) Impeller shaft and key
 - d) Shaft and flexible coupling
 - e) Key and keyway on shaft at (d)

5) Finish of water passage in impeller and diffuser.

- 6) Review of raw Material Test Certificate and quality control procedure.

Any deviation from tenders specifications & related IS shall be pointed out in inspection report.

Material test certificate to the various pump components shall be furnished.

FIELD PERFORMANCE TEST

Field test shall be witnessed by at least Two Engineers of NMMC.

The test shall be carried out as per IS:10981 Code of acceptance test of pump Class-B, in general and stated below in particular. The purpose of field test is not to ensure whether pump performance as regards acceptance limit as per IS : 9137, the purpose is to ensure that the pump performance is generally acceptable or otherwise. Final acceptance shall be as per following criteria.

- i) Verification of guarantee for H and Q specified in Clause 9.4.1 shall be based on following liberalised tolerances.

$$\begin{array}{ll} X_{Hv} & \pm 0.006 \\ X_{Qv} & \pm 0.09 \end{array}$$

- ii) As regards P-Q. characteristics for acceptance. It shall be checked whether motor is not getting overloaded within specified head range.

- a) Volumetric

Volumetric measurement shall be taken on the basis of rise of level in clarifloculator. In addition, one Ultrasonic calibrated flow meter shall be arranged by the contractor at his cost

- b) The head shall be measured with calibrated pressure gauge of accuracy 1% or better. At least three pressure gauges shall be used duly calibrated from two different institutions with prior approval of the Engineer. The calibration shall be point to point and not mere for percentage error. The gauge shall be fitted at suitable place on the discharge nozzle. It may be noted that the stipulation that pressure gauge shall be installed at least two times diameter away from discharge nozzle and delivery valve be placed at least four times diameter away from discharge nozzle cannot be simulated at site conditioned no allowance for this deficiency shall be considered. The decision of Engineer in-Charge shall be final.
- c) The input power to motor shall be measured with 2 Nos. class 0.5 accuracy single phase watt meters with suitable CTs test lid and PTs provided in panel. The wattmeter, CTs and PTs shall be got calibrated from approved institutions. The calibration shall be for point to point and not mere for percentage error.

- d) The speed shall be measured by at least two numbers, non contact tachometer with digital display and calibrated from two institutions, approved by the Engineer.
- e) The field test shall be taken with entire head range in such a manner that it would cover at least 6 points (i.e. duty point, 2 above, 2 below and shut off). The guarantees for head and discharge shall be deemed to be fulfilled as per clause under 9.4.1 of IS : 10981.
- f) The field performance test at site is absolutely essential as above (a) to (e).

Make: As per approved list of NMMC.

Location wise details of the pumps :

Pure Water Pump Details							
Sr. No.	WD	Location	Nos.	Total Discharge in LPS	TOTAL HEAD	Motor BHP	Pump Type
1	5B	Diwale Gaon	(1W + 1S)	54.00	31.00	40.00	Vertical Turbine
2.1	4	Parsik Hill	(1W + 1S)	44.00	104.00	90.00	Vertical Turbine
2.2	8	Sec-9	(1W + 1S)	57.00	43.00	50.00	Vertical Turbine
2.3	7	Mango Garden	(1W + 1S)	45.00	37.00	40.00	Vertical Turbine
3	9	Sec-5	(1W + 1S)	68.00	44.00	60.00	Vertical Turbine
4	10 - B	Sec-21	(1W + 1S)	173.00	35.00	120.00	Vertical Turbine
5	16	Sec- 44	(1W + 1S)	171.00	29.00	100.00	Vertical Turbine
7	18	Karave Gaon	(1W + 1S)	55.00	33.00	40.00	Vertical Turbine

ITEM NO.VERTICAL SOLID SHAFT MOTOR

The scope of the work includes providing approved make, vertical solid shaft squirrel cage induction motor(min HP as specified above), conforming to relevant IS,suitable to operate on 415 Volts +/- 10%, 3 Phase, 50 Hz, AC supply. The synchronous speed of the motor should be 1500 RPM. The insulation grade of the motor should be „B“. The motor should be screen protected and drip proof type. **It should have suitable terminal box to accommodate incoming cable from starter & size of which shall be got approved from department.** It shall be suitable to operate on +/- 10% voltage variation, +/- 5% frequency variation and +/-10% voltage and frequency variation.

Thrust bearing shall be suitable and of adequate capacity to carry the weight of all rotating parts and the hydraulic down thrust. Non reversing ratchet or similar mechanism should be provided to the motor to prevent reverse rotation.

Continuous maximum rating of the motor shall be at least 20% above the maximum power absorbed by the pump under any operating point within stipulated head range of the pump, or at least 10% above the power required at shut off, which ever is higher.

However the motor rating should not be less than that mentioned in schedule „B“.

All the motors shall be subject to factory test in presence of corporaton Engineer (M) or his representative and third party inspection agency approved by NMMC.

The scope of inspection is as under

- i) Review of raw material test certificate and quality control procedure.
- ii) Routine test for all.

The vibration level should be within permissible limit (IS: 12075) and noise level shall be 80db for which the certificate shall be submitted.

All technical details, leaflets for the motor offered should be given along with tender only. Manufacturer's test certificate shall be furnished along with the supply of motor.

ITEM NO. C.I.D.F. SLUICE VALVE (GLANDLESS) WITH ACTUATOR

The entire assembly comprising valve actuator reduction gear box and head stock shall be supplied by the approved valve manufacturer only and documentary proof for the same shall be submitted.

3.1 SLUICE VALVE

Providing, erecting and commissioning of dia & PN Rating Sluice Valves without by pass as specified in BOQ shall be of approved by the City Engineer and shall be provided in the delivery pipe of each pump. The sluice valves of cast iron body suitable for the PN as specified in BOQ rating shall be provided and shall conform to relevant IS6. The sluice valves shall be double flange, water works pattern, inside screw, non-rising spindle type and shall be fitted with double faced gunmetal taper wedge made in one piece and having two machined facing rings securely fixed into machine recesses in the wedge. The guides and the lugs shall be provided to guide the wedge through its full travel and the lugs and guides shall be lined with bronze. The bronze liners provided on guides and lugs shall be secured by counter sunk screws or rivets of nonferrous metals. The clearances (radial and lugs axial) between the lugs and guides shall not exceed 2.5mm. All valves shall be provided on delivery side of pump.

MATERIALS OF CONSTRUCTIONS:

Body, bonnet cover and wedges	Grey cast iron
Stuffing box and gland.	FG - 200 of IS-210
Spindle	Stainless steel IS:6603
Wedge and body rings	Leaded in bronze conforming to grade-2 of IS:318
Nuts and Bolts	As per IS: 1363
Wedge Nut	High tensile brass conforming to Alloy 3 of IS : 320

3.1 SLUICE VALVE (GLANDLESS)

A mm dia Class 300, Cast Steel sluice valve shall be provided on the delivery pipe of each pump. The valve shall be double flanged water works pattern inside screw with non-rising spindle. The valve shall generally conform

to Class 300 rating of relevant international standard. The valve shall be suitable for operation with valve actuator mounted on valve body with reduction gear box and head stock.

The materials of construction shall be as per relevant standard with stainless steel spindle of grade specified in standard. Thrust bearing shall be located in suitable housing above stuffing box and shall be oil/grease lubricated. Construction shall be such that ingress of water into bearing housing is totally prevented.

The valve shall be subjected to test at manufacturer's works in the presence of the Third Party Engineer for seat and body test at the pressure stipulated for the rating and entire operation with valve actuator simulating field installations.

Material of construction of Valve

Body, Bonnet - CS ASTM A216 Gr WCB

Body Seat Ring - SS CA15 / CS WCB +13% Cr. HF

Wedge - CS WCB +13% Cr. HF

Spindle & Gland Bush - SS AISI type 410 Seal (O) ring - Nitrile rubber

Back Seat Bush - SS AISI type 410

Yoke Sleeve - SG Iron / Gun Metal

Gasket - Spiral wound SS 304 + Graphoil filled

Body Studs - ASTM A 193 Gr B7

Body Bolts - ASTM A 194 Gr 2H

Ends- Flanged Drilled to ANSI B16.5, CL-300

3.2 VALVE ACTUATOR

Electromechanical valve actuator shall be provided for sluice valve of individual pump delivery line the actuator shall be electrically operated. However features shall be incorporated to disengage electric motor and operate the actuators manually.

3.3 ACTUATORS

The actuator shall be designed to open and close with manual push button operation considering actual torque required for opening and closing of actuator and under shut off condition. The operating speed shall be designed for valve stroke of approximate 250 mm per minute during valve closing and opening operation. The enclosure shall be fully weatherproof it shall incorporate double „O“ sealing arrangement for protection of electrical

component from moisture and dust at all time even when terminal covers are removed, mechanical indicator for sluice valve close and open should be provided on actuator. The actuator shall also incorporate hammer blow feature to open the valve.

3.4 MOTOR

The electric motor shall be 3 phase squirrel cage, Class-B insulated with a time rating of 10 minutes or twice the valve stroking time, whichever is longer. The HP of motor shall be with% extra margin.

3.5 DRIVE

The actuator gear box shall be of the totally closed oil/greased lubricated type the arrangement shall be such that the gear case can be opened for inspection or disassembled without taking the valve out of the service.

The drive shall incorporate bottom entry drive bushing which shall be easily detachable and machined to fit on valve spindle.

3.6 MANUAL OPERATION

A hand wheel shall be provided at appropriate level for manual operation. The mechanism shall be such that the manual operation is possible only when motor is disengaged by means of lever.

3.7 LIMIT SWITCHES

Limit switches shall be provided for open and close torque and/or positions. Means shall be provided to prevent the open torque switch tripping during initial unseating hammer blow effect.

All required electrical and mechanical connections including power and control cables shall be provided and cost of all such items shall be deemed to be included in the quoted cost for valve and actuator.

Necessary support in CC block shall be provided underneath the valve. If required CC platform shall be provided to ensure that height of hand wheel is 1 m above the platform cost of CC support and platform shall be separately under relevant item in Schedule-B.

3.8 TESTING

All the Sluice valves & Valve actuators shall be subject to factory test in presence of Superintending Engineer (M) or his representative and third

party inspection agency approved by NMMC.

The scope of third party inspection by the agency approved by NMMC is as under **for all Sluice valves:**

1. Review of raw material test certificate and quality control procedure.
2. Body and seat test
3. Test with operation of actuator and reduction gearbox fully assembled with valve opening and closing with synchronizing.
4. Checking wear travel.

Acceptable makes: As per Mechanical approved make of NMMC.

ITEM NO. C.I.D.F. REFLUX VALVE**a) Dia as specified in BOQ for Each pump & Rising Main**

- 2.1 A dia as specified in BOQ non-return valve generally conforming to relevant international standard shall be provided on the delivery pipe of each pump. The valve shall have free acting, quick opening, non-slam closure, and low head loss characteristics. The entire assembly shall be suitable for working pressure of suitable PN Rating Kg/Sqcm and body test pressure of suitable PN Rating Kg/Sqcm construction materials shall be as per relevant standard. However, rubber faces shall not be offered. A dia as specified in BOQ Non-Return valve shall be multidoor generally conforming to relevant standard and shall be installed on rising main at location as directed by Engineer In Charge . Alternatively CIDF mm dia valve with sliding disk generally as per construction of zero velocity valve can be accepted if manufacturer and contractor jointly give guarantee for years. Themm dia NRV/ZVV shall be provided on rising main.

The valves shall be of approved make and shall be tested at manufacturer's works for seat and test and body test for test pressure in presence of the Third party inspection agency.

Necessary CC support shall be provided underneath the valves and shall be paid under relevant item in Schedule „B“.

2.2 MATERIALS OF CONSTRUCTION

Body, cover, door and door face disc.	Grey cast iron confirming to grade
Disc.	FG -200 of IS-210
Hinges	Cast steel to IS:1030
Hinges pins, door pins & door	Stainless steel to IS:6603
Suspension pins	
Bearing bushes, body hinges and door faces	Gun metal conforming to grade 2 of IS:318

2.3 TESTING

All the Reflux valves shall be subject to factory test in presence of Superintending Engineer (M) or his representative and third party inspection agency approved by NMMC.

The scope of third party inspection by the agency approved by NMMC is as under

- a) Review of raw material test certificate and quality control procedure.

Contractor

No. of correction

City Engineer

b) Body test and seat test.

All test certificates in triplicate shall be submitted along with supply of valves.

Acceptable makes: As per approved mechanical list of NMMC

ITEM NO. ... CAST STEEL REFLUX VALVE (CLASS 150/300)

- a) mm dia for Each pump
- b) mm dia on Rising Main

A mm dia non-return valve generally conforming to relevant international standard shall be provided on the delivery pipe of each pump. The valve shall have free acting, quick opening, non-slam closure, and low head loss characteristics. The entire assembly shall be suitable for working pressure of 52 Kg/Sq cm and body test pressure of 78 Kg/Sq cm construction materials shall be as per relevant standard. However, rubber faces shall not be offered. A..... mm dia Non-Return valve shall be multi door generally conforming to relevant standard and shall be installed on rising main at location as directed by Engineer In Charge . Alternatively M.S. fabricated mm dia valve with sliding disk generally as per construction of zero velocity valve can be accepted if manufacturer and contractor jointly give guarantee for 3 years. The.....mm dia NRV/ZVV shall be provided on rising main.

The valves shall be of approved make and shall be tested at manufacturer's works for seat and test and body test for test pressure in presence of the Third party inspection agency.

Necessary CC support shall be provided underneath the valves and shall be paid under relevant item in Schedule „B“.

Material of Construction

For mm dia and ,..... mm dia REFLUX VALVE :

Body , Cover & Hinge - CS ASTM A216 Gr.WCB

Disc - CS WCB + 13% Cr. HF

Body Seat Ring- SS CA15 / CS WCB +13% Cr. HF

Washer, Hinge Pin & Split Nut - SS AISI 410

Gasket - Spiral Wound SS 304 + Graphoil filled

Cover Stud / Nut - ASTM A 193 Gr B7 / A 194 Gr 2H

Valves 400mm & above sizes are with Counter weight arrangement.

Ends- Flanged Drilled to ANSI B16.5, CL-300

OR

2.3 TESTING

All the Reflux valves shall be subject to factory test in presence of Superintending Engineer (M) or his representative and third party inspection agency approved by NMMC.

The scope of third party inspection by the agency approved by NMMC is as under

- a) Review of raw material test certificate and quality control procedure.
- b) Body test and seat test.

All test certificates in triplicate shall be submitted along with supply of valves.

Acceptable makes: As per approved mechanical list of NMMC

TESTING

All the Reflux valves shall be subject to factory test in presence of Superintending Engineer (M) or his representative and third party inspection agency approved by NMMC.

The scope of third party inspection by the agency approved by NMMC is asunder

- a) Review of raw material test certificate and quality control procedure.
- b) Body test and seat test.

All test certificates in triplicate shall be submitted along with supply of valves.

Acceptable makes: As per Mechanical approved list of NMMC.

ITEM NO..... BUTTERFLY VALVE

BUTTERFLY VALVE, P.N.-..... (..... mm dia for each pump andmm dia for rising main).

..... mm dia and mm dia Butterfly valve shall be short wall body pattern conforming to BS 5155 suitable for working pressure ofKg/Sq.cm and body pressureKg/Sq.cm. The manual actuator with suitable hand wheel shall be provided to operate the valve. The shaft shall be horizontal. The mm dia. butterfly valve shall be installed on rising main as directed by

Engineer-in-Charge.

The valve seat of the disc shall be synthetic rubber and renewable without dismantling the valve.

All fasteners shall be stainless steel. The casting shall conform by third party inspection agency.

Necessary CC support shall be provided underneath the valve and shall be paid separately under relevant item in Schedule-B.

5.2 TESTING

All the valves shall be subject to factory test in presence of Superintending Engineer (M) or his representative and third party inspection agency approved by NMMC.

The scope of third party inspection by the agency approved by NMMC is as under

- a) Review of raw material test certificate and quality control procedure.
- b) Body and seat test.

Acceptable makes: As per Mechanical approved list of NMMC.

ITEM No KINETIC AIR VALVE

Double orifice kinetic type as specified in BOQ air valve of approved make by NMMC shall be provided on 800 mm dia common manifold as shown in drawing as per direction of Engineer-in-Charge. The air valve shall be suitable for working pressure of suitable PN rating Kg/Sq.cm and isolating sluice valve designed for working pressure of suitable PN rating Kg/Sqcm shall be provided.

The air valve shall be mounted on same dia branch hole with same size

The air valve shall be of approved make by NMMC only and shall be test at factory in presence of Third Party Inspection agency approved by NMMC.

TESTING

All the valves shall be subject to factory test in presence of City Engineer (or his representative and third party inspection agency approved by NMMC).

The scope of third party inspection by the agency approved by NMMC is as under

- a) Review of raw material test certificate and quality control procedure.
- b) Body and seat test.
- c) Operation test for functioning of small orifice and large orifice.

Acceptable makes: As per Mechanical approved list of NMMC.

ITEM NO. M.S. DISMANTLING JOINTS.

As specified in BOQ dia dismantling joint shall be provided between the discharge elbow and non-return valve in delivery line of each pump & as specified in BOQ dia dismantling joint shall be provided between butterfly valve & N.R.V. for easy assembling and dismantling of the pipe work . The shell thickness shall be 10 mm and flange thickness shall be not less than 12 mm. The dismantling joint shall be withstanding test pressure of suitable PN rating Kg/Sqcm or twice the shut off whichever is greater. The design shall generally confirm to typical drawing of dismantling joint. The tenderer may offer other technically equal arrangement. The arrangement shall however fully ensure that...

- 1) When assembled and under dynamic load the bolts together shall withstand pull equal to 1.5 times the duty head and no torque or pull is extend on the pump foundation arrangement.
- 2) During assembling or dismantling the sliding flange can be slided adequately to enable to detach the discharge tapper and piping from each other.
- 3) The seal ring joint shall be designed to withstand test pressure of suitable PN rating Kg/Sqcm without any leakage
- 4) The sliding flange should slide at least 20 mm.

TESTING

The scope of third party inspection of the dismantling joints by the agency approved by NMMC and Superintending Engineer(Mech.) or his representative is as under:

- a) Review of raw material test certificate and quality control procedure.
- b) Operation test.

The drawing shall be got approved from department before actual fabrication.

ITEM NO. :-M.S.D.F.PIPES AND SPECIALS**General**

Pipe work including tapers, specials and bends shall be provided and completed. The pipes, and specials shall be of mild steel and fabricated to transmit flow without disturbing streamlined condition, to gradually and smoothly changes the direction or velocity as the case may be and to offer neat aesthetic appearance.

The M.S. pipes and specials to be provided by the contractor under this item includes on delivery, dished ends and specials on as specified in BOQ dia manifold @ Raw water pumping station.

MATERIAL AND FABRICATION

The pipes, specials and flanges shall be manufactured from mild steel plates generally conforming to IS: 226 Thickness of plates shall not be less than those stated below or nearest commercial thickness.

- | | | |
|-----|-------------------------|-------------|
| i) | M.S. pipes and specials | 10 mm thick |
| ii) | Dished end | 20 mm thick |

MODE OF MEASUREMENT AND PAYMENT

The pipes and specials provided by the contractor such as pipes, specials flanges dished end and blank flanges are payable on Kg. - rate basis for complete work.

For calculation the weight for payment on rate per kg basis following parameters will be applicable.

- i) Wt. of pipe and special shall be based on finished/fabricated component, Wastage will not be considered for payment.
- ii) Thickness shall be average thickness of pipes supplied.
- iii) No deduction for bolt holes in flanges will be made.
- iv) Nut bolts and washers will not be considered for weight calculation.
- v) Specific weight of M.S. pipes and specials shall be assumed as 7850 kg./ Cum.
- vi) Cost of epoxy painting of M.S. pipes specials and valves are deemed to have been included in rate for Kg. basis and shall not be considered separately for payment.
- vii) Positive tolerance in the thickness of pipe is acceptable. The thickness shall be measured by ultrasonic gauge and it shall be measured by agency in presence of department Engineer at site with their instrument.

Contractor

No. of correction

City Engineer

- viii) Cost of breaking of pump house wall for pipeline work and making and finishing to original after completion of work is included in this item.

Contractor should provide branch tees for air valve, pressure relief valve etc. erected on manifold as per drawing and as per directions of Engineer-in-charge.

PAINTING

For all M.S. pipes supplied by the contractor and manifold pipe the external surfaces of the pipe work and valves shall be painted with one coat of epoxy primer and two coats of epoxy paint approved by the Engineer. Painting shall be carried after completion of erection work.

TESTING

The contractor shall test the pipe work for hydrostatic pressure of Kg / Sq.cm. in presence of Engineer-in-charge.

ITEM No.... : M.S. FLANGES

Providing, fabricating, erecting M.S. flanges as specified in BOQ dia, 15 mm thick. The flanges shall be machined on both sides. The flanges shall be welded to the M.S. pipes used for connecting the pumps and other accessories. The payment will be made on weight basis.

ITEM NO FLANGED JOINTS

The delivery of pump shall be connected to the rising main by making flanged joints as specified in BOQ dia. to the MS pipes & specials. The flanges shall be jointed with fasteners of adequate strength and quality . The bolt diameters shall conform to IS: 1538.

The joint ring between flanges shall be of 3 mm thick rubber of adequate hardness for forming watertight joints and suitable to withstand pressure of Suitable for PN rating kg/Sq.cm.

This item includes the cost of good quality rubber packing & nut bolts with washer. All flanged joints shall be hydraulically tested on full load of pump.

ITEM NO PRESSURE GAUGE

This job covers providing and fixing as specified in BOQ dia Glycerine filled pressure gauge Bourdon's type pressure gauge as per IS 3624 : 1987 with brass cock, siphon tube, etc. as per direction of Engineer in charge. Contractor should provide suitable tapped holes at appropriate places for fixing these pressure gauges & the pressure gauge shall be located at a height of 2.5 feet from floor level to ease easy reading for the operator. The pressure gauges shall have range from 0- 14 Kg/ sq. cm. should be of approved make only.

ITEM NO CONCRETE FOUNDATION**GENERAL**

The work includes excavation in all types of strata, reinforcement casting of RCC works as required with curing etc. complete. Payment shall be made on the basis of finished concrete work. Excavation disposal of excavated stuff refilling., form work and curing etc. shall not be paid separately and deemed to be included in cost of RCC/PCC work.

The thrust block for foundation NRV/SV using M-200 concrete shall be provided. All foundations shall be made finished with proper edges and surfaces.

C.C. FOUNDATIONS

- a) The support for valves and pipes, platform for valve operation, shall be cast in M-200 concrete. The dimensions and spacing of block shall be submitted for prior approval.

Suitably designed and adequate numbers of concrete supports for pipe work and all sluice valves and non-return valves shall be provided. Minimum design criteria as under shall be adopted.

- i) Span shall be such as to restrict deflection within $1/360$ of span.
- ii) Width of the support shall be equal to pipe diameter (+) 200 mm.
- iii) Cradle thickness shall be $1/4^{\text{th}}$ of pipe diameter but not less than 300 mm.

- iv) Minimum cradle depth shall be $\frac{1}{4}^{\text{th}}$ of pipe diameter.
- v) Bearing angle shall be 120°
- b) The free end of mm dia common delivery line shall be suitably anchored to withstand and relieve pipe work and fasteners from stresses due to thrust.

The thrust block to common manifold free end / bend should be designed and got approved from the Deptt. Proper RCC chairs blocks should be provided to common manifold.
- c) There should be separate foundation blocks for all valves.

ITEM NO H.O.T. CRANE- as specified in BOQ

GENERAL

Particular	For Pure water pump house
Qty	1 No.each
Capacity	as per BOQ
Span	as actual
Lift	6 Mtr

- i) The contractor should design & provide the H.O.T of capacity as per BOQ safe working capacity tested to 50 % overload times working capacity, overhead travel- ling crane with all equipments & accessories shall be provided. Functional requirements of the crane are as under.
- ii) To lift complete weight of the pump or motor from any point, in the pump house.

The sub-work includes.

- a) Bridge girder mounted on track wheels and end carriages.
- b) Travelling Trolley
- c) Chain Pulley Block

Minimum capacity of crane, ISMB, l section are stated above. It shall be the responsibility of the tenderer to provide higher capacity if the heaviest load of the equipment's to be handled need so, without any extra cost.

The crane shall generally conform to respective IS

The bridge girder shall be designed to carry specified load at any position during travel. The wheels of end carriage shall be machined and shall have flanged on both sides. Common shaft extending shall drive the end carriage full span for longitudinal travel, power to end carriage shall be through reduction gearbox.

The travelling trolley shall have four wheel geared type. The trolley shall run on the lower flange of the gantry beam with two wheels on either side of the gantry web. The trolley wheel shall be single flanged with threads machined to match the flange of the gantry beam. A gearing arrangement shall be incorporated in the trolley to affect the traverse motion and shall be operated by mean of chain extending to within 6 m of the operating floor. The trolley shall also incorporate a hook of robust design for fixing the chain pulley block.

All gears shall be machined cut and of robust design. Suitable ball or roller bearing shall be employed on all motions.

The chain pulley block shall be of spur gear type. The chain pulley block shall generally confirm to IS - 3832 .The chain pulley block shall consist of load chain wheel, hand chain wheel. The hand chain for hosting shall be hanged well clear of the hook. The hand chain wheel shall be provided with roller type guarding to prevent slip off the chain. Gearing arrangement shall

be totally enclosed with proper lubrication arrangement for bearing and pinions. Gears shall conform to IS - 4460. The brake shall be of automatic screw and friction disc type and shall offer no resistance during hoisting.

The assembly shall be such that the load could be sustained automatically at any position of the lift on release of the manual hoisting effort.

The hook shall swivel and operate on ball and roller bearing and shall be generally confirming to IS- 3815.

Suitable stoppers shall also be provided to prevent over travel of travelling trolley.

Testing

The crane shall be tested at manufacturers work in presence of the third party agency approved by NMMC and Superintending Engineer (Mech.) or his representative. Site conditions shall be simulated for deflection test. The scope of inspection is as under : -

- a) Review of raw material test certificate and quality control Procedures.
- b) The crane shall be tested 50% overloaded times working capacity for all three motions .
- c) Operation test.
- d) Deflection test.
- e) Load test.

ITEM NO SQUARE BAR / RAIL

The rails shall be square bars, not less than mm x mm or equivalent rail sections of EN 8 material. The rails/square bars shall be secured on supporting RCC continuous corbel beam with all required fasteners and end stops to prevent over-travel.

The Rail section shall be secured on the provided M.S. plate on RCC continuous corbel beams.

ITEM NO..... H.T. SUBSTATION :-**1. GENERAL :**

The equipments and associated works included shall be suitable for applicable site voltage system and characteristics.

PRIMARY VOLTAGE

Voltage system on MSEDCL side shall be 11/22 kV.

SECONDARY VOLTAGE

On secondary side the tenderer shall offer and quote for the following.

415V system for motor feeders and 415V system for lighting load and auxiliary load.

415 V

2. GENERAL ARRANGEMENT :-

The general arrangement of the switch yard shall be as per I.E. rule.

It will be responsibility of the tenderer to prepare the layout conforming to Indian Electricity Act 2003, Indian Electricity Act modified up to-date, Guidelines of Electric Inspector of Government of Maharashtra and MAHADISCOM, without any extra cost to the Owner. Entire technical and financial responsibility, including fees etc. to get the approval from the Electrical Inspector and MAHADISCOM authorities shall rest with the tenderer.

3. THE CONCEPTUAL ARRANGEMENT IS AS UNDER

- i) One incoming kV feeder from MSEDCL will be connected to a proposed ten pole structure arrangement.
- ii) Two Nos kVA, kV/0.433 kV outdoor transformer are to be installed with H.T. equipment.
- iii) The proposed work includes LBS Or RMU OR VCB of kV on incoming feeder with stand bye arrangement .
 - i) For this kV AB switch on incoming side of the LBS Or RMU OR VCB and kV isolator with pedestal on outgoing side of incoming VCB shall be provided.
 - ii) HT Sub-station equipments are to be installed separately.
 - iii) For Power Transformer P.F. Correction/control panel shall be provided.

4.KV SWITCH YARD :-

.... (....) Pole (ISMB 200 x 100) structure for switch yard shall be erected for reception and distributing kV power supply to one new kV LBS Or RMU OR VCB. In Feeder Yard and in transformer feeder yard, new bays of adequate size of copper conductor not less than 6 SWG shall be provided for entire pole structure suitably.

The item includes required number of channel section ISMC 100 x 50 mm to accommodate AB switches, Outdoor CTs, PTs, Insulators and bus-bars, poles of size ISMB 200 x 100, Lightning arrestors, chain link fencing for sub-station, stone metal for entire sub-station, civil work such as filling murum, pole and raft foundation etc. Stays for poles shall be provided.

For the poles and steel structure sufficient earthing as required by I.E. Rules shall be provided. All poles shall have adequate foundation.

5.....**KV LIGHTENING ARRESTOR STATION CLASS :-**

Required sets (minimum 3 sets) (as per I.E. Rules and Electric Inspectors Inspections) of lightning arrestors (each set comprising 3 Nos) shall be provided on pole structure at suitable location in feeder switch yard and transformer switch yard. The final location shall be as approved during detail Engineering and as approved by Electrical Inspector. The arrestor shall be station class as per relevant IS. It shall be suitable for kV, 3 Phase, and 50 Hz effectively grounded system.

It shall have anti-contamination feature and pressure relief device with current limiting gaps generally conforming to IS: 3070, Part-I proven gap less lightning arrestors will also be accepted.

Test certificate in duplicate from the manufacturer shall be furnished.

6. **kV AIR BREAK SWITCHES AND ISOLATORS :-**

A.B. switches (with earth switch) (minimum 3 sets)shall be provided. The isolators shall be post type suitable for kV system and confirm to IS:2544. Each switch shall be rated to 200 Amps, continuous current and short time current of KA RMS. The AB switches shall be mounted on cross channels on pole structure. The isolator shall be mounted on concrete pedestal or pedestals is included in this item.

The A.B. switches shall be triple pole, manually operated off load type, single break with earth switch and suitable for mounting in vertical position shall be gang operated.

Each pole of the switches shall be rated for 200 Amp. The switch shall be complete with down rod lever, G.I. pipe operating handle erected on extended square shaft and supports by external bush bearing phase coupling pipe, padlocking arrangement and other components copper alloy only. Total Six Nos, kV A.B. switches / Horizontal isolators should be provided minimum. One AB switch each on incoming and one isolator each on outgoing side of outdoor VCB shall be provided. The Porcelain post insulators for air break switches shall be of kV single stacks or kV double stack type post insulator. The insulators shall comply with the specifications separately mentioned below in respect of electrical and mechanical characteristics.

7kV D.O. FUSES :-

The kV D.O. fuse sets (3 sets) shall be of 200 Amp rating and shall offer protection against a suitable fault level at kV on H.V. side. The fuses shall be designed for vertical mounting. The fuse holder shall be of phosphor bronze leaf spring hears. All other current carrying parts shall be of aluminum bronze. The insulators shall confirming to IS: 731 and IS: 2544. The complete fuse shall meet impulse voltage in accordance with IS: 2692 or IS: 3106. Each fuse shall be assembled and mounted on channel base. The complete fuse unit shall withstand power frequency wet voltage in accordance with IS:1818. Two pairs of rubber hand gloves for working on kV shall be provided along with D.O. operating rod (in 3 pieces).

8kV HORN GAP FUSE :-

..... kV horn gap fuses (2 sets shall offer protection against short circuit and suitable for use conjunction with kV system. The fuse shall be suitable for horizontal mounting with kV post insulators. The set shall comprise of 3 No of fuses. The complete fuse shall meet impulse voltage in accordance with BS: 2692 or IS: 3106. The same shall withstand power frequency wet withstand voltage in accordance with IS: 1818.

The fuse equipment shall be mounted on pedestal as specified for isolator. The cost of pedestal is included in this item.

9. CONDUCTORS AND INSULATORS :-

9.1 kV BUS BARS AND TAPS

The bus bars bus-taps inter-connector jumpers shall be copper conductor rated to carry Amp. Continuous current without exceeding temperature

rise of 70° C over ambient temperature and to carry KA fault current for 1 second without exceeding temperature limit of 200 degree.

The bus bars spacing and supports shall be designed to keep deflection within limit. The terminations and interconnections shall be with mechanical bolted type clamps, insuring reliable permanent and good electrical connections. Wherever appropriate and required the bus conductors shall be covered with alkathene pipes or other insulating pipes / tubes.

10 kV INSULATORS :-

Required number of disc insulators and port-pin insulators shall be provided. The insulators shall confirm to IS:731 and IS:2544 applicable for system voltage of kV.

Tests as per relevant IS shall be carried out test certificate shall be furnished in duplica

11. SUBSTATION CIVIL WORK :-

The item includes work of pole foundations, fencing, equipment foundations and all necessary civil work for sub-station equipments. The fencing for entire sub-station shall be galvanized chain link mesh size 50mm x 50mm made of 10 SWG G.I. wire. The fencing mesh wire shall be welded on I.S.A. 75 galvanized angle frame of 2.5 m height spaced at distance not exceeding 3m with extra stay to corner poles on both sides to prevent bending 4 Nos of 3.8m wide gates in two halves with 1.85m height shall be provided. The halves shall be fixed on steel joist ISMB, 15 mm or above. A padlock and duplicate key shall be provided for each gate. Suitable foundation for entire fencing shall be provided. Adequate size of rail shall be provided and grouted in sub-station area for sliding transformer for loading and unloading.

The pole foundation for poles (ISMB x) shall be constructed and foundation for VCB shall be constructed in switch yard as per I.E. Rules.

**12. CURRENT TRANSFORMERS FOR PROTECTION (Dual Core)
(Protection + Metering) :-**

The outdoor type current transformer for protection shall be single phase, oil filled type suitable for kV effectively earthed system and generally conforming to IS:2705. Oil level indicators shall be provided at suitable

location.

The rating of the current transformer shall as per I.E. rule & related IS / ISO.

CTs are to be installed with each outdoor LBS or RMU or VCB on galvanized iron associated structure of LBS or RMU or VCB or separate pedestal. Pedestal cost is included in this item. CTs shall be of approved make by NMMC. Out of two cores one core shall be used for metering, one core for protection. VA Burden shall be designed and modified to suit actual requirement.

Test certificate in duplicate from the manufacturer shall be furnished.

13. POTENTIAL TRANSFORMERS (Double Core) :-

The outdoor type potential transformer of approved make for measurement shall be single phase double wound oil filled type, suitable for kV effectively earthed system and generally conforming to IS:3156. They shall be mounted on pole structure, on incoming feeder oil level indicator shall be provided as suitable location.

The rating of the potential transformer shall be as per relevant standard.

Test certificate in duplicate from the manufacturer shall be furnished.

Contractor shall provide following Items as per requirement

D.O. opting rod of kV	Length 20m long
Base copper wire	6 SWG - 0.668 kg/Mtr.
Alkathene pipe	10 mm dia
Stone metal spreading	For 50 x 25m substation area
Instruction chart	As required as per IE rules.
G.I. Stay	..... Nos.
Steel for CC foundation/plinth, girders for switch yard.	

14. FENCING :-

The fencing frame 2.45 m (height) x 1.2 m (width) size shall be fabricated from angle of size 50 x 50 x 6 mm and covered with G.I. welded 50 mm Sq. mesh made out of 10 SWG G.I. hard drawn wire duly painted with two coats of red lead and two coats of silver paint/aluminum paint for minimum 40 x 20 . The vertical angles of the frames, shall be extended 0.5 m on both sides and duly erected in CC foundation block. Adjacent frame shall be

fixed by means of nuts and bolts to vertical angles on both sides. Anti-climbing spikes shall be provided. Four fence gate of overall size 3.0 m x 1.85 m height shall be fabricated from G.I. pipe 25 dia and shall be in two halves, each half of 1.50 m x 1.85 M with anti-climbing devices and frames are to be covered with similar welded mesh. The gates (minimum 2 Nos.) shall be supported on hinges fixed on 2 Nos ISMC 100 channels. The channels shall be 3 m long and vertically erected in CC foundation 400 x 400 x 600 mm deep in the ground. Suitable padlock and keys shall be provided with Godrej Navtal lock of 7 levers. Also walkway of 1 m wide on three side of switch yard compound shall be provided. The entire area shall be levelled and covered with 100 mm layer of 20 to 25 mm stone metal. The contractor will have to refill sub-station area upto required level as directed by Engineer-in-Charge without any extra cost.

Acceptable makes of substation equipments: As per list of approved make of NMMC enclosed

15 kV VACUUM CIRCUIT BREAKERS (Out Door Type) :-

15.1 GENERAL

..... Nos VCBs (with CT & PT for protection) for kV incoming Feeder shall be provided of approved make. The breaker shall be suitable for outdoor application, triple pole, manually and electrically operated.

15.2 RATINGS

The minimum rating of the circuit breaker shall be as under.

- | | | |
|-------|---|------------|
| i) | Rated voltage | kV |
| ii) | Rated current | Amp |
| iii) | Fault level | MVA |
| iv) | Symmetrical breaking | KA |
| v) | Opening time | Sec. |
| vi) | Making current (Peak) |KA |
| vii) | Withstand capacity for 1 Second | KA |
| viii) | 1 minute dry power frequency
withstand voltage (RMS) | KV |
| ix) | /..... Microsecond Impulse withstand voltage..... KV. | |

15.3 FEATURES

The breaker shall have constructional features and fitting as under.

- i) Main and arcing contacts of suitable alloy. The main contacts shall be first to open and last to close.

- ii) 230 V AC motor for gang operated spring charging mechanism, suitable for operation at 85-110% of rated voltage, spring limit switch and all necessary accessories suitable for any number of closing and opening operations so long as power is available to the motor and at least one closing and opening operation is case of powerfailure.
- iii) Crank for manual charging of spring.
- iv) Required NO + NC auxiliary contacts with minimum 2 NOs + 2 NCs spare contacts, operated by cam type or similar mechanism with minimum linkage.
- v) Closing coil rated for 110 V D.C. and suitable for 85-110% of rated voltage.
- vi) Trip coil rated for 110 V D.C. and suitable for operation on 70-110% of rated voltage.
- vii) Operating mechanism housed in 3 weatherproof enclosure at accessible height.
- Viii) Mechanical On-Off release.
- ix) Remote control from pump house.
- x) Local On-Off release.
- xi) Suitable mounting arrangement with withdraw able truck for PTs.
- xii) 1 No. 3 phase V/110 V/100 VA burden PT with fuses both on primary and secondary and test block.
- xiii) Marshalling box with adequate number of terminals.
- xiv) Mounting, arrangement on galvanized iron channel base, supported on steel structure and grouted in cement concrete foundation.

15.4 INDICATION

- i) Local On-Off indication
- ii) Remote On-Off indication
- iii) Spring charged / discharged indication

15.5 Relay Metering Panel

1(One) No. out door kV, Vacuum circuit breakers is to be installed s for incoming feeder , A panel of Relay metering is to be designed and provided as per detail specifications..

Protection relays shall be provided to open the circuits in the event of fault The relays shall conform to specifications in subsequent sub clauses.

The relays, instruments and indications specified below shall be housed in common relay and metering panel located in the pump house. The CTs and PTs installed on pole structure shall be connected for protection and metering. Rectifier unit to obtain 110 V (D.C.) for the control circuit shall be provided.

15.6 PROTECTION RELAY

A separate protection relay for each VCB for over current, short circuit and earth fault protection shall be provided. The relay shall be triple pole, 5A rating having, two over current elements with 50% to 200 range and one earth fault element with 20% to 80% with inverse definite minimum time lag characterize and instantaneous high set relay for 200% to 800% All relays shall be in one standard case and mounted flush on panel. The relay shall be suitable for protection on 110 VDC with range of 70% - 110% of rated Voltage. The relays shall be provided with plug setting on coil and time reset tripping time.

The relay shall conform to IS: 323 in general and IS: 3231 in particular.

The relays shall be of rectangular shape with tight dust covers removable from the front. It shall have external reset positive action indicator. The auxiliary relays shall be series or shunt connected and shall be non draw out type. The main relay shall be draw out type. It shall not trip the circuit when de-energized.

Facilities as under be provided.

- i) test facilities with loose test plug
- ii) provision for easy isolation of trip circuits of each relay for testing and maintenance.

15.7 METERS

1 No. / mm voltmeter having 0-15 KV range and equipped with 4 position selector switch, indicating voltage on incoming feeders and 1 No. Ammeter of suitable range.

15.8 PANEL

The panel shall house the protection relays all vital controls, indication, fault annunciation and vermin proof with degree of protection not less than IP 54. the panel shall be fabricated from steel sheet of 2 mm thickness reinforced with steel section and shall be floor mounted on base channel of ISMC of 75 mm at least 150 mm above floor. The panel shall be equal to height of kV panel. Panel with proper finish of spray painted.

The relays controls and meters etc. mounted flush on the front side of the panel. Doors shall be provided at the rear.

The panel shall incorporate following components.

- i) 1 Nos. over current plus earth fault IDMTL relays with instantaneous high set relay as specified elsewhere.
- ii) 1 No. remote control switches, for closing opening of VCB.
- iii) Illuminated windows
 - Circuit breaker on : Red
 - Circuit breaker off : Green
 - Spring charged
 - Spring discharged
 - Trip circuit healthy
 - Trip circuit faulty
 - Relay energized : Red
 - Relay de-energised : Green
 - 2 spare windows duly wired
- iv) Under Voltage relay shall be provided.

Grouped alarm annunciation shall be provided to indicate operation of the relays and hooter shall be at top of the panel. Audible alarm accept push button, test push button, reset push button and push button for on demand trip circuit healthy position shall be provided for each relay.

15.9 TESTS

All the VCBs & Relay metering Panel shall be tested in the factory in presence of Superintending Engineer (Mech.) or his representative & Third party inspection agency approved by NMMC. The scope of third party inspection is as under.

A) VCB

- i) Review of raw material test certificate and quality control procedure.
- ii) Routine test.
- iii) Checking components, wiring diagram, control circuit and operation of panel.
- iv) Insulation Resistance Test
- v) High Frequency Test
- vi) Power voltage test
- vii) Fault simulation
- viii) Review of type test certificate of Breakers

B) Relay Metering Panel

- i. Review of raw material test certificate and quality control procedure.
- ii. Checking wiring diagram.
- iii. Relay operation test for over current, earth faults by DC injection .
- iv. Reviewing test (certificates of relays)
- v. High voltage and insulation test.

- C)** The relay on incoming VCB shall be got tested from MSEB or other agency acceptable to the department before commission the system.

15.10 INSTALLATIONS

The VCBs shall be installed on RCC / PCC platform. The contractor shall cast cement concrete block on floor consistent with cable duct required, considering permissible bending radius. The relay metering panel shall be installed in Pumphouse.

Acceptable makes: As per Mechanical list of approved make of NMMC.

ITEM NO..... POWER TRANSFORMERS.**GENERAL DESIGN AND RATING****Copper Wound Transformer Indoor Type**

Supplying, installing, testing & commissioning 3 phase, 11/22/0.433 kV, 50 Hz., kVA Mineral oil immersed and naturally cooled Indoor type, Copper wound Non-sealed transformer delta/star connected with additional neutral brought out on load side, temperature rise should not Exceed 45°C by thermometer in oil and 50°C by the resistance method in winding at full load rating, using type A winding insulation (kraft paper) with HV tapping (with off load tap changer) off load +5 to -10 in steps of 2.5%, having 7 number of tap positions ,with standard accessories complete with test certificate with losses below 980 Watts at 50% load, 2930 Watts at 100% load as per IS:1180 (part 1) : 2014, with necessary permissions of Electrical Inspector, as per specification no SS- TR

The Standard mountings required for transformer are shown below.

The mountings are to be selected from them and any additional if required.

1. Off load tap changing
2. Oil conservator with fitting holes and cap and plain oil level gauge
3. Silica gel dehydrating breather
4. Oil drain valve
5. Thermometer pockets
6. Oil filter valve
7. Lifting arrangement
8. Two earthing terminals
9. Diagram and rating plate
10. Four bi directional plain rollers
11. Air vent
12. Explosion vent
13. Terminal arrangement
14. Bushing with lugs and/or cable end box on LV side
15. HV cable end box and/or HV bushing.

1. **TANKS**

Transformer tank shall be manufactured from high grade steel plates suitably reinforced by providing stiffeners of structural steel. Tank shall be provided with lifting lugs, so located that safe clearance is obtained between sling attached to the lifting lug and transformer fittings without use of spreader.

Main tank drain valve shall be provided with flanged connection at the bottom-most location of the tank to ensure complete drainage of the transformer oil. One filter valve, at the top and one drain valve at the bottom of the tank shall be provided.

The tanks shall be constructed as to prevent collection of water at any location. The bottom and cover thickness of plate shall not be less than 6 mm and that of side shall not be less than 5 mm.

All gasketed joints on the tanks such as main tank cover, bushings, mounting and other bolted attachments shall have high quality neoprene gaskets and so designed that the gasket will not be exposed to the weather. If necessary, suitable stops shall be provided to prevent crushing of the gasket due to over tightening.

2. **TRANSFORMER CORES**

The cores shall be constructed from high grade cold rolled grain oriented silicon steel laminations. The operating flux density shall be of the order of 16.5 x 17 Kilo lines/Sqcm. The design shall provide tank mounted core and the use of core bolts shall be totally avoided for securing the core to the tank. Suitable arrangement shall be provided for lifting the core and winding for inspection.

3. **WINDINGS**

The transformer windings shall be made using electrolytic grade copper conductors. The insulation of transformer windings and connections shall be of insulating paper. The material used for winding insulation shall not shrink, disintegrate, carbonize or become brittle under the action of hot oil. While copper conductors are being covered with paper, care shall be taken to avoid damage to the paper layers due to sharp edges etc.. Completed windings shall be subjected to shrinkage treatment before assembly on the core.

Tappings shall be provided at such on the windings so as to preserve, as far

as possible, the electromagnetic balance of the transformer at all voltage ratios.

Joints carrying shall be riveted and soldered or riveted and brazed. No joint shall be made in the disc of the windings.

The windings shall be suitable for withstanding the short circuit current in the even of fault without damage. Adequate insulation shall be provided between the windings and core / tanks wherever the specified minimum clearance in oil are difficult to obtain.

4. RADIATORS

Radiators shall be either tubular or plate type. Each radiator shall be provided with air releasing plug, isolating valve and drain valve. The radiators shall withstand the pressure tests specified for the tanks to which these are fitted. Radiator earthing shall be as per IS:3043-1982.

5. CONSERVATORS

Conservators shall be fitted with filling hole with cap and drain plug. Each feed pipe from the conservators shall be connected to the highest point of any part of the transformers and associated equipment to which it may run.

A dehydrating breather shall be fitted to the conservators. The breather shall be designed to ensure that external atmosphere is not in contact with the dehydrating agent. The transformers shall be supplied with first filling of dehydrating agent. Conservators shall be provided with magnetic oil level gauge on one face and prismatic oil level gauge on other face and which shall be clearly visible from ground level.

6. BUSHINGS

The bushings shall be of solid porcelain or oil filled porcelain type. The bushings shall have continuous metal stud or tube from end to end making intimate contact with either solid or liquid dielectric at all points throughout the length.

Porcelain used for insulator shall be of best electrical quality, sound, free from defects and thoroughly vitrified so that glaze shall be smooth and of uniform brown shade and shall completely cover the exposed parts of the insulators. The protected creepage distance shall be at least 50% of the total creepage distance.

7. TAP CHANGERS

The tap changers shall be off circuit type electrically and mechanically rugged and arranged to provide for convenient tap changing. Tap position indicators shall be positive and there shall not be any ambiguity resulting into incomplete tap changer position with respect to the mechanical tap position indication . The operating handle of tap exchanger shall be brought out of the tank at the side at an accessible height from ground level. Tap changer operating switch mounted on the top of the transformer tanks will not be acceptable . Provision of padlocking the tap changers without interfering with visual tap position indicator shall be provided. The tap changers shall be provided with a micro switch arrangement to issue trip command to the breaker disconnecting the transformer from source of power in the event of an inadvertent attempt to change the taps when transformer is on load.

8. TEMPERATURE INDICATORS

Transformers shall be provided with oil temperature indicators which shall register the temperature of the top oil in the transformer tank. Indicators shall be housed in the marshalling box of the transformer. The connection between the temperature sensing element and the temperature indicator located in the marshalling box shall have adequate mechanical protection.

9. CABLE BOXES

Transformers shall be provided with air insulated type boxes with disconnecting chamber of L.V. side cable boxes shall be suitable for accommodating the termination / glands of appropriate size The cable boxes shall be suitable for withstanding the short circuit current of the corresponding system for one second duration. The minimum phase to phase and phase to earth clearances in the cable boxes shall be as under.

For 415 Volts

Phase to phase	50 mm
Phase to earth	25 mm

The cable boxes shall be fully weather proof in construction, with provision of suitable gaskets on the joints of covers. Suitable canopy shall be provided on the boxes to prevent entry of rain water through the joints. Necessary inspection covers shall be provided on the cable boxes and disconnecting chambers so as to access to the bushing connections.

11. INSULATING OIL

The transformer shall be supplied with new, filtered and tested transformer oil duly filled. The insulating oil shall conform the IS:335. Approximately 10% excess oil shall also be supplied to account for loss.

12. TRANSFORMER FITTINGS

The fittings to be provided on the transformer shall include the following among others and shall be as per IS:3639-1966.

- a) Off-load manual tap changing switch extremely operated specified and positioned on side of transformer accessible from the ground level.
- b) Conservator with drain plug, filling plug as specified
- c) Explosion vent with diaphragm
- d) Air relief vents
- e) Inspection cover on the tank covers for all transformers
- f) Following valves shall be provided.

i) Oil sampling valve	One No.
ii) Oil drain valve	One No.
iii) Filtering Valve	One No.
- g) Grounding terminals, two for the transformer tank for clamping to grounding grid connections.
- h) Lifting lugs or eyes for the cover top part of tanks cores and soils and for the complete transformers.
- a) Pulling eyes for pulling the transformer parallel to and at right angle to the axis of bushing.
- b) Diagram and rating plate of transformer
- c) Bidirectional Rollers
- d) Thermometer pockets with dial type thermometer for top oil temperature indication. The thermometer shall be clearly visible from ground level as specified and
- e) Weather proof control cabinet

13. RATING

Capacity required	→	11/22. kVA
Quantity	→	As per BOQ
Number of phases	→	Three
Frequency	→	50 Hz.
Number of windings	→	Two
Type of cooling	→	ON
Max. system voltage	→	..... kV
Transformer ratio	→	..... kV/433 Volts
Specification	→	IS:2026
Method of connection		
Primary	→	Delta
Secondary	→	Star
Vector group	→	Dy.11
Impedance at rated kVA	→	4%
And corrected to 75°C for		
Neutral Earthing	→	The neutral of the secondary winding brought out through an appropriate connection to earthing system
Tapping	→	Off circuit taps from -12.5% To +2.5% on the primary side in steps of 2.5%
Installation	→	Outdoor
Tolerance in impedance	→	$\pm 10\%$
Temperature	→	Max. temperature for oil (measured by thermometer shall not exceed 45°C and of windings (measured by Resistance method) shall not exceed 50 °C

Terminal details

H.V. side	Suitable for receiving kV overhead copper wire connection covered with alkathene pipe.
L.V. Side	Outdoor type suitable for three and half core of required size PVC armored cable with brass compression cable ending gland with suitable disconnecting chamber (marshalling box)
Noise level	Less than 80 db
Earthing	Grounding terminal with clamps suitable for connecting to the grounding grid to be provided for transformer body earthing.

TESTS

Both the KVA transformers shall be tested at manufacturers works for routine and performance tests and No. for type test as mentioned below as per relevant IS in presence of the third party inspector and Superintending Engineer (Mech.) or his representative and MSEDCL representative. Manufacturers test certificate shall be furnished.

The scope of third party and MSEDCL inspection of transformer by the agency approved by NMMC is as under.

- a) Review of raw material test certificates and quality control procedure.
- b) Routine test for all
- c) Type test including impulse test for random one transformer
- d) Load & no load losses.

Acceptable makes: As per list of approved make of NMMC enclosed

ITEM NO. :- L.T. PANEL BOARD :-**1. 415 VOLT L.T. PANEL**

The section specifies 415 V, LT Panel, 3 phase, 50 Hz switch board panel related equipment, control, metering, protection and indication. The general requirements of the system are described in the following clauses.

One 415 V switch gear would receive power from the transformer in Raw Water pump house and would serve power to another switch gear to starter

and driving motors

A dimensional drawing of the panel; showing position of switch gears, Ammeter, Voltmeter etc. shall be submitted before manufacturing, for approval.

For Diwale Village

i) Control Panel

Encloser (Size : 2.0 M x 2.0 M x 0.5 M)

Weight of Panel Sq.M x 0.0016 M x

Encloser : 8.00 7850 Kg/Cum = 100.48 Kg

a) Panel Stool : ISMC 100 x 50 mm

Total Weight of Panel with iron work : 141.267 Kg

Say 141 Kg

iii) Bus

bar 200 Amp

Net weight of Bus Bars 17.316 Kg

Add 10% Basbar Extra 1.7316 Kg

Say 19 Kg

MCCB -200 Amp,4 Pole for 2 Nos (I/C + DG)

... 2.0 No

MCCB - 100 Amp,3 Pole for 3 Nos (For 2 Pump + APFC)

... 3.0 No

MCB - 32 Amp,3 Pole for(Fixd Type Capacitor +Actuators)

... 4.0 No

MCB -32 Amp 4 Pole for (Internal lighting)

... 2.0 No

Dol Starters for (Acutators)

3.0 Nos

Self locking arrangement

... 5.0 No

Digital Voltmeter

... 2.0 No

Digital Ammeter

... 2.0 No

CTs 50/5 to 1000/5

... 6.0 No

Indicator lamp LED Type R,Y,G)

... 6.0 No

Indicator lamp LED Type (B)

... 4 No

PVC synthetic elastomer elect

... 2 Sqm

Labour charges for internal wiring.

... 80 HP

S.P. MCB 0.5 to 5 A

10.0 No

For Parsik Hill, Mango Garden & Sec- 9

i) Control Panel Encloser (Size : 3.5 M x 2.0 M x 0.5 M)

Weight of Panel Encloser : 12.50 Sq.M x 0.0016 M x 7850 Kg/Cum = 157 Kg

a) Panel Stool : ISMC 100 x 50 mm

Total Weight of Panel with iron work : 243.373 Kg

Say 243 Kg

iii) Bus bar 600 Amp

Net weight of Bus Bars 48.924 Kg

Add 10% Basbar Extra 4.8924 Kg

Say 54 Kg

MCCB -600 Amp,4 Pole for 2 Nos (I/C + DG) ... 2.0 No

MCCB -315 Amp,3 Pole for (APFC) ... 1.0 No

MCCB - 200 Amp,3 Pole for 3 Nos (For 2 Pump + Spare) ... 3.0 No

MCCB - 100 Amp,3 Pole for 4 Nos (For 4 Pump) ... 4.0 No

MCB - 32 Amp,3 Pole for(Fixd Type Capacitor + Actuators) ... 8.0 No

Dol Starters for (Acutators) 6.0 Nos

MCB -32 Amp 4 Pole for (Internal lighting) ... 2.0 No

Self locking arrangement ... 5.0 No

Digital Voltmeter ... 2.0 No

Digital Ammeter ... 2.0 No

CTs 50/5 to 1000/5 ... 6.0 No

Indicator lamp LED Type R,Y,G) ... 6.0 No

Indicator lamp LED Type (B) ... 4 No

PVC synthetic elastomer elect ... 2 Sqm

Labour charges for internal wiring. ... 360 HP

S.P. MCB 0.5 to 5 A 10.0 No

For sector 5

i) Control Panel Encloser (Size : 2.0 M x 2.0 M x 0.5 M)

Weight of Panel Encloser :	8.00	Sq.M x 0.0016 M x 7850	Kg/Cum	=	100.48	Kg
----------------------------	------	------------------------	--------	---	--------	----

a) Panel Stool : ISMC 100 x 50 mm

Total Weight of Panel with iron work :	141.267	Kg
--	---------	----

Say	141	Kg
-----	-----	----

iii) Bus bar 315 Amp

Net weight of Bus Bars	20.796	Kg
------------------------	--------	----

Add 10% Basbar Extra	2.0796	Kg
----------------------	--------	----

Say	23	Kg
-----	----	----

MCCB -200 Amp,4 Pole for 2 Nos (I/C + DG)	...	2.0	No
---	-----	-----	----

MCCB - 100 Amp,3 Pole for 3 Nos (For 2 Pump + APFC)	...	3.0	No
---	-----	-----	----

MCB - 32 Amp,3 Pole for(Fixd Type Capacitor + Acutators)	...	3.0	No
--	-----	-----	----

MCB -32 Amp 4 Pole for (Internal lighting)	...	2.0	No
---	-----	-----	----

Dol Starters for (Acutators)		3.0	Nos
------------------------------	--	-----	-----

Self locking arrangement	...	5.0	No
--------------------------	-----	-----	----

Digital Voltmeter	...	2.0	No
-------------------	-----	-----	----

Digital Ammeter	...	2.0	No
-----------------	-----	-----	----

CTs 50/5 to 1000/5	...	6.0	No
--------------------	-----	-----	----

Indicator lamp LED Type R,Y,G)	...	6.0	No
--------------------------------	-----	-----	----

Indicator lamp LED Type (B)	...	4	No
-----------------------------	-----	---	----

PVC synthetic elastomer elect	...	2	Sqm
-------------------------------	-----	---	-----

Labour charges for internal wiring.	...	120	HP
-------------------------------------	-----	-----	----

S.P. MCB 0.5 to 5 A		10.0	No
---------------------	--	------	----

For sector 21

i) Control Panel

Encloser (Size : 2.0 M x 2.0 M x 0.5 M)

Weight of Panel

Encloser : 8.00 Sq.M x 0.0016 M x 7850 Kg/Cum = 100.48 Kg

a) Panel Stool : ISMC 100 x 50 mm

Total Weight of Panel with iron work : 141.267 Kg

Say 141 Kg

iii) Bus 31 Am

bar 5 p

Net weight of Bus Bars 20.796 Kg

Add 10% Basbar Extra 2.0796 Kg

Say 23 Kg

MCCB -315 Amp,4 Pole for 2 Nos (I/C + DG) ... 2.0 No

MCCB - 200 Amp,3 Pole for 3 Nos (For 2 Pump + APFC) ... 3.0 No

MCB - 32 Amp,3 Pole for(Fixd Type Capacitor) ... 4.0 No

MCB -32 Amp 4 Pole for (Internal lighting) ... 2.0 No

Dol Starters for (Acutators) 3.0 Nos

Self locking arrangement ... 5.0 No

Digital Voltmeter ... 2.0 No

Digital Ammeter ... 2.0 No

CTs 50/5 to 1000/5 ... 6.0 No

Indicator lamp LED Type R,Y,G) ... 6.0 No

Indicator lamp LED Type (B) ... 4 No

PVC synthetic elastomer elect ... 2 Sqm

Labour charges for internal wiring. ... 250 HP

S.P. MCB 0.5

to 5 A 10.0 No

For sector 44

i) Control Panel Encloser (Size : 2.0 M x 2.0 M x 0.5 M)

Weight of Panel Encloser : 8.00 Sq.M x 0.0016 M x 7850 Kg/Cum = 100.48 Kg

a) Panel Stool : ISMC 100 x 50 mm

Total Weight of Panel with iron work : 141.267 Kg

Say 141 Kg

iii) Bus bar 315 Amp

Net weight of Bus Bars 20.796 Kg

Add 10% Basbar Extra 2.0796 Kg

Say 23 Kg

MCCB -315 Amp,4 Pole for 2 Nos (I/C + DG) ... 2.0 No

MCCB - 200 Amp,3 Pole for 3 Nos (For 2 Pump + APFC) ... 3.0 No

MCB - 32 Amp,3 Pole for(Fixd Type Capacitor) ... 4.0 No

MCB -32 Amp 4 Pole for (Internal lighting +Actuators) ... 3.0 No

Dol Starters for (Acutators) 3.0 Nos

Self locking arrangement ... 5.0 No

Digital Voltmeter ... 2.0 No

Digital Ammeter ... 2.0 No

CTs 50/5 to 1000/5 ... 6.0 No

Indicator lamp LED Type R,Y,G) ... 6.0 No

Indicator lamp LED Type (B) ... 4 No

PVC synthetic elastomer elect ... 2 Sqm

Labour charges for internal wiring. ... 210 HP

S.P. MCB 0.5 to 5 A 10.0 No

For Karave Gaon

(Size : 2.0 M x 2.0 M x 0.5 M				
i) Control Panel Encloser)				
Weight of Panel	Sq.M x 0.0016 M x			
Encloser :	8.00 7850	Kg/Cum	=	100.48 Kg
a) Panel Stool : ISMC 100 x 50 mm				
Net weight of Panel Iron Work (a+b +c)				40.7873 Kg
Total Weight of Panel with iron work				141.267 Kg
			Say	141 Kg
iii) Bus				
bar	315 Amp			
Net weight of Bus				
Bars				
Add 10% Basbar				
Extra				
			Say	19 Kg
MCCB -200 Amp,4 Pole for 2 Nos (I/C +				
DG)				
			...	2.0 No
MCCB - 100 Amp,3 Pole for 3 Nos (For 2 Pump + APFC)				
			...	3.0 No
MCB - 32 Amp,3 Pole for(Fixd Type Capacitor +				
Acutators)				
			...	3.0 No
MCB -32 Amp 4 Pole for (Internal lighting)				
			...	2.0 No
Dol Starters for				
(Acutators)				
				3.0 Nos
Self locking				
arrangement				
			...	5.0 No
Digital Voltmeter				
			...	2.0 No
Digital Ammeter				
			...	2.0 No
CTs 50/5 to				
1000/5				
			...	6.0 No
Indicator lamp LED Type R,Y,G)				
			...	6.0 No
Indicator lamp LED Type (B)				
			...	4 No
PVC synthetic elastomer elect				
			...	2 Sqm
Labour charges for internal wiring.				
			...	80 HP
S.P. MCB 0.5 to				
5 A				
				10.0 No

Electrification

S. No.	Description of Item	Qty	Unit
a	Point wiring in PVC trunking (casing-capping) with 1.5 sq.mm (2+1E) FRLSH grade copper wire, flush type switch, earthing and required accessories as per specification No: WGPW/ SW	2.00	Point
b	Point wiring for independent plug in PVC trunking (casingcapping) with 1.5 sq.mm FRLSH grade copper wire, flush type switch, earthing and required accessories as per specification No: WG-PW/SW	2.00	Point
c	Wiring for plug on board with Switch socket, copper wiring and earthing as per specification	2.00	Point
d	Supplying and erecting mains with 3x2.5 sq.mm FRLSH copper PVC insulated wire laid in provided conduit/trunking/inside pole/Bus bars or any other places as per specification No: WG-MA/BW	40.00	Mtr
e	Supplying & erecting inverter LED batten 20W tube light fitting with polycarbonate housing, heat sink, integrated HF electronic driver, Min. 2600 mAh Lithium ion Battery with charging time of 8-10 Hours and backup time of Min. 3 hrs. with minimum 25% of initial Watts having luminous efficacy of 100 lumen/watt, CRI>80, CCT of 6500K and THD<=20% having useful life of minimum 25000 hrs. with overheating protection with 2 years warranty.	2.00	Each
f	Supplying and erecting integrated LED street light fitting 70-75W IP65 & IK08 class having single piece pressure die-cast aluminium housing, having system lumens output of Min. 7700 Lumens, min. efficacy of 110 lumen/W, CRI>70, CCT upto 6500K, THD 0.95, ope	1.00	Each
g	FRP box of size 150mm x 125mm x 100 mm, 2.7 mm thick complete on pole as per specification No. CB-SB	1.00	Each
h	Supplying & erecting water tight terminal box of 1.6 mm (16 gauge) CRCA sheet of size 150 x 100 x 100 mm complete on pole as per specification No. CB	1.00	Each
i	Supplying and erecting Street light bracket made from 40 mm. dia 'B' class G.I. Pipe, 0.6m. in length along with pole cap of 300 mm length and 80 mm dia duly welded with provided leads as per specification no. FG-BKT/BPC	1.00	Each

Contractor

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2. CONSTRUCTION

The control panel shall comprise of fully compartmentalized modular type cubicles suitable for floor mounting. The panel board shall be divided into distinct vertical sections each comprising of:

- a) A completely metal enclosed bus bar compartment running horizontally.
- b) Individual feeder modules arranged in multi-tier formation.
- c) Enclosed vertical bus bars serving all motors in the vertical sections.

The panel shall be fabricated out of 50 x 50 mm angles and 16 SWG M.S. sheets at the bottom and rear and 14 SWG M.S. sheets in the front and top. The front and the rear sides shall be provided with hinged doors. Mechanical interlock shall be provided so that the front doors cannot be opened on „ON“ positions. Cable entry and exit to and from the panels board shall be from the bottom. The fabricated cubical shall form a totally enclosed, metal clad, dust and vermin proof enclosure. The indicating and operating switches shall not be mounted above 1.6 m from floor level

The panel in cubical in shape and of minimum sizem x m x m (height x width x length)

3. INTERNAL CABLING

The switch board shall be completely factory wired, ready for connecting to the equipment.

Power cabling shall be of suitable size not less than 2.5 mm, 2 PVC insulated, multistoried copper conductors of 1100 V grade. All cable connections shall be made using proper crimping sockets. Suitable size flanged type glands shall be provided for outgoing cables.

Control cabling shall be done with PVC insulated multistrand copper conductors of size not less than 1.5 Sqmm of 600 V grade. The control wiring shall be concealed by taking through neatly arranged PVC cable trays and all cables shall be terminated in suitable compression type terminal blacks. The cable terminations shall be made in accordance with wiring diagrams, using identifying codes as approved by the Engineer.

All cable shall be arranged and marked in general compliance with IS:375.

4. EARTHING

As specified in BOQ mm G.I. earthing flat, running the length of control

panels shall be provided. Metal frame of control switchboard shall have two separate and distinct earth connections of adequate size.

5. PAINTING

The panel shall undergo chemical de-rusting and shall be effectively phosphatised as per IS:6005 and primed. The panels shall be thoroughly rinsed with clean water after phosphatising, followed by final rinsing with dilute bicromate solutions and oven drying. The phosphate coating shall be sealed by the application of two coats of ready mixes, stoving type zinc chromate primer.

Two coats of finishing synthetic enamel paint shall be applied, each coat followed by stoving. The final finished thickness of paint film on steels shall not be less than 100 microns and shall not be more than 150 microns. The color for the finishing paints shall be approved by the Engineer. The finished painted appearance of panels shall present an aesthetically pleasing appearance free dust and un-even surface.

6. MISCELLANEOUS

Engraved PVC labels shall be provided on all incoming and out going compartments. The exact legend to be provided shall be as approved by the Engineer.

7. COMPONENT

The power receiving panel comprises of following equipments for receiving the power from transformers.

1.	a) Amp capacity ACB(Electrically operated Drawout type)(2 for reception of power from transformers & 1 as bus coupler) b) AMP capacity ACB(Electrically operated Drawout type) (..... Nos. for ATS feeder) c) Amp capacity ACB (Electrically operated Drawout type) (..... Nos. for APFC panel + No. for WTP)	..... No. Nos. Nos.
2.	i) 63 Amp MCB (2 for Lighting + 2 spare) ii) 32 Amp MCB (For actuator starter)	..... Nos Nos
3.	Aluminum bus bar of minimum Amp rating with insulator (minimum 3 meter in length)	..... Set

4.	Volt meter with selector switch (0-500V)	..... No.
5.	Ammeter 0-100-300 Amp with suppressed scale with selector switch and CTs of proper ratio.	..... No.
6.	Indicating lamps 22 mm dia LED type	.....Set
7.	PVC Synthetic elastomer electrically insulating mat with B class insulation 2.5 mm thick up to kV	..... Sq.m.
8.	Power Analyser with CTs	..... No.
9	Forward Reverse DOL Starter for actuators	..... Nos
10	Iron work	As required for completion of Job
11	Caution board	2 Nos
12	Internal wiring	Job
13	Name board for P/M details of size 2 Sqm	1 No.

8. AIR CIRCUIT BREAKER Electrically Operated Drawout Type

.....No Amp ACB shall be provided and fixed for reception of power supply. Two shall be used for reception of power from transformers and one as bus coupler. Standard accessories shall be provided as relevant IS. Shunt Release and ELR shall be provided for receiving breakers.

9. MOULDED CASE CIRCUIT BREAKER

The 440 volt Moulded case circuit breaker shall have the following features. All MCCB shall be provided for distribution of power supply.

The continuous rating of MCCB shall be as shown in above table. The final steady state operation temperature of the contacts when carrying rated current under continuous operation shall not exceed the limit specified in relevant IS. The contacts shall be of silver alloy of high arc resistance and long electrical life quality. The operating mechanism shall be quick make quick break and trip free. The housing shall be made of heat resistant insulating material. Mechanical ON-OFF indication shall be provided. The MCCB shall be mounted in panel board.

The MCCB shall incorporate shunt release device. The overload protection shall have the setting range to meet the load requirement. All release should operate on common trip bar. The auxiliary contact block should be provided to facilitate visual ON-OFF indication. The MCCB shall be supplied with all standard accessories for functional requirement as per duty conditions, as per relevant standard.

10. BUS BAR

Bus bar shall be of electrolytic Aluminum to suit Amp current rating and of withstanding the electro mechanical force due to short circuit. The

neutral bus bars shall not be smaller than half cross section of main bus bars. The bus bars shall be housed in separate bus bar chamber and supported on unbreakable, non-hygrosopic supports, rigidly held to the framework. The bus bar shall have separate special screwed cover with ventilating louvers. The continuous rating of the bus bars shall not be less than Amp. The temperature rise of the bus bars shall not exceed 55°C over an ambient temperature of 40°C. The bus bars shall be PVC insulated with colour code for phase identifications. The bus bars shall be easily accessible for inspection. The power distribution bus bars or cables shall be bolted clamp type. The parallel bus bar shall not be used for main bus bars or distribution.

The current density for auxiliary bus to connect out going switches or other switches shall be minimum 1 Amp per square mm or nearest commercial size whichever is on higher side for Aluminum bus and 2 Amp/Sq.mm for copper bus.

11 MCB

The Miniature Circuit Breakers shall be provided for isolation purpose and have the rating to suit the load continuous on it. The ON-OFF position shall be clearly marked on the panel. The mechanical interlocking shall be provided so that the door opens only on off position of switch

12. H.R.C. FUSES

H.R.C. cartridge fuses shall be of link type for power and control, non-deteriorating has adequate fault capacity, indication to show health and tripped conditions. Fuses shall conform to IS:2208.

13. INDICATING LAMPS

The indicating lamps of 22 mm dia shall be of filament bulbs type of 230 volts rating with series resistance for different voltages. The oil and dust proof, un-breakable suitably colored poly-carbonate lenses shall be used to improve appearance and illumination..

14. SELECTOR SWITCH

The selector switch shall be with three positions, unit designed for heavy duty application and handle of robust design. The required position shall be engraved on the front plate.

15. AMMETER, VOLTMETER

The meters shall meet following general requirements.

i)	Accuracy	→	Class 1 as per IS;1248
ii)	Case	→	Steel
iii)	Cover	→	Metal
iv)	Window	→	Plastic
v)	Scale	→	Flat
vi)	Voltmeter - 0-500 V	→	... No. with S/S
vii)	Ammeter - 0-100-300	→	....Nos. with suppressed scale with S/S and suitable CTS

16. FORWARD REVERSE DOL STARTER:

Forward reverse type DOL Starter shall be provided for operation of valve actuators .The starter shall be associated with interlocking arrangement of pump starters including control wiring required for satisfactory operation of valves .

17. RUBBER MATTING

PVC Synthetic elastomer electrically insulating mat with B class insulation 2.5 mm thick up to kV of approved make shall be provided for panel boards and starters.

18. FACTORY TESTING

The Panel shall be tested at Manufacturer's workshop in presence of third party inspection agency approved by NMMC & superintending Engineer (Mech.) or his representative . The scope of inspection is as under and as mentioned in QAP for the LT Panel .

- i) Review of raw material test certificate and quality control procedure.
- ii) HV test
- iii) IR test
- iv) Routine test
- v) Checking phase and earth clearance of bus bars.
- vi) Checking wiring diagram and contact circuit and operation of panels.
- vii) Fault simulation for testing protection relays except short circuit and earth fault.

Note :- The complete circuit diagram of all power circuits, control circuits with necessary protection relays, CTs, PTs, auxiliary contacts etc. shall be prepared and drawn on A - 1 size engineering sheets duly laminated and fixed on teak wood board and shall be fixed in the pump house.

In addition to above five laminated copies of above sized circuit diagram shall be submitted to the office for Record and O & M purpose.

ITEM NO..... :- A.T. S. STARTER :-

The scope of work includes, designing, providing and giving test and trial of locally manufactured fully automatic auto transformer starter with ap-

Contractor

No. of correction

City Engineer

proved make power contactors.

Fully automatic auto transformer starter shall be housed in totally enclosed sheet metal clad, vermin and dust proof cubical box, suitable for floor / plinth mounted for indoor operation. The panel shall be fabricated from MS sheet SWG 14, with hinged door at front. Limit switch shall be provided to trip the motor in the event of opening of door. The panel framework shall have ICMC-100 base channels.

The size of the cubical box shall be sufficient for ease in maintenance work and proper ventilation. However the size of the cubical should not be less than X X Mt. At least two number of ventilating louvers shall be provided on side walls, at top to exit the hot air, and one number louver at bottom to allow fresh air inlet.

The terminal box shall be of waterproof construction suitable for outdoor service. Gaskets shall be provided at the cover joints and between box and the motor frame.

The terminal box shall be suitable for termination of 120 Sq.mm alluminium armoured three core PVC cable . The Contractor should make this arrangement specially, the cost for which is included in the rate of item.

Terminal box shall be complete with stud type terminals, plain washers, spring washers, check nuts, cable glands and lugs.

The panel shall be painted with one coat of primer and two coats of enamel paint of approved shade.

Bus bar, copper strips, copper leads shall be designed for twice the full load current. The potential wiring shall be carried out in 1.5 Sq.mm copper cable, and CT. circuitry wiring shall be carried in 2.5 Sq.mm copper cable.

The Auto transformer starter shall incorporate following equipment.

- | | |
|---|--------|
| ♦ Triple pole AC3 rating Amp. power contactor
With required number of NO & NC
MAIN CONTACTOR | 2 Nos. |
| ♦ AUXILLARY CONTACTOR, Amp. | 1 No.. |
| ♦ Oil immersed, copper wound Auto transformer
With tapings, 50%, 65%, 80%
with first fill of
Best quality transformer oil. | 1 No |

♦ CT operated bimetallic over load relay.	1 No
♦ ON & OFF Pneumatic timer (0.05 to 30 Sec)	1 No
♦ ON delay pneumatic timer (0.05 to 30 Sec)	1 No
♦ Master timer	1 No.
♦ ON OFF Push buttons.	2 Nos.
♦ HRC control fuses.	2 Nos.
♦ Suitable rating Ammeter with metering CTS & Selector switch.	1 No
♦ Thermostat with 1No.+ 1 NC. for oil temperature	1 No
♦ Door limit switch. (1 NO +1 NC)	1 No
♦ Current sensing Single phasing presenter with CTS	1 No
♦ No volt release	1 No
♦ Motor Protection Relay,solid state with protection CTs	1 No.
♦ Indicating lamps, Motor ON, OFF, TRIP (Protection CTs 10P3 / 10 VA)	3 Nos.

AUTO TRANSFORMER

Fully automatic auto transformer shall be 3 Phase, oil cooled type, suitable for motor starting duty, core type, copper wound of high grade silicon lamination with „B” class insulation. The auto-transformer shall be suitable for operation on 45-degree ambient temperature with tapping at 65%, 80% and 100% regulation when fully loaded. The lowest tapping at auto-transformer shall be in compliance with driven equipment torque requirement. It shall be suitable for 6 operation per hour, all six starts being uniformly distributed over an hour with equal period in between.

The auto-transformer shall conform IS 1822. The auto transformer starter shall be wired up as per standard connection to avoid open circuit transition providing for a smooth change over from tap to line voltage. The main contactor shall be of suitable rating.

Adequately rated thermal overload relays operated through suitable CT shall

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be provided. The CT operated base mounted single-phase presenter shall be provided. The starter shall be complete with necessary adjustable timer, auxiliary contactor other accessories, wiring, etc to make a composite unit. The master timer set shall be provided to cut off supply to auto transformer in case of the change over timer fails to operate.

POWER CONTACTOR

The contactors in starter shall have 3 main poles with a minimum of 2 Nos. + 2 NCs, auxiliary contacts, with one spare NO and NC of capacities as mentioned above. The contact shall be made of anti weld Silver Cadmium oxide and contact system shall be designed with minimum bounce to ensure long contact life. The contactor shall be sufficiently rated for severity operating condition for use in motor circuit. The coil shall be molded in hard resin suitable for continuous operation. The contactor shall be suitable for making and breaking at 0.35 power factor and stalled current of associated motor which shall be assumed and times full load current of corresponding motor. All contactors employed shall conform IS 2959

SINGLE PHASING PREVENTOR.

The single-phase preventor in the starter shall be provided for each panel and it shall be current operated negative sequence with necessary CTs.

The indicating lamp shall be of filament bulb type of 160-Volt rating with series of resistance for different voltage.

The timer shall have 2 Nos + 2 NCs auxiliary contacts. The timer shall be capable of the thermal effect of switching and have very close accuracy. The timer shall be capable for operating on 240 Volts AC supply in the voltage range of 80% to 110% and frequency range 95% to 105%.

FACTORY INSPECTION AND TEST.

The Auto Transformer Starter, shall be inspected and tested by third party approved by NMMC. in presence of Executive Engineer (Mech.) or his representative.

The scope of inspection includes: -

- ◆ Review of raw material test certificate and quality control procedure.
- ◆ High voltage test.
- ◆ Insulation resistance test
- ◆ Full load test of auto transformer winding.
- ◆ Die- electric strength of oil.
- ◆ Fault simulation for testing protection relays except short circuit and earth fault.

ITEM NO.....: ELECTRONIC MOTOR PROTECTION RELAY

The Electronic motor protection relay shall be provided for protection of VHS motors like overload, phase failure, locked rotor, phase reversal with trip indication and adjustable over current function & DIN rail mounted. The separate CTs shall be provided for each Electronic Motor Protection Relay.

- ◆ The make and type of EMPR shall be got approved from competent authority before supply.

ITEM NO..... APFC PANEL if required

The contractor shall design, supply, erect, commission & give satisfactory test & trial of Automatic power factor correction panel. The panel shall be designed in such a way that the system P.F. shall be improved to unity and as per directive of MSEDCL /MERC . But in any case the system P.F. should not be on leading side. The tentative technical details of the equipment is given below. But it is the responsibility of the contractor to provide necessary accessories for proper functioning of the equipment. The P.F. shall be improved by min.4 step CONTACTOR SWITCHED APFC PANEL. The capacitor bank shall be Mix dielectric type. Each bank shall be of as specified in BOQ KVAR .Two banks of KVAR shall be kept spare.

1)	<u>Main Incomer</u> -A, TP, KA,MCCB	01 No.
2)	<u>Protection:</u> .....A, TP,MCB	..... Nos.
3)	Switching - Contactor Type Capacitor Duty Contactor for ....KVAR step	..... Nos.
4)	<u>P.F.Controller</u> - 04 steps	01No.
5)	<u>Cooling Fan</u>	01 No.
6)	<u>Capacitors</u> -Mixdielectric.....KVAR O/P at 440V.	..... Nos.
7)	Power Cable- For .....KVAR Step	As required
8)	C.T. - /.....A, Class 1.0	03 Nos.
9)	Panel (control Cubicle): - CRCA Sheet	-
10)	Aluminium Bus bar -	As required

The APFC panel board shall be completely factory wired ready for connecting the equipment. All internal wiring of the panel is to be carried out by PVC insulated PVC sheathed copper cable of adequate capacity. Incoming and

outgoing cable entries shall be enclosed in metal clad dust and vermin proof enclosure and suitable size cable glands shall be provided for cable entries from bottom.. The drawing of the panel shall be got approved before actual manufacturing and the panel board shall be tested at manufacturers work in presence of departments representatives

FACTORY INSPECTION AND TEST.

The APFC Panel shall be inspected and tested by third party agency approved by NMMC. in presence of Executive Engineer (Mech.) or his representative

ITEM NO CABLE & CABLE TRMINATION KIT

21.1 kV GRADE POWER CABLES

..... kV grade power cable shall be aluminum conductor XLPE insulated armoured cable earthed and of NMMC approved make only. The cable shall be of size & rated to carry full load current at 0.90 P.F. continuously or to with stand short circuit current of 15 KA for 1 second duration but shall not be less than the size specified in subsequent clause.

21.2 1.1 kV POWER CABLE

Power cable used in 415 V system shall be of NMMC approved make and shallbe 1.1 kV grade 3.5 core single core or 3 core as applicable aluminum/copper conductor PVC insulated PVC sheathed galvanized flat steel armoured type conforming to IS: 1554. As given in cable schedule.

Cable shall be of sizes rated to carry full load current continuous at 0.90 PF
or
To withstand short circuit current of KA for 1 second duration but shall
not
be less than size specified in subsequent clause.

21.3 CABLE SCHECULE

The cable lengths stated in the schedule are estimated quantity and shall form the base for comparison of the tender others. However for contract work quantity of the cables as actually required shall be supplied at the tendered rates.

The sizes of the cables stated in the schedule are the minimum acceptable size and shall form the base for comparison of tender offers. The tenderer may offer alternative sizes and quote for such size separately the prices for which shall however not be considered for comparison and evaluation of tender offer. The Engineer-in-Charge reserves the right to accept or reject such alternative size / sizes.

Sr. No.	From	To	Grade	Cores x Run	Size Sq.mm	Total length in meter.
1	AB Switch / Isolators	..... KV VCB to kVA	..... kV XLPE	.... core Run	.... sq mm	.....m
2	Transformer kVA	0.433 kV LT Panell	1.1 kV PVC/XPLE	.... Core Run per phase	.....sqm m	..... m
3	0.433 kV LT Panel	ATS Stareter to 0.433 kV motor	1.1 kV PVC/XPLE	.... core Run	.....sqm m	..... m
4	0.433 kV LT Panel	APFC Panel	1.1 kV PVC/XPLE	.... core Run	.....sqm m	.....m
5	0.433 kV LT Panel	WTP panel	1.1 kV	3.5 Core Run	.....sq mm	..... m
6	440 Volts LT panel	Valve actuator	1.1 kV	4 Core Copper 1Run	..... sqmm	.....m
7	440 Volts L.T. panel	Internal & external lighting DBs and Fixtures.	1..1 kV	4 core Copper 1 Run	10 sqmm	..... m
8	..... kV VCBs	Relay Metering Panel	1.1 kV Control Cables	As required for satisfactory completion	As Required	As Required

21.4 CABLING METHODS

Cables shall be laid in ducts above ground and while passing through wall on trays in and out the pump house. Every cable shall be neatly run vertically, horizontally or parallel to adjacent walls, beams or Columns. At both ends

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for termination, the cable shall approach from a common direction and are individually terminated in an orderly and symmetrical fashion.

The cables shall be terminated in mechanical ground which shall be suitable to provide adequate support by locking on the anchor for additional earth continuity. Suitable compression type copper cable lugs shall be used for cable terminations.

The point of entry, exit of the cables from the building shall be sealed from outside with an approved asbestos compound followed by, about 40 mm thick bituminous compound or a weak mortar, care shall be taken not to damage sheathing of cable due to hot bituminous compound while sealing.

Cable route markers of approved design shall be installed at the following position.

- i) Entry and exit points of under ground duct / trench.
- ii) Exits from the building.
- iii) At every 5 m distance of straight run.
- iv) Any other position necessary to trace route.

A metallic plastic tag bearing cable reference number indicated in cable schedule at every 4 m run or part thereof and at both ends shall be provided. For case of identification and route tracing. The schedule shall be prepared by the contractor and submitted for approval.

The cable routing and laying shall be such that sharp bends and links are avoided. The radius at bends for PVC insulated cables shall not be less than 15 D where D is overall diameter of the cable. Laying and termination ofkV and kV grade cable shall be as per manufacturers instructions. Such instructions shall be furnished to the Engineer-in-Charge.

Loops/extra length shall be provided in each cable run located suitably. The loop/extra length shall be adequate for two straight through joints as and when such needs arises.

21.5 CABLE DUCT :

Following cables shall be laid in cable ducts -

- a) kV 3 core Sq. mm XLPE (E) cable from isolator / AB switch to all transformers.
- b) From kVA transformer to KV panel and kVA Transformer to 415 V Panel.

The duct shall be designed and constructed in RCC of suitable size as required as per I.E. rules, ISA 40 shall be inserted at 400 mm center to center to support

at 200 height above bottom and clamp the cable. The 1 core cables shall be laid in trefoil formation. The cables shall be clamped at 1200 mm interval. The ducts shall be supported by suitably designed rigid RCC column from HT sub-station to pump house. The cost of all this RCC work is included in this item.

Pre-cast covers shall be provided over the trench. The arrangements shall be got approved prior to execution.

21.6 CABLE TRAYS :

The cable trays shall be used for indoor installation of cables and outdoor vertical runs on the building. The trays shall be of stainless steel pre-fabricated and perforated. The sheets shall be of thickness not less than 2.0 mm shall be complete with approved. Tees.. Bends and tees shall also be pre-fabricated with inside radius not less than 300 mm or above (in case of large cables) and shall be of stainless steel . Support brackets shall be provided at maximum of mm centers. Cable trays from panel to motors shall be supported from underside of floor slab.

Cable shall be fixed on the trays at an interval of mm with suitably designed cable clamps. The cables shall be supported at each mm span particular care shall be exercised in laying cable on vertically rising trays by providing adequate cable fixing at short intervals to ensure that cable is not under any strain, load is properly transmitted to clamp and cable is securely fixed.

Separate cable tray shall be used for power and control cables and also the cables operating on different voltages.

21.7 CONTROL CABLES AND ACCESSORIES

Control cables for DC supply circuits breakers, relays, indication, annunciation and protection. 650/1100 V grade cable of adequate number of core of suitable size copper conductor PVC sheathed armoured shall be provided as required and approved by the Engineer and MSEB. All above cable or purpose of tendering are designated as control cables and includes all required cable not specifically stipulated. Number of cores in the cable as under shall be spare.

- | | | |
|----|--------------------|--------|
| a) | Upto 6 Core | Nil |
| b) | 7 core to 10 core | 1 No |
| c) | 11 core to 20 core | 2 Nos. |
| d) | Above 20 core | 3 Nos. |

Complete electric diagram showing terminal block numbers, ferrule numbers and units with earthing point shall be submitted for prior approval before execution.

21.8 TERMINATION METHOD :

Termination method on pole structure, VCB, Vacuum contractor, motor for kV and kV cables shall be as recommended by the manufacturer, with cable termination heat shrink type Kit/Compound etc. and any structural work required for its proper mounting connections including lugs and glands.

The kV cable shall be laid in suitable vertical G.I.Pipe with clamp while jointing to DP structure.

21.9 TESTS

The scope of third party inspection by the agenda approved by NMMC to as under;

- a) Review of raw materials test certificate and quality control procedure,
- b) Routine test,
- c) Overload test,
- d) Insulation Resistance test.

Above test are to be carried out

- i) for H.T.cables of Sq.mm size and above and if length required is mtrs. and above.
- ii) For L.T. cables of Sq.mm size and above and if length required ismt. and above.

For conditions other than (a) and (b) manufactured test certificate for routine test shall be furnished.

ITEM NO:-- EARTHING**GENERAL**

1. The earthing arrangement for sub-station switch yard and indoor equipment shall be designed in conformity with the I.E. rules 1956 and IS: 3043 and Rules/ Regulation/ Instructions of statutory authorities, as applicable for the class of work under the contract. The arrangement specifications and quantity/size stipulated hereunder are minimum requirements. It shall however, be the responsibility of the contractor to design and provide the earthing arrangement as stated above without any extra cost. Required excavation for above system by Mechanical Means should be done by concern contractor without any extra cost

2. EARTH ELECTRODE AND EARTH PITS

All earth electrodes shall be of Galvanised cast iron earth plate size 60 x 60 x 0.6 cms. with funnel with a wire mesh for watering and brick masonry block C. I. cover complete with all materials, testing & recording the results as per specification No. EA-EP . The electrodes shall not be situated at a distance less than 1.5 m from building fencing structure and equipment foundations. The earth pits shall conform to the provisions in IS and shall be constructed in M-150 concrete. Required quantity of salt and charcoal shall be provided. Each earth pit shall have funnel arrangement for watering, minimum requirements of each pits/ electrodes are as under.

Earthing for kV / 0.4 33kV system:

1. Pole structure	10 Nos.
2. Lightning arrestor	3 Nos.
3. KV Indoor VCB body	2 Nos.
4. Transformer body	8 Nos.
5. Transformer neutral	4 Nos.
6. GOD/D.O./Insulator	3 Nos.
7. Earthing for 0.4 KV system	7 Nos.

Total 37 Nos.

Each earth electrode shall have disconnecting link to disconnect and measure resistance of earth electrode. RCC chamber shall be provided with C.I. cover to each earth pit. RCC chambers top shall be flushing to metal spreading level in switch yard.

A ring bus shall be formed in a pole yard and transformer yard to which individual earth electrode shall be connected. Earth leads from equipment, structure etc. shall be connected separately to the ring bus. Both ring buses shall be interconnected with two parallel earth leads at two opposite points on each ring bus.

3. **EXTENT OF EARTH CONNECTIONS**

Earth connections shall be given to metal frame work of A. B. switches, operating handles, lightening handles, lightening arrestors, insulators, transformer neutral and body cable box and glands, VCB body and frame work, pole structure and fencing. Each unit shall have two separate and distinct earth connections of adequate size.

4. **EARTH LEADS**

Minimum size of earth leads for earthing of equipment shall be as under.

Lightening arrestor, A.B. switches steel structure	50 x 6 mm
Transformer body, cable box, gland	Galvanized
fencing	flat,
Transformer neutral	

.... kv system

The earth leads run on the structure shall be severely bolted or clamped. Neutral earth leads shall run on separate support without touching body of the transformer. The run and arrangement of earth lead shall be neat and in parallel and at right angles formation with reference to general layout of switch yard and equipment. The bend in flat shall be gradual to prevent mechanical damage and 90° multiple bends if required in earth leads shall be located below ground level.

Inter connections of the earth continuity conductor and main/branch earth shall be bolted ensuring reliable, permanent and good electrical connection and further brazed. Earth leads shall be protected against mechanical damage and corrosion particularly at the point of connection.

5. **EARTHIG FOR 415V SYSTEMS**

The earthing shall be generally as specified above and as detailed

- Minimum 30 earth pits for kV system.
- Minimum 7 Nos. earth pits for equipments and panel of 415V system.
- There shall be separate and independent earthing system for kV and 415V system and isolated from each other.
- Earth electrodes for ... kV and 415V system shall be 50 mm diameter

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- G.I. and of 3m long.
- e) Separate ring bus shall be formed for each system to which individual earth electrode of the system shall be connected. Earth leads from equipment shall be connected separately to the ring bus.
 - f) Two earth leads from each equipment shall be connected to ring bus independently.
 - g) A disconnecting link shall be provided at each pit for disconnection and measuring earth electrode resistance.
 - h) Water tap connection with necessary G.I. pipe & isolating valves(Brass) shall be provided for watering earthing pit. The water connection shall be tapped from rising main with suitable arrangement of isolation.

TESTING

The contractor shall arrange for taking the actual earth tests for all electrodes as per I.E. Rules & relevant BIS code. These tests shall be taken in presence of Engineer-in-charge & test results shall be submitted in five copies for record.

The Tenderer shall submit the details earthing system layout drawing for HT & L.T. earthing system from Competent Authority before starting / Execute the above work.

ITEM NO: EARTHING STRIP

All electrical equipment shall be double earthed with suitable size GI earth lead as per IE rule and IS 3043 / 1966. All earth electrodes shall be inter connected by GI strip of suitable size through a common circular ring.

The earth resistance should not exceed the limit prescribed in IS / IE rule.

ITEM NO: IRON WORK

The iron work includes providing, erecting the ISMB and base plate for monorail travelling trolley including cutting, welding, drilling etc and complete erection in position with necessary material hardware etc. as per direction of Engineer in charge duly painted with one coat of red oxide and two coats of enamel paint to match with the associated equipment.

MODE OF PAYMENT

The payment will be made on Kg basis as per standard weight of plate, bar angle used for fabrication work. The nut bolts and any sundry material will

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not be considered for weight calculation.

ITEM NO. VENTILATION

The job covers designing, providing, and installing proper ventilation system comprising combination of air supply fans in the space between two floors & exhaust fans below corbel level . All equipments shall be capable of continuous operation in the climatic conditions.

Ventilation equipment shall be of heavy duty industrial type suitable for continuous operation in an ambient temperature up to 50 degree centigrade on 240 volt single phase or 440 volt three phase , 50 Hz. Electric supply as specified otherwise , ventilation equipment designed for ten(10) air changes per hour . Minimum no. of air intake fans and exhaust fans shall be provided as given below.

- 1) Air Intake fans 450 mm dia, 1400 rpm - 4 Nos.
- 2) Exhaust fans 450 mm dia, 900 rpm - 6 Nos.

The necessary 20 Gauge G.I. ducting with S. S. Jali shall be provided and erected.

METERS AND INSTRUMENTS :-

1	Insulation tester(megger) cranking type having metal body 1000 V/1000 Ohms with housing box make shanti /meco/motwane only	1 No
2	Earth Tester - 4 Terminals of range 0-10-100-1000-10000 ohms	1 No
3	Supplying tong tester(clip on meter) to read current a) 0 to 1000 Amp,voltage 0 to 600 v, and insulation resistance with housing box. Make/Shanti/ Meco/ Motwance only.	1 No.
	b) for 3.3 kV	1 No.
4	Digital non contact techo meter having digital display of above make. duly calibrated for measurement of speed.	1 No.
5	Supplying shock proof type hand lamp with lamp holder, guard- ed glass and 10 meter 3 core PVC flexible cord with hand shield type 3 pin 6 Amp Plug top	1 No.
6	Engineers princison steel level of size 300mm	1 No.
7	Hydraulic crimping Tool suitable for 6 sqmm to 500 sqmm (min- imum) with M.S. housing box Make : Usha/Ismail/or Dowels only	1 No.

8	Hand operated crimping tool with set of dies ranging from 6 sqmm to 185 sqmm cable size. In pairs and hand ratchet. (Make Usha Ismail or Dowels)	1 No.
9	Supplying screw type puller for removing motor bearing of suitable size minimum size 12inches, three legs type with a wrench drop forged carbon steel arm and link chrome plated, other parts black finished etc	1 No.
10	Spirit level of 60cm size of Aluminium body	1 No.
11	Line tester cellulose acetate handle with neon bulb 3.6 x 60mm	1 No.
12	Portable Generator Birla Yamaha Model LG 2800 with diesel run	1 No.

TOOLS : OF MAKE GEDORE/JHALANI/TAPARIA/EVERST ONLY

- 1) Double ended open Jaw spanner set size 6-32 mm (set of 12 pieces) 1 set
- 2) Ring spanner set size 6-32 mm (set of 12 pieces) 1 Set
- 3) Tubular box spanner with Tomy. bar set of 8 pieces 6.22mm size 1 Set
- 4) Hack saw frame 300mm size with blade heavy duty 1 No
- 5) Insulated combination cutting plier size 200mm KDPE quoted. 1 No
- 6) Ball pan Hammer 1000 gm capacity with handle 1 No
- 7) Screw driver Engineering pattern blade from selected steel chrome plated size 8 x 200mm 2 Nos
- 8) Screw driver Engineering pattern blade from selected steel chrome plated size 5 x 200 2 Nos
- 9) a) Screw driver Electrical pattern blade from selected chrome plated size 5 x 200mm (Insulated) 2 Nos
b) Screw driver Electrical pattern blade from selected chrome plated size 5 x 300mm (Insulated) 1 No
- 10) Diagonal cutting plier of size 150mm (Insulated) 1 No
- 11) Long nose plier carbon steel of size 200mm PVC

coated	1 No
12) a) Pipe wrench stillson pattern selected carbon steel polish handle rod Japan confirm to IS 4003 of size 450mm - 60mm	1 No
b) Pipe wrench stillson pattern selected carbon steel polish handle rod Japan confirm to IS 4003 of size 600mm - 76mm	1 No
13) Chain pipe wrench as per IS 54123-210 -6inch	1 No
14) Adjustable pipe wrench chrome vanadium 250-30 mm	1 No
15) Allen Key Head wrench chrome vanadium 10 pieces 6- 10mm	1 Set
16) 5 Kg grease gun bucket type	1 No
17) Water pump pliers chrome vanadium 259 mm- 40mm	1 No
18) Box spaner set with racket & extension bar etc complete from size 3/8" to 1 1/2" (2.2 Sockets)	1 No
19) Cold chesels chrome vanadium hexagonal 19/14 - 200mm	1 No
20) 25mm dia heavy duty 1.2 mtr long crow bar	1 No
21) 12mm size 2 MT capacity wire roap,3 mtr long with dog bolts	2 Nos
22) Central punch 175mm	1 No
23) Triangular file 300mm size	1 No
24) Half round file of 300mm size	1 No
25) Aluminium ladder hevay duty suitable for 7 mtr height folding type (Type & make shall be got approved from City Engineer(M) before procurmant)	1 No
26) Tool box made from 16 SWG M.S.sheet duly painted with two coats of anticorrosive paint and two coats of post office red color of minimum size 4 feet x 2 feet x 1.5 feet having compartment for keeping of various tools	1 No

ITEM NO. FURNITURE, TOOLS & FIRE FIGHTING EQUIPMENTS

The contractor has to supply following meters/instruments/Tools./safety equipment/Spares/Water Cooler and Furniture of standard specification and approved make as directed by the Engineer-in-charge

FURNITURE

1	Fiber chair of “Nilkamal” make only	6 Nos
2	Fiber chair with cushion of “Nilkamal” make only	1 Nos
3	a) Office Almari of Godrej make 150 x 90 x 45 cm. with 3 self b) Eight locker Cupboard of Godrej make	1 No 1 No
4	Office table of 120 x 75 size, sunmica top with one cabinet & 3 drawers Make - Godrej	1 No

D) Board of NMMC details :-

Providing & fixing wall mounting type name board duly painted all details/ instructions of pumping machinery i.e for details of P.M.C. -1 No + For pump operation guide instructions - 1 No + single line diagram of complete installation etc details on G.I. sheet of 18 gauge of required size duly painted with red oxide and enamel paint for displaying the above details, Board shall be provided with suitable size

6 Nos (Minimum)

E) FIRE FIGHTING & SAFETY EQUIPMENTS

1	GI Buckets	4 Nos
2	Stand for GI Buckets	1 Nos
3	a) First Aid Box b) Hand Gloves c) Instruction charts	1 No 1 Pair 3 Nos.
4	Fire fighting Extinguisher ABC type- 5 Kg capacity	4 Nos.

ITEM NO. TEST & TRIAL.

The contractor shall carry out operation and maintenance of pumps and the relevant works involved in the scope of this item.

The intention of carrying out operation & maintenance through contractor is to operate the pumps as per the requirement, impart training to the staff in a systematic manner, so that the starting and stopping of pumps is done methodically, the records are maintained, checks, routine maintenance which shall be as under.

1. Operation of all pump, motor, valve and supply water as per the requirement of deptt.
2. To maintain all records i.e. logbook, for operation and maintenance.
3. To monitor all parameters such as pressure temperature, substation equipments and for all other systems specified in the tender.
4. To carry out routine checks water level, operation of equipments noise, vibrations and shall maintain all corresponding records.
5. Carrying out preventive maintenance during above period such as lubrication, greasing, gland cooling abnormal heating of panel, motor, etc. checking of loose connections decolourisation of cables, and keep the installation neat and clean dust free.
6. The pump house shall be clean as far possible from leakage water i.e. checking and keeping the drainage arrangement clean and clear removing waste etc.
7. To give training to the operators or to the agency envisaged by the department for smooth O & M.
8. The contractor shall provide log books and all records as directed by the department and shall hand over to the department and safety precautions for emergency situations such as power failure, tripping restarting, abnormal leakage's in pump house short circuits sparking fire etc.

The contractor shall engage the following staff.(Three shifts per day)

- a) Operator-cum-Electrician having valid PWD electrical license- 1 No per shift
- b) Helpers - 1 No per shift

The contractor shall make suitable arrangement to provide reliever for operator/helper to avail weekly off, without hampering water supply. Contact No. of employees engaged with operation and maintenance shall be informed to office Engineer-in-Charge prior to start O & M work.

He shall carry out following duties.

1. Operate the pump set.

Operate the pumps as & when required to meet the water demand & as per instruction of engineer in charge.

2. Keep the log book of activities:-

All activities regarding pumping machinery should be kept regularly i.e. starting time , stop time, voltages, currents, daily P.F. , transformer temperature etc. should be maintained.

3. Carry out preventive maintenance.

Contractor shall arrange for preventive maintenance of pump, motor, starter, transformer, all types of valves to avoid the breakdown proper maintenance procedure should be carried and the necessary record should be kept. as required. The tools supplied under the contract shall be allowed to be used for O & M and shall be handed over in good working condition.

Normally the pump is to be operated to required quantity in 24 Hrs. a day.

The contractor shall carry out daily operation of the pumpset to meet the daily requirement of the water as per instruction of Engineer in charge.

4. House keeping, watching & guarding:-

The contractor shall provide for watching & guarding of premises. He is responsible for any loss of material from our premises.

5. Rectification of defects:-

The defects noticed during operation of pumps shall be attended & keep the pumps in smooth working condition immediately. The defects remained un rectified shall be brought to the notice of engineer in charge.

Important Note

- 1) The Specifications shall be checked by the City Engineer (Mech.)/ Superintending Engineer (Mech.)
- 2) Electromagnetic Flow meter (AMR) - Raw Water, Pure Water Rising main - up to 300 mm
- 3) Ultrasonic Flow meter (AMR) - Raw Water, Pure Water Rising main -above up to 300 mm
- 4) Ultrasonic Bulk meter (AMR) - Gravity main ESR Outlet - up to 50 to 300 mm
- 5) Sub station shall be Indoor Type.
- 6) Third Party Inspection of Equipments shall be as per NMMC s Letter No350/4161 , dated 10 /12/1998. (Copy attached)
- 7) For Raw Water Pumping Machinery, Water Treatment Plant, Pure Water Pumping Machinery, all Sluice Valves (Glandless) & Butterfly Valves shall be compatible to Actuator.

AUTOMATION & SCADA SYSTEM SPECIFICATION

DETAILED SPECIFICATIONS

Automation / SCADA of Pure Water Pumping Station :-

The scope of work in Automation & SCADA system includes designing, providing, erecting, testing and commissioning of Automation system at Pure water Pumping Stations

The specifications are indicative only and cover minimum functional requirements. It is total responsibility of Contractor to ensure full functionality of the system and all essential equipment / installation shall be deemed to be in the scope of the Contractor.

- a. The Contractor has to prepare detailed Physical & Financial Activity Schedule, P & I diagrams, I/O Schedules, Cable Schedules, equipment datasheets, control panel GA drawings and process flow charts, operation philosophy and O & M Plan for each plant and get approved from the Engineer-in-charge before commencement of the work.
- b. It is the responsibility of the contractor to design the SCADA system of complete scheme from Pure water to inlet of each ESR considering all items mentioned in schedule "B" & get P&ID diagram, makes of field instruments, capacity etc approved from competent authority of NMMC. It is binding on contractor, if any changes & modification suggested by NMMC, then same shall be carried out with no extra cost.
- c. Date wise reports shall be generated by SCADA system. The monthly abstract sheet containing the water quantity pumped, water quality parameters, electrical parameters, specific energy consumption kWh/ml , NRW etc shall be mailed to respective offices for monitoring purpose during O&M period.
- d. Mode of Payment for Automation SCADA work

Break-up of the payment admissible for pumping machinery and other Electrical, Mechanical items and automation works shall be as under :
- e. 60 % against receipt of material at site of work in good condition with relevant test report with proper stacking and storing safeguard arrangement of the material.

- f. 15% after erecting, testing and initial commissioning for 1 month.
- g. 15% shall be made after completion of all work and satisfactory field performance test of 6 months and contractual obligation in all respect and submission of 3 sets of Record Drawing/Reports and required documents etc.
- h. 10% after completion of satisfactory field performance testing of complete system along with Automation of 12 months.
- i. Payment for Comprehensive operation and Maintenance is as per Schedule B of the Tender.

Guarantee Period

The guarantee period starts from date of completion of commissioning & initial test & trail period of the equipments. The defect liability period for, Automatic Flow Control Valves, Ultrasonic Level Transmitters / sensors, pressure sensors, PLC, SCADA software, Data Communication System will be counted from the date of Trial Run of entire system. During this period all wear and tear to Automatic flow Control Valves, Ultrasonic Level sensors, pressure sensors, PLC, SCADA software, , Automatic Chlorination system, Data Communication System is to be borne by the Contractor. The offer may be quoted considering all above factors.

Equivalency of Standards and Codes

Wherever reference is made in the contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise stated in the contract. Where such standards and codes are national, or relate to a particular country or region, other authoritative standards that ensure an equal or higher quality than the standards and codes specified will be acceptable subject to the Engineer's prior review and written approval. Differences between the standards specified and the proposed alternative standards must be fully described in writing by the contractor and submitted to the Engineer at least 28 days prior to the date when the contractor desires the Engineer's approval. In the event the Engineer determines that such proposed deviations do not ensure equal or higher quality,

the contractor shall comply with the standards specified in the documents.

Standard and Codes

Generally the specifications for supply, implementation and support of the product and services shall be governed by relevant Indian Standard (IS) issued by the Bureau of Indian Standards (BIS) & CPHEEO manual on Water Supply, IEC. In the absence of ISS the British Standards (BS) or American Standards (AS) shall be followed. In all the cases the later issue/ version/ amendment shall apply. Where no ISS or alternatives are available, the specification suggested by the employer from other standard shall be adopted. The relevant international standards for software development deployment and maintenance shall be incorporated to the system and produced to the engineer for reference. The employer shall clear the doubts and give final decisions based on the request of the contractor. The decision intimated in writing shall be binding on the contractor. Only SI system shall be followed. A conversion utility as required by the engineer shall also be provided.

Sign Board

The Contractor shall provide a sign board at the site of the works of approved size and design which provides (i) the name of the project (ii) the names and addresses of the Employer, the Contractor and the Consultant; (iii) the name and short description of the project and (v) the starting and completion dates.

Protection of Utilities

The Contractor is required to carefully examine the location of the Works and their alignments and to make special enquiry's with concern authorities. The Contractor shall take all precautions necessary to see that the work is carried out with care and safety, without disturbing such transmission lines. The Contractor will be responsible to carry out all construction activities in such reaches in consultation with the owners of such facilities. However, satisfactory completion of the entire work will be the responsibility of the Contractor.

General Technical specifications

Design Criteria

System shall be designed, manufactured, installed and tested to ensure the high		
Contractor	No. of correction	City Engineer

standards of operational reliability and suitable for continuous operation.

All electronic components shall be adequately rated and circuits shall be designed so that change of component characteristics shall not affect plant/ pump operation.

All equipment shall be new, of proven design, reputed make and shall be suitable for continuous operation.

Unless otherwise specified, all instruments shall be tropical zed. The outdoor equipment's shall be designed to withstand tropical rain. Wherever necessary space heaters, dust and water proof cabinets shall be provided. Instruments offered shall be complete with all the necessary mounting accessories.

Electronic instruments shall utilize solid-state electronic components, integrated circuits, micro controllers etc., and shall be of proven design.

Unless otherwise specified, the normal working range of all indicating instruments shall be between 30% and 80% of the full-scale range.

The instruments shall be designed to permit maximum interchange-ability of parts and ease of access during inspection and maintenance.

The field instruments i.e. the instruments mounted outside the control panel shall be mounted at a convenient height of approximately 1.2 m above grade platform.

The instruments shall be designed to work at the ambient conditions of temperature, humidity and chlorine contamination that may prevail. The instruments shall be given enough protection against corrosion.

All field instruments and cabinets/ panel mounted instruments shall have tag-plates/ name-plates permanently attached to them.

The performance of all instruments shall be unaffected for the $\pm 10\%$ variation in supply voltage and $\pm 5\%$ variation in frequency simultaneously.

General specifications

For uniformity of appearance all panels shall have a common appearance and color. Adequate size shall be provided to accommodate all the necessary equipment.

In order to reduce the holding of the spares to a minimum, the instruments and, electrical, control and instrumentation equipment and components of similar

type and purpose, used throughout the works shall be of the same manufacturer and type / series.

All ventilation grills provided to the control panel shall be provided with fly screens to prevent the entry of insects.

Operation and Control Philosophy of Automation System

Functions required at Pumping Station:

Pumps shall stop when the water level in the inlet sump / reservoir is reached below minimum set water level.

When the water level reaches to maximum, system shall give alarm.

When the power is restored, application software and RTU shall start the pump on the basis of duty pump selected and mode of operation viz. Auto/ Semi-Auto/ Manual and the signal shall be sent to the MCS.

Electrical parameters, like voltage, current, power factor, Frequency, Energy consumption etc., for each pump shall be monitored using Load Manager (Electrical Parameter Monitoring System) and if any of the parameter crosses set min or max limits alarm shall be generated.

All other safety devices like level sensor, pressure sensor, installed in the pumping station shall be interfaced with PLC/RTU and Min & Max limits for each parameter shall be set. Any parameter crossing the set limits, there shall be an alarm.

Any other functions as desired by the Engineer in charge of the plant to make it more easy for day-to-day operation and not involving any price implications shall be included in the system.

Information / data for various parameters at pre-defined interval (say 15 minutes) shall be recorded at each location along with trends and alarms data. Generation of local Reports, Trends & Alarm shall be provided.

Surge Protection

Surge protection devices (SPD s) shall be provided for analog signal and power supply loop of all instruments located outside the control room. One SPD shall be provided near the instrument at field end and the other SPD near the control panel end. The SPDs shall be connected to earth and shall be suitable for arresting the surge arising out of high energy static discharge / lightning strikes and protect the equipment from damage. SPDs shall provide protection through quick acting semiconductor like transorb, zener diodes, varistors and an automatic discharge and reset circuit. SPDs shall be a passive unit and shall require no power for its operation. During the lightning strike it shall clamp on the allowable voltage and pass the resultant current to the ground. The SPD shall operate without in any way affecting normal operation i.e., they should pass signal without attenuation while diverting surge currents safely to earth and clamping output voltages to specific levels. SPDs shall be of self resetting type to minimize the down time of the measurement loop. SPDs shall be weather proof casing. There should be total isolation between input, output and ground terminals. SPDs shall have a minimum surge rating of 10 kA. The SPD s shall be grouped in a specific area within the CP to ensure 'dirty' signal cables do not come into direct contact with 'clean' signal cables.

Detailed Technical Specifications of Equipments

Ultrasonic level transmitter - Designing, Supplying, Installing, commissioning & testing of Ultrasonic level transmitter CE marked with following technical parameters at Pure Water Pump House and Interfacing with PLC panel including mounting arrangement

Pump Output-4-20 mA/HART

Power supply - 24V DC ext.

Display - 4" LED

Range- 0 to 30 m

Accuracy - +/- 0.25% of Full Scale or better

Enclosure- IP 68

Mounting - On PLC panel.

Transmitter design: Transmitter design, Sizing & selection is based on process data, process requirement, general requirement and specification as mentioned below.

Erection of transmitter: Erection includes mounting of process isolation valve, erection of impulse piping, mounting of transmitter support and rack, laying of electrical cable from PLC to transmitter, mounting of junction box, glanding, termination and interfacing of transmitter with control system.

Commissioning: Commissioning of transmitter includes, calibration checking, loop checking, testing of transmitter from PLC and open / closed loop checking from sub control system & main control system.

Ultrasonic type level transmitters shall be provided with 4-20 mA DC output. All necessary amplifiers, Zener isolations, signal distribution & associated electronics / hardware / housing / mounting accessories shall have to be provided. The transmitters shall be able to drive at least 600 ohms load. The power supply to the transmitters shall be derived from the control system.

Accuracy of the transmitters shall be 0.2 % of calibrated span (minimum). Transmitter housing shall be Weather proof as per IP-67 with durable corrosion resistant coating.

Ultrasonic level transmitters, consisting of a transducer, a display / transmitter unit, and manufacturer's cable, shall be provided as specified below. Stainless steel tags for ultrasonic level transmitters shall be provided as specified. The transmitter shall have built in temperature compensation, digital level indicator and any other item required to complete the level measuring system. The level measuring system shall be suitable for mounting on the top of the Water trench, pump sump pit, water channel and Filter bed as required

The level sensor material shall be non-corrosive. Contractor shall arrange for the installation of the level transmitter on top location at suitable location. Accuracy of the level transmitter shall not deteriorate even if suspended solids are present in the service fluid.

Level transmitter shall be suitable for field mounting in safe area. Transmitter output shall be isolated and shall be suitable for transmitting over long distance.

Ultrasonic level transducers and manufacturer's cable assembly shall be provided with at least the features specified below:

Display / transmitter units shall be furnished for use with the transducers specified above and shall include at least the features specified below. At least two programming key pads shall be included per project unless directed otherwise:

Pressure Transmitter - Designing, Supplying, Installing, commissioning & testing of pressure transmitter CE marked with following technical parameters at Pure Water Pump House and Interfacing with PLC panel including mounting arrangement.

Output 4-20 mA /HART

Power supply - 24V DC ext.

Display - 4" LED

Accuracy - +/- 0.1 % of full scale or better

Enclosure- IP 68

Range - Range of the pressure gauge shall be 3 times of the pressure to be measured. Selection shall be done as per requirement of the system.

The pressure transmitters are to be installed on the individual delivery of Pumps one each & one transmitter on common manifold of pipe line

Transmitter design:- Transmitter design, Sizing & selection is based on process data, process requirement, general requirement and specification as mentioned below.

Erection of transmitter: Erection includes mounting with mounting structure and process isolation valve, erection of impulse piping, mounting of transmitter support and rack, laying of electrical cable from PLC to transmitter, mounting of junction box, glanding, termination and interfacing of transmitter with control system.

Commissioning: Commissioning of transmitter includes, calibration checking, loop checking, testing of transmitter from PLC and open / closed loop checking from sub control system & main control system.

The pressure Transmitter shall be Micro-processor based 2 wire transmitters & shall have an impressed output signal of 4 - 20 mA corresponding to zero to full range input. A two-wire transmitter shall be used with accuracy of $\pm 0.1\%$ or better of span. Transmitter shall have external zero and span adjustment with self-diagnostics feature. Transmitter shall have temperature sensor for process compensation. The transmitters shall be of the SMART-type with HART protocol. The transmitter shall be indicating type & shall have LCD display of Min 4" with engineering units.

Turn Turndown Ratio of all the transmitter shall be 100:1 for pressure transmitters and 50:1 for very low pressure applications. Load impedance shall be 600 ohm (min). The repeatability shall be within a range of 0.1% of full span. Over Pressure of the transmitter shall be 150% or more of the Maximum Range of the pressure transmitter or maximum working pressure of equipment / pipe line.

The output signal of transmitter must be independent of the burden of the transmitter output circuit including cable resistance over a wide range.

All transmitters shall be suitable for field installation and shall have strong, moisture and dust proof cases of Aluminum housing with epoxy coating suitable for IP 67 or equivalent degree of protection or better to be envisaged.

All wetted parts of the transmitters shall be SS316 or special material for corrosive applications. Accessories like snubbers for pump discharge applications and chemical diaphragm of 10 m PVC covered SS armoured capillary for remote services shall be considered. Diaphragm seals shall be of the flanged type, suitable for the same conditions as those for the transmitter. The material selection shall be according to the requirements of the fluids to be measured. The seal shall be provided with a flushing connection.

Transmitter shall be provided with Mounting bracket, mounting stand & nameplate. Material of accessories shall be SS or better.

Process connection shall be $-1/2"$ NPT (F). 2 valve manifold to be considered for absolute pressure, 3 valve manifold for gauge pressure and 5 valve manifold to be considered for DP / level / flow measurements. Mounting bracket, mounting stand & name plate to be envisaged. The material of accessories shall be SS or better.

Transmitter shall be capable of driving an output Impedance of 600 ohms at 24 VDC, shall be generally powered from the control system I/O cards and provided with integrated digital display in percentage and engineering units.

The removal of connected devices must not open the transmitter output circuit or cause malfunction of this circuit. In the case of failure and return of the supply voltage within a measuring circuit, no false signals endangering the system shall be issued. All transmitters shall be individually fused.

Power Analyser - Designing, Supplying, Installing, commissioning & testing of Power Analyser interfacing to PLC Panel with modbus communication port as per IEC 62053 in the prescribed format including mounting arrangement & Suitable for pump capacity.

Power Analyser design: Design & selection of Power Analyser shall be based on electrical consumption, mounting arrangement, interface requirement with control system, general requirement and specifications below.

Erection of Power Analyser: Erection includes mounting of energy meter on existing switchgear panel, wiring from CT and PT to energy meter. Laying of communication cable from energy meter to communication switches mounted in PLC based control panel. Mounting of junction box, glanding, termination and interfacing go energy meter with control system.

Commissioning: Commissioning of Power Analyser includes, calibration checking, loop checking, testing of energy meter locally from switchgear panel, remotely from PLC based SCADA system and from Historian station.

System description:

Energy Audit shall be part of automation of water treatment plant. To accomplish this requirement Digital Power Analyser shall be mounted on following switchgear panel, Incoming and outgoing breakers, PCC, MCC.

Power Analyser falls under particular master PLC based control system section shall be interfaced on Ring topology /Daisy chain network with each other and this network finally shall be interfaced with that particular master PLC. All the electrical parameters available in the Power Analyser shall be made available in the associated master PLC and SCADA.

Technical specifications:

Power Analyser shall have following minimum specifications but not limited to:

- a. Selectable for system, 1Ph, 3Ph 3 W and 3 Ph 4W. (The Input CT and PT shall be ratio programmable)
- b. 21st Harmonics of voltages and currents (selectivity)
- c. Import and Export Energy measurement
- d. THD factors for currents and voltages
- e. Measurement of power network parameters in balanced & unbalanced systems
- f. Configured watt-hour meter for the selected harmonic
- g. Backlit LCD 4.5 " screen, mono chromatic with backlight
- h. Ingress protection : IP 68
- i. Digital transmission to the master system through the RS-485 interface (MODBUS)
- j. Inbuilt Real Time Clock (RTC)
- k. Configurable analog, alarm and pulse outputs (energy)
- l. A programmable current output shall be 4 to 20 mA, programmable relay output, potential free contacts, load capacity 250V~/0.5
- m. Output : 1 Analog, 1 Relays, 1 OC, RS485 Modbus
- n. Accuracy Class shall be : 0.2 for Voltage and current, 0.5 for power, energy & Phase Angle
- o. Universal Auxiliary Power supply , power consumption shall be not more than 7 Volt Ampere
- p. Temperature withstand shall be 55 Deg.C. and Relative Humidity withstand capacity shall be 95%
- q. The transmission baud rate shall be 38.4 Kbits/second.

PLC Panel - Design, manufacture, supply, installation, testing and commissioning of indoor type PLC panel of size approx. 1000 mm X 700 mm X 1500mm (LBH), fabricated out of min. 2 mm thick CRCA sheet powder coated to Siemens gray color. The Panel shall be provided with reputed make PLC with following accessories as well as input output configuration. The PLC shall be programmed with IEC 61131 standards for control, monitoring and communication of equipment's & instruments at Raw water Pump house PLC shall have Ethernet port & protocol for Modbus TCP communication with following IO

DI -32 num DO - 32 num AI -24 num AO - 8 num. 7 inch color TFT HMI complete with programming shall be provided to interact with PLC The panel shall include all the accessories (not limited to following) to achieve purpose of smooth & trouble free operation of pump house.

MCB 10A DP - 1 num

MCB 4A DP - 4 num

24 VDC Power Supply 10A - 1 num

Push Buttons - 7 num

Selector Switch - 2 num

Control Contactor - 6 num

Annunciator with 6 Windows NO to NC Type

Electronic Hooter - 1 num

Control Transformer - 1 num

Emergency PB - 1 num

Panel Cooling Fan - 1 num

Panel Light with Door Switch - 1 num

Control Indication Lamp - 5 num

Wiring + TB etc - 1 lot

Hardware - 1 lot

The proposed control system, based on latest state-of-the-art technology, will be a Dual redundant/Hot standby PLC based system, with IOs configured in TMR

mode. The system shall have fault tolerance and self-diagnostic features. The Input/output modules reside in the remote I/O units connected to their respective main controllers. The remote I/O units will be configured based on the functional requirements. The Controllers along with the associated remote I/O units are to be realized for each system and the I/O modules must be interfaced to the existing instrumentation system through interface modules. All the PLCs in a system should be interconnected on a Network (Say Control Network) with dual redundancy. The PLC systems are henceforth referred to as 'Controllers' as part of this document. PLC panel shall be provided with data concentrators: The function of the data concentrator is to acquire data from third party communication devices and provide these data to the PLC based controllers. The Data concentrator need to interface to RS 485 and Ethernet data interfaces. The Data Concentrator should co-exist along with the controllers on the Control Network and provide data to the PLCs at the scan cycle rate. The Data Concentrator System should have Hot-Standby redundancy with fault tolerance features built-in.

IO Card Specifications The various I/O cards that are envisaged in the overall system should have the following minimum specifications. The IO cards must be the same family as the main controllers.

1. It shall be a proven, intelligent Remote Terminal Unit having local memory, processor, power supply unit & communication cards. The main processor shall employ a minimum of 32 bit or higher word length for CPU processing. The PLC memory shall take care of the I/O count requirement including serial points.
2. The supplied PLCs shall be microprocessor based, programmable and with erasable ROM/ RAM Memory. Each of the PLCs shall have its own processor, memory, power supply unit & communication processor and I/O cards complete in all respects. All PLCs shall be modular & from the same model product line with identical capacities.
3. All field instrumentation signaling from Field Instruments shall be cabled up-to the respective Hardware panels.
4. The PLC hardware shall have following basic features.
5. PLC shall be programmable in a structured programming language for ease of programming and ease of de-bugging.

- a. The I/O cards shall not be combined for the functionalities i.e. each card shall be used to perform its own functionality with respect analog inputs, digital inputs, digital outputs.
- b. The PLC's shall have a dual processor. The changeover in case of a dual processor shall be bump less and should be fail-safe. Redundancy should be provided for complete processor subsystem including CPU memory and power supply.
- c. The PLC should be completely unaffected by a momentary loss of Power of the order of 20 milliseconds.
- d. The PLC's shall be configured such that failure of an individual module shall not affect the integrity of the unit as a whole.
- e. The high performance PLC must be designed to log the parameters with time stamping.
- f. The parameter logging interval can be set locally remotely from the central control station. The logged data can then be downloaded to the central station PC. The report shall be generated using Crystal Reports.
- g. LED indication on the front panel shall be provided for the indication of the present mode of operation and for alarm status along with its simultaneous display on the MCS.
- h. The PLC shall be battery backed-up so as to maintain time stamping during power failure of the monitored Field Instruments parameters which can be used in further analysis
- i. The PLC shall be designed to have communication compatibility for wire / wireless mode viz. for Radio, GSM / GPRS, VSAT or wired mode viz. OFC and serial to transmit data and receive commands remotely. A total of 3 communication ports shall be required in the SURVEILLANCE Hardware considering:

 Port 1: Host port for 3rd party communication
 Port 2: Remote communication
 Port 3: For acquisition of stored data through local hand held terminal
- j. Above ports exclude the HMI panel to be provided on the PLC fascia.

PLC at each location shall be interfaced with communication equipment through RS232 / RS 485 serial bus / industrial Ethernet using standardized communication protocol. The complete PLCs shall be supplied with all its components including the cabinets. All the supplied PLCs shall be with same make & model no., differing only in number of PLC I/O cards.

Digital Output card Specifications:

Number of outputs	Minimum 4
Sink/Source Output	Source type
Output switching	Solid-state
Switching voltage	24V nominal
Number of outputs that can be triggered simultaneously	All outputs
Maximum Current Per Output	0.15A
Switching delays	Less than 10 ms
Internal protective circuit	Overload protection must be available
Front Panel display	Must indicate the health status and command status for all channels
No Inter channel interference	Essential
Diagnostics at Module level	Essential

Digital Input Card Specifications:

Number of Inputs	Minimum 4
Number of inputs that can be triggered simultaneously	All inputs
Sink/Source mode	Sink
Isolation	
➤ Between channel and backplane	500VDC
➤ Between group to group	500VDC
Input voltage	24V nominal
Switching threshold	
➤ Low Range (0)	➤ Low <5VDC
➤ High Range (1)	➤ High >15VDC
Input Resistance	2.5 K Ohms to 6 K Ohms
Input Switching delay from '0' to '1'	1 to 10ms
Front Panel display	Must indicate the health status and ON/OFF status for all channels
No Inter channel interference	Essential
Diagnostics at Module level	Essential

Analog Input Card Specifications:

Input type	Current
No of channels	8
ADC Resolution	14 bit or better
Input Measuring ranges	0-25 mA /0-20 mA/4-20 mA
Input Impedance	250 Ohms
Accuracy	0.2% or better at room temperature
CPU read time	Less than 10ms
Update Time for all channels	Less than 10ms
Input Filter	Essential
Diagnostics	
➤ Module level	➤ Essential
➤ Channel level	➤ Essential
Isolation Between channel and backplane	500V DC
CMRR	70dB or better
Front Panel display	Must indicate the module and channel health status
No Inter channel interference	Essential

Analog Output Card Specifications:

Output type	Current
No of channels	8
DAC Resolution	14-bit or better
Output range	4-20mA
Accuracy	0.2% or better
Maximum Load Resistance	1000 ohms or as to meet TMR Configuration – refer to interface diagram*
Update Time	10 ms without ramp or better
Diagnostics	
➤ Module level	➤ Essential
➤ Channel level	➤ Essential
Isolation Voltage channel and backplane	500V DC
Front Panel display	Must indicate the module and channel health status
No Inter channel interference	Essential

PLC based control monitoring and communication software - Designing, Supplying, and Installing, commissioning & testing of PLC based control monitoring and communication software as per IEC 61131 at suitable for monitoring and control of Pure water Pumps, Pressure Transmitters, Level Transmitter, Flow Transmitter complete.

- a. Each pumping station control system shall be based on the use of programmable logic controllers (PLCs). Remote input / output modules (I/O modules may also be used to link remote areas of a given process. Each PS control panel (CP) shall be provided with its own local PC based Operator Interface Unit (OIU).
- b. The control systems shall be designed for fully automatic operation of the pumping systems. However, in the event of failure of the automatic controls or by operator choice it shall be possible to revert to manual operation of each item of Plant independently of the PLC function.
- c. The PS control systems shall be designed to recover fully to a normal operational state on restoration of power following a power failure without manual intervention.
- d. The control system hardware at each PS shall comprise the following:
 - PLC
 - Control system power supplies;
 - OIU ;
 - Field cabling interfaces;
- e. The site instrumentation shall also form an integral part of the control system.
- f. The equipment detailed in the aforementioned list and some components of the instrumentation system shall be housed within the CP. The CP shall be located in the control room.

Cable: Providing specified wires and drawing them through provided conduits / trucking and / or as directed; with coded ferrules, harnessing the bunch of wires with necessary material when used in panel boards, duly connecting /

terminating with lugs, and testing for safety and beneficial use.

PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, ISI marked, of required colour coding as per Table.

Wires: open

PVC insulated and PVC sheathed wire of specified size, minimum FR grade insulation, copper conductor of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, ISI marked, of required colour coding as per Table

Earth Continuity Wire: PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation of 1.1 kV grade, of green / green yellow colour, ISI marked, of specified size.

Lugs: Copper lugs of appropriate size & type.

Other material: Rubber grommet, bush, harnessing material, flexible conduit etc.

Testing: Insulation resistance test:

All wiring shall be tested with 500 V Meggar between phases, phase - neutral and to Earth. IR value shall not be less than 1M-ohm.

Earth continuity: Earth continuity shall be ensured between termination points of Earth wire.

Polarity Test: Test shall be carried out for ensuring the correct polarity in switch and plug.

CCTV IR water proof camera : Designing, supplying, installing, commissioning & testing of CCTV IR water proof camera suitable for up to 100ft. with control key board, DVR, Hard Disk, cables, UPT transreceivers etc. complete with not less than following specifications.

- Four numbers of IP Camera with night vision functionality with range up to 30 meters. Camera construction shall be suitable for weather proof outdoor installation.
- Eight Channel DVR with metal body construction, having software features of motion detect recording. .

- inch 2 GB HDD
- port POE Switch
- 32 inch LED Screen, Keyboard & mouse.
- Full Night Vision CCTV Camera , 48 Led
- 24X7 Operation
- Water Proof, Dust Proof

SCADA Software: Design, manufacture, supply, installation, testing and commissioning of SCADA System for pump house. Windows based PC with latest configuration & OS complete with necessary office & antivirus software's. PC configuration shall not be less than Intel i5 10th Gen CPU, 16 GB Ram, 128 GB SDD, 500 GB HDD, DVD RW, Rs232 & Rs485 port, 2 RJ45 ports, Keyboard, Optical Mouse, 32 inch color TFT Monitor, Latest Windows Pro OS, Microsoft Office & Antivirus & Internet Security software for 3 years license.

One remote dice mangement software shall be provided to manage IP addresses of RTUs SCADA Software of reputed compny with developer & runtime license with unlimited number of Tags with following features & functions

- Supervise real-time data in the form of graphical presentation
- Control pumping processes locally or through Remote locations
- Dynamic process Graphic, It should resemble the process mimic. SCADA should have good library of symbols so that develop the mimic as per required. When operator sees the screen he should know what's going in plant.
- Alarm summery & Alarm history, SCADA system must be able to detect, display, and log alarms and events. When there are problems the SCADA system must notify the operators to take corrective action
- Acquire real-time data as well as logs data with Real time trend & Historical time trend.

- Web Connectivity, Real-time displays can be accessed on remotely attached PCs and notebooks using internet.
- SCADA Programming shall be done so as operator can visualize and control complete pump house operation from operator desk. All-important alarms & events shall be logged. All the data from field instruments & equipment's shall be logged. There shall be provision to take reports in required formats of real time & historical data, events & alarms.
- There shall be provision of broadcasting messages, emails of reporting information. There shall be provision of access security
- An Industrial grade Din rail mounting Ethernet switch with 5 ports shall be provided. An Industrial grade modem with 4G/5G GSM connectivity shall be provided.

a) Testing of Instantaneous & Totalised flow monitoring system

Sensor Integration :-

Flow Meter data acquisition

Acquire data continuously from up to 4 Flow meters as per site requirements

Directly capture Flow Rate & Totalized flow values from existing Flow meters

Shall support Electro-Magnetic & Ultrasonic flow meters

All data of flow rate & cumulative flow should be displayed in form of

graphs & charts

Level Sensor data acquisition

Acquire data continuously from up to 4 Level meters as per site requirements

Directly capture Level values from existing level sensors

All data of Level should be displayed in form of graphs & charts

Additional sensor data acquisition

Capture data from additional sensors like

Flow

Pressure

Chlorine content

Turbidity

Water level

Vibration

Directly capture values from existing sensors

All data of sensor should be displayed in form of graphs & charts

For Flow meter integration

1	Technical Specification :-
	Rugged, State-of-the-art Micro-controller based system.
	Dual functionality flow rate indication / 8 digit flow totalizing and Batch Counter mode.
	User configurable flow rate range.
	Field settable flow totalizing rate.
	Serial communication port with MODBUS protocol
	4 - 20 mA DC Linear or Square root corresponding to flow rate
Input	Factory set
Display	7 Segment LED, 5 - Digit Flow rate, 8 - Digit Totalizer.
Keyboard	4 Key Tack-tile Keyboard.
Resolution	4 and 1/2 digit for Flow rate.
Accuracy	± 0.3% of FS, ± 1 LSD (Flow) and ± 2 Count (Totalizer).
Totaliser	8 Digit Totalizer for flow.
	Flow Rate and Totalizer, span and zero are scalable by front keypad.
Scaling	
Data	
Storage	Totalizer value and set points stored in battery backup RAM.
LED	LED indications for Relays and Serial Communication.

Indications

Excitation	24 VDC, 100 mA excitation supply for external Flow Transmitter.
Serial Port	RS485 port with MODBUS RTU protocol for on-line communication.
Supply	230 VAC or 110 VAC, $\pm 10\%$, Single Phase, 50 Hz.
Connections	On Screw Type Connectors.

Re-transmission True 4 - 20 mA re-transmission output for external indicators / recorders or PLC. Maximum load resistance 500 Ohms.

Remote

Reset Remote Totalizer reset facility through potential free switch input.

Alarm Output Relay output for 2 set points on flow rate or one for flow rate and one for totaliser or Batching relay.

- b) Remote data monitoring connected to SCADA
- c) Wiring, cabling etc.
- d) Pressure transmitter
[Specifications of this item as mentioned in Item No.2 (k) of WTP]
- e) Level transmitter
- f) Transformer monitoring to major oil & winding temperature of transformer including all electrical parameters such as voltage, current, power factor & energy consumption etc. with required accessories.
- g) PLC Local HMI
- h) Load manager for each pump
- i) Web camera arrangement for complete premises.
[Specifications of this item as mentioned in Item of WTP]
- j) A/C of suitable capacity & rating latest version in control room.
[Specifications of this item as mentioned in Item of WTP]
- k) Computer & accessories, Laser printer & UPS. [Specifications of this item as mentioned in Item of WTP]

- a) PLC shall have Ethernet port & protocol for Modbus TCP communication with following IO DI -16 num DO - 16 num AI -2 num AO - 1 num. The panel shall include all the accessories (not limited to following) to achieve purpose of smooth & trouble free operation at GSR/ESR functionality. Digital Flow Indicator-1 num Digital TDS Indicator - 1 num Led Level Indicator - 5 levels MCB 4A DP - 4 num 24 VDC Power Supply 10A - 1 num

- Push Buttons - 4 num Selector Switch - 1 num Control Relay -2 num Electronic Hooter - 1 num Control Transformer - 1 num
- b) Emergency PB - 1 num Panel Cooling Fan - 1 num Panel Light with Door Switch - 1 num Wiring + TB etc - 1 lot Hardware - 1 lot

This panel will control butterfly valve depending upon water level of MBR / GSR. This system will work on backup power charged and generated from solar energy of suitable strength. This panel will have indications for OPEN/CLOSE status of valve and level indications for EMPTY and FULL levels.

This panel will work in both AUTO/MANUAL modes. In AUTO mode the opening and closing of valve will be done depending on water level automatically.

In MANUAL mode operator should press push buttons of OPEN/CLOSE provided on front door of panel.

Programmable Logic Controller		
Sr.No.	Description of Parameters	Specifications
1	Operating Voltage	12 VDC
2	Related Power Frequency	50 Hz
3	Digital Inputs	Depending on requirement.
4	Digital Outputs	Depending on requirement.
5	Communication Port	RS 232/Programming port,
6	Maximum Baud rate	19200 bps
7	Enclosure	Engineering Plastic

GPRS / GSM Controller:

GPRS / GSM controller will monitor MBR / GSR water levels and accordingly EMPTY OR FULL levels will be transmitted to central SCADA station, which is located at water treatment plant.

The GPRS / GSM controller is a small rugged computer, which provides intelligence in the field and allows SCDM master unit to communicate with the field instrument. Its function is to control process equipment at the remote site, acquire data from the equipment and transfer the data from the equipment back to SCDM master unit. **GPRS / GSM controller** consists of

following hardware features.

- ❑ I/O interfaces to DI/DO
- ❑ CPU
- ❑ Serial communication port.
- ❑ Secure power supply with back up battery.
- ❑ Solar Photovoltaic panel with battery charger.
- ❑ Watchdog timer.
- ❑ Electrical protection against spikes.
- ❑ Bank of Contact Free Sensors to measure water level.
- ❑ Suitable gain antenna.

GPRS/GSM controller have always been used in a situation where communication is very difficult and the **GPRS/GSM controller** strength was its ability to handle difficult communication. RTU will operate scanning its inputs, normally fairly at a fast rate. It may do some processing such as change of state and to report to the SCDM master unit. RTU is used for remote control and monitoring in the various applications.

Features of GPRS / GSM controller:

- ❑ Wireless Communication.
- ❑ Event notification.
- ❑ Remote supervision.
- ❑ Remote Control.
- ❑ Remote cell phone support for data messaging
- ❑ Simple installation

Specification of GPRS / GSM controller:

Sr. No.	Parameters	Range
1	Operating Voltage.	12 VDC.
2	Mode of Transmission.	Supporting to GSM dual band with better signal quality.
3	Inputs.	4 Digital inputs as “ EMPTY “ “HALF” “FULL” etc.
4	Data transmitting format.	Through RS 232 with GSM network / Programmable Logical Controller (PLC) with RF radio network.

5	Attachment of field instruments.	Sensors and logic controllers.
6	Solar panel	Suitable solar photovoltaic panel to charge battery through microcontroller based intelligent charger.
7	Extra reporting facility to registered Mobile.	Available to maximum two different Cell numbers for any change in water level. (Optional)
8	Status reports facility through mobile.	Available with a password. (Optional)
9	Water level sensing	Water level sensing is done through
		Contact Free Sensors type M 301
10	Interfacing cable	Suitable core, shielded cable.
11	Enclosure of RTU	Suitable for outdoor installation and has protection against electrical spikes.

CONTACT FREE SENSOR:

This sensor is specially developed to sense liquid level. The sensor is made of engineering plastic material and can be used for water, acids, viscous oils, solvents, petrochemicals etc. The switching contact is hermetically sealed in glass, totally protecting from surroundings. The switch is isolated from external media by magnetic coupling giving long life of operation. This sensor has wide applications in process control systems.

SPECIFICATIONS:

1. Sensor type : Contact free potential free
2. Number of operation : More than 10 x 6
3. Accuracy or level sensing: +/- 5 mm.

Detailed Specifications

Item No. 1 : Residual Chlorine Meter

The residual chlorine meters will monitor residual chlorine exist in pure water of treated water at water treatment plant and at tail end of distribution system. The location of meter at tail end shall be finalized by Engineer in charge. Meter shall be installed in safe and suitable place so as to get protection from sunlight / rain & chlorine vapour.

Residual Chlorine meter shall be waterproof and having on line data transmission arrangement. It shall be connected to departmentally provided central computer with power & data cable of required size and length.

The Chlorine meter shall have following specifications.

Construction	:	Residual Chlorine Meter with sensor, flow through assembly and transmitter.
Range	:	0 ~ 10 mg/l
Measuring range	:	10 PPM online
chlorineOutput	:	4 - 20 mA
Supply Voltage	:	230 V,AC / 24V,DC
Enclosure	:	IP 68 of suitable
materialTemperature	:	Ambient
Service	:	Water

Residual Chlorine Analyzer

a) General

i) Service	:	Residual Chlorine of Pure Water
ii) Quantity	:	As per scope of work
iii) Process fluid	:	Pure Water
iv) Accuracy of measuring	:	± 0.5 % of reading or better loop

b) Transmitter

i) Type	:	Free Chlorine
ii) Principle	:	Amperometric measurement of free chlorine
iii) Output	:	4-20 mA, 4 wire
iv) Supply Voltage	:	230 V AC +10/ - 15%, 50 Hz
v) Material	:	Field Housing : ABS PC Fr cast Al
vi) Display	:	LC display, two lines, with status indicators
vii) Electromagnetic Compatibility	:	Interference emission and

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interference immunity acc. To EN
61326: 1997/A1 : 1998

- viii) Protection class of field housing : IP 68
ix) Ambient Temperature : 0 to +60 degrees Celsius

Sensor

- i) Measurement Range : 0,01 - 5 ppm free chlorine; pH 4-8,2
ii) Material
 Sensor shaft : PVC
 Membrane : PTFE
 Membrane Cap : PBT (GF30) ; PVDF
iii) Process temperature : 2 degrees Celsius - 45 degrees Celsius
iv) Max Process pressure : 1 bar
v) Temperature Sensor : NTC/Pt100
vi) Connection : Inductive digital connection with transmitter
vii) Ingress protection : IP 68
viii) Additional Certifications : FM, ATEX, CSA
ix) Resolution : 0.01 mg/l
x) Inaccuracy : 0.5% of Measuring range
xi) Repeatability : 0.2% of Measuring range

Item No 4 Cable :

- a. Pairs : 2 Pair
b. Material : Plain Annealed Copper Wire
c. Conductor Area : 1.5 mm², 7 Strands/ 0.53 Dia,
BS: 6360, Class 2, as per
table of BS 5308: Part 2:
1986
d. Pair Identification : As per BS : 5308 (Table 11)e
Conductor Insulation
: PVC
f. Armouring : Galvanized Steel wire

Glands-Cable glands shall be made of brass zinc plated double compression type suitable for outdoor service.

Mounting - All mounting materials to be used shall be of SS material.

Leak Detection System

The software to be used for this system should be intended to be a cloud-based and maintenance-free application, which will allow water network operators to monitor their networks for leaks. As "state of the art" security, the cloud application should be based on internationally valid standards.

The water loss management system should be designed to be regularly updated by the supplier with new features and is used for the automatic backup and storage of data.

The system shall be designed to enable the user to implement a complete distribution network with different DMA's (District Metering Area) or PMA's (Pressure Metering Area), in which all inflows/outflows/pressures are measured.

The software should be able to record the flow or consumption in a DMA. These measurements are to be used to detect and locate events in the various DMA's.

In order to get an overview of the security of supply via DMA's, it should be possible to create and calculate associated KPI's.

The user should be able to define notifications/alarms through the included tools, the analysis should be performed automatically. The results of the analyses should be sent to the user/customer by e-mail or via other notification channels of the software.

Charts and analysis results can be exported as PDF or CSV files for further processing.

The system shall be designed in such a way that it can perform a real-time analysis of the incoming data to detect problems in the water supply network as quickly as possible.

Advanced event management, based on artificial intelligence (AI) algorithms, makes which will be possible to detect many types of events such as leakage, trend, etc.

All sensor data from the connected sensors should be available in the software. The user can analyze the sensor data (standard view, minimum night flow, average night flow, etc.). Various levels shall be available in the charts (expected value, previous year's figures, real-time analysis, integrated hardware alarms, curve history, etc.). Sensors can also be represented on a map.

The system should also be able to generate predictions such as expected values that can be compared to metrics to generate AI-based events. This feature increases accuracy and takes also into account holidays, seasonal influences, weekends, etc.

The "calibrated hydraulic models and internal sensors" function should make it possible to define virtual DMA's in the simulation, which help to detect the occurrence of a leak age in advance or to drastically reduce illegal consumption. Furthermore, it should be possible to locate leaks with an accuracy of < 300 mt (Three hundred mt).

In order to integrate the system into a complete solution, it must be possible to receive data directly from sensors or from a SCADA. The geographic data shall be extracted from the GIS, typically using shapefiles. In addition, it should be possible to integrate the system into intelligent business systems through a secure API.

GENERAL SPECIFICATION OF Leak PLUS ADVANCED VERSION:

ARTIFICIAL INTELLIGENCE CLOUD SOFTWARE TO REDUCE WATER LOSSES-

The software shall be application designed to enable water utilities to reduce water losses with the help of artificial intelligence and hydraulic simulation.

The software will receive once or many times per day data from sensors from the water utility. The software will process data and use the existing information to detect and pre-locate problems in the water delivery network.

The required functionalities are listed below:

SECURITY, INFRASTRUCTURE AND INTERFACE

- Cloud based - maintenance free: only a web-browser should be necessary to access the software.
- Cloud certifications: ISO 27001, ISO 27017, ISO 27018, ISO 9001, SOC1, SOC2
- Two-Factor Authentication: in addition to username and password, activating Two-Factor authentication should be possible
- The software should have language and unit of measure localization.
- It should have a user-friendly interface accessible from any device with a web-browser.
- Data shall be backed-up securely on a mirror data-center to avoid losing data.

DATA MONITORING, REPORTS AND NOTIFICATIONS

- User defined notifications/alarms: users can customize notification/alarms. Configured analysis can be executed by the user or scheduled with different frequencies. The result of the analysis can be reported to the user by email.
- Available data can be exported to PDF or CSV files.
- Time Series Analysis in Real Time: the software can perform real time analysis of the incoming data in order to detect as soon as possible any problem in the water distribution network.

Following type of events should be available in the software

- Leak
- Breach
- Flow trend
- Anomaly

- Sensor failure
- Missing data
- Flow increase
- Flow decrease
- Pressure increase
- Pressure decrease
- Asset failure (connected sensors)
- Water quality problem (optional if liquid analyzers are connected)

SENSORS

The software can manage sensor information (monitoring, visualize information with charts and maps): all the information related to sensors is available on the software. Users can analyze the charts for raw data, minimum night view, average night view, etc. Sensors should be also available on a map.

Sensor prediction (based on Artificial Intelligence): the software should generate predictions based on artificial intelligence that will be compared with measured values to generate AI based events

AREAS

Area management (DMA, PMA, user defined geometries, etc.): users will define DMAs/PMAs. The software will calculate the net-flow or net-consumption for every DMA/PMA that has all the inflows/outflows measured.

Area maintenance mode: The software allows users to define works on field related to an area during a period of time. This action should mute the area (no events will be generated).

Area KPIs: indicators related to areas should be calculated

HYDRAULIC SIMULATION

Hydraulic model management and simulation ("what-if" scenarios, pipe isolation, etc.): the software should work with Bentley Water Gems/info-works hydraulic models. Simulations of different scenarios can be done. Simulating the impact on any operation like closing valves, changing asset settings, etc., should be possible. The software shall also allow to select a pipe to isolate. The list of valves to close and the rest of pipes that will be isolated should be an output of the software.

Virtual DMA/PMA based pre-location (Leak and illegal consumption): the software will use calibrated hydraulic models and internal sensor to define virtual-DMAs based on simulation. Leaks and illegal consumptions should be pre-located at virtual-DMA level

THIRD PARTY SYSTEMS INTEGRATION

The software should receive data directly from sensors (IOT approach) or from SCADAs. The geographical data is extracted from GIS, typically using shape files.

The software should be integrated with other kind of tools like business intelligence software, CMMS software, etc. The integration should be done using a secure API published by the software.

Hydraulic modelling tool: hydraulic models from other systems could be integrated with the software.

This software should be integrated with the flowmeters and pressure transmitters installed in the DMA. The data from the instruments shall be gathered by the software and analytically produce the leak detection system.

It is mandatory to the bidder to design the system and get approved from NMMC authorities before supply. The make of the software , flow meters and pressure transmitters to be integrated to the software shall be got approved so that the integration will be easily possible at site of work. The software shall be suitable for integration with flow meters and transmitters.

DETAILED SPECIFICATIONS

CONSUMER SURVEY

Carrying out consumer survey in order to collect identification details, socio-economic characteristics, details of consumers connection, details of consumptions of water usage, preparing database system including all the attribute tables of consumers data, matching of consumer survey data with billing data integration of consumer survey with GIS layer, showing coverage of water supply scheme on digitized map using different annotations, attaching the attribute tables to the point feature representing consumer in appropriate GIS software etc. complete as per prescribed format, as per direction of Engineer-in-charge and detailed specifications etc. complete

OBJECTIVES

The objectives of the survey are:

- * Details of consumption of water usage by different beneficiaries.
- * Determine the perception of water services received.
- * Provide facts for formulation of policy for Water billing and collection.
- * Provide information to Improving the efficiency and financial performance of the Water distribution system.
- * Evaluate the quality of service hen reporting problems or making enquiries.
- * Determine the level of awareness of promotional water conservation initiatives.
- * Identity issues relating to payment and billing for services.

COMPONENT INCLUDES

Survey of the utility

1. Survey of Consumers in all households in Panvel Municipal Council water Distribution area (Residential consumption).
2. Survey has to be conducted in all non domestic consumers like hotels, Lodge, shops etc. (Commercial Consumption).
3. Survey has to be conducted in all institutions like Schools, hostels, bus stands, Government offices, hospitals, etc (Institutional consumption)
4. Survey has to be conducted in industrial area

5. Survey has to be conducted at all public stand posts (public stand post consumption)
6. Survey of other water consumption on line cattle through, fire fighting etc.

DATA COLLECTION

Survey form has main five categories as below:

a. Identification

Under this category basic information has to collect his house number, complete address, telephone number; etc.

b. Economic Status :-

Under this category data has to collect like name of respondent, sex, education, occupation, family income and size of family etc.

c. Details of House / Building :

Dates to capture in this section are type of building, where they live, and construction of building. Also information .about number of water closet, number of total taps use in house, uses of water like whether they use water for gardening.

d. Quantity and use :-

Required and use of water for daily activities in liters from various sources.

TRAINING

Two days training course has to conduct for surveyor by staff of the company. The aim of the training will be to build their capacities to conduct survey successfully. All surveyors will given two days training on how to conduct survey, how interact with respondent, how to facilitate to respondent, how to fill information in the survey form. How to read facial expression of respondent, so that surveyor can get correct information. The Engineer In charge will take a sample test of any trained staff to check the ability required for survey.

METHODOLOGY

Survey has to conduct house to house. The survey has to simply design to collect information about customer perceptions, their billing habits,

their water consumption and usage, their misunderstanding about the water tariff and system, their satisfaction area. Methodology is an operational framework within which facts are placed so that their meaning may be seen more clearly. The scientific method is further a systematic and organized series of steps that ensures maximum consistency and objectivity in researching a problem.

This survey has to be conducted in which data collectors have to participate as facilitator to the respondents. Data has to collect by utilizing structured interviews conducted for a total number Household recorded in Municipals Corporation.

A disadvantage of employing interviews to gather data is that the response's given may not be accurate and may not reflect real behavior. Respondents may also provide wrong information and may forget or lack the information required. These disadvantages of the selected data gathering method may well influence the findings of this survey. The (questionnaires) for the structured interviews have to be filled. These schedules and survey approach had to be kept consistent for all areas and wards.

After successfully completion of survey all filled survey forms has to be kept well and make it computerized. Computerized data should be analyzed and presentation has to be given to the concerned authority as directed by Engineer In charge. It should also clarify the batch of consumer not using the legal pipe water.

PAYMENT BREAK-UP SCHEDULE FOR VARIOUS SUB-WORKS

Section & Sub work No.	Name of work/Milestone	% of Payment release
Section A	CONSUMER SURVEY	
	➤ Preparation and submission of Survey format along with field survey planning including providing Identity Cards to the field staff.	10%
	➤ After completion of 50% properties survey for existing Water Supply Scheme	10%

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Section & Sub work No.	Name of work/Milestone	% of Payment release
	<ul style="list-style-type: none"> ➤ 100% completion of property survey ➤ Completion of data computerization ➤ Submission of Data and Report of computerized data ➤ After approval of data and report ➤ Submission of GIS layer 	30% 20% 10% 10% 10%
	TOTAL	100%

Contractor

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UNDERTAKING FOR GUARANTEE

I / WE GUARANTEE THAT

1. I / WE will replace, repair and adjust free of all charges to the employer any part of the work which fails to comply with referred to in our specifications at-tached to tender, fair wear and tear accepted until the completion and for a period of four years from the date of acceptance certificate issued under clause 20 of the conditions of contracts.
2. All the work will be reliable.
3. All the work will be of a type, which has been proved in service to be suitable for the duty required by the specification and will be manufactured and testedand approved by the Engineer In-charge.
4. I / WE accept and abide by the clause relating to quality and guarantee of work for complete defect liability period as mentioned in the clause 20, Pg. No. 87 from the date of submission.

BIDDER'S SIGNATURE

DECLARATION

1. The local condition regarding all materials such as stone, murum, sand, availability of water, electricity and labor etc. on which I /WE have based our rates for this work. The specifications and requirements of lead for this work have been carefully studied and understood by me before submitting the tender. I /WE undertake to use only the best materials, to be approved to the City Engineer In-charge of the work or his duly authorised representative, before starting the work and also to abide by his decision.
2. I / WE hereby undertake to pay the labor engaged on the work as per “Minimum Wages Act 1984” applicable to the zone concerned or any the Act applicable.

BIDDER'S SIGNATURE

DRAWINGS

The following drawings shall be incorporated in the tender

- a) L section of rising main /Gravity Mains with invert levels of pipeline and Hydraulic Gradient line
- b) Layout plan of pumping Machinery
- c) Contour map of ESR
- h) Distribution drawing showing existing and proposed pipeline g) drawing showing all units and their levels
- i) ESR drawing showing all levels
- j) GSR drawing showing all levels

MAHARASHTRA JEEVAN PRADHIKARAN

**Up-dated List of Approved Makes (Elect. / Mech. / Automation) as on
01.12.2021**

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
1	Pumps				
A)	Submersible Pump Borewell				
a)	For 100 mm (4'') pumps				
	Nil			Make to be approved at EEM level.	
b)	For 150 mm (6'') and above				
i)	Amrit	No Limit	M/s Amrit Engineering Pvt Ltd, GIDC, Visanagar, North Gujarat 384315.	Mobile No. - 09426302658 Ph. No. 079-27546932 / 6710 amrutpump@gmail.com, amrutpump@yahoo.com	30.04.2022
ii)	Calama	No Limit	M/s Calama Technologies Pvt Ltd, Indore 452007 Ph. No. 0731-2535601	Mobile No. - 09425081772 sales@calama.com vinodrai1963@ymail.com	31.03.2022
iii)	Deccan-Karvel	No Limit	M/s. Deccan Industries No 1390, Sathy Main Road, Ganpathy, Coimbatore-641006 Tamilnadu	Mr. Gopal Krishnan Mobile No. - 9965796960 gopal@deccanindustries.com Mr. Rohan Inamdar Mobile No.- 9623830404 rohan@karvel.in	31.12.2023
iv)	Duke	No Limit	M/s. Duke Plasto Technique Pvt. Ltd, N.H. 27, deesa highway, Opp. Greenwood Hotel, Badarpura, Palanpur - 385510	Mr. Parth Patel Mobile No.- 9978905921 parth@dukeplasto.com Mr. Nirav Gajjar Mobile No.- 9408701762 / 9724506183 info@dukeplasto.com niravgajjar@dukeplasto.com	31.03.2024
v)	Falcon	No Limit	M/s. Falcon Pumps Pvt. Ltd., PO Vavadi, Rajkot. 360 004. Ph. No. 0281-2370801/5.	Mr. Ridhish Dobaria Mobile No. 7718821200 9727700566 / 9727700573. brg@falconpumps.in technical@falconpumps.in	30.06.2023

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
vi)	JASCO	No Limit	M/s.JASCO Pumps Pvt. Ltd. Plot No.47, phase-1, Opp Mangal Estate, GIDC, Naroda, Ahmedabad- 382330, Ph. No. 079-22821240	Mr. Hiresh Pandya Mobile No. - 9374063726 hires.pandya@yahoo.com Mr. Manish Puranik Mobile No. - 9898059021 jascopump47@gmail.com	30.06.2024
vii)	KSB	No Limit	M/s. KSB Ltd., E - 3 & 4, MIDC Sinner, Nashik - 422113. Ph No. 022 / 21681300, 020 / 27101273,	Mr. Niket Mehta Mobile No. - 9769208641 niket.mehta@ksb.com Mr. Jitendra Patankar Mobile No. - 9765556995 jitendra.patankar@ksb.com	31.07.2024
viii)	Lubi	No Limit	M/s. LUBI industries LLP, Near Kalyan Mills, Naroda Road, Ahmedabad - 380025	Mr. Alkesh Dalwadi Mobile No. - 9052044887 Mr. Avinash Ingrulkar Mobile No. - 9619492067 adalwadi@lubipumps.com	31.01.2024
ix)	MBH Pumps	No Limit	M/s. MBH Pumps (Guj) Pvt. Ltd, 14, GIDC Industrial Estate, Naroda, Ahmedabad - Phone no. 079 / 22823066, 22822094	Mr. Yogesh Vachhani Asst. Manager Marketing Mobile No. - 9427533830 marketing@mbhpumps.com Mr. Parth Kamania Mobile No. - 9825467472	30.09.2024
x)	Texmo & Taro	No Limit	M/s Texmo Industries, Fursungi, Pune 412308	Mobile No. 07094484312 / 13, 8806088866, Email id - kaa@texmo.net, mgk@texmo.net	31.12.2021
xi)	U-neel	No Limit	M/s. Unnati Industrial Corporation, D-61, Diamond Park, GIDC Naroda, Ahmedabad- 382330 Phone No. 079 - 22811320 / 21	Mr. G. B. Patel Mobile No. - 9825044355 / 9825039815 Mr. Chetan Prajapati Mobile No. - 9979508668 pump.uneel@gmail.com	30.06.2024
xii)	Unnati	No Limit	M/s. Unnati Pumps Pvt. Ltd. 81 to 86, Amarnath Industrial Estate, Opp. Shayona Estate, Naroda Road, Ahmedabad 380025	Mr. Vishal Modasariya Mobile No. - 9825400370 Mr. Parag Modak Mobile No. - 9130036911 sales@unnatipumps.com liaison@unnatipumps.com	31.03.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
i)	Grundfos	Upto 30 HP	M/s. Grundfos Pumps India Pvt. Ltd. G B Road, Thane West	Ph. No. 022 25973466 / 5130 Email-raj@grundfos.com	31.03.2022
ii)	Harison	Upto 30 HP	M/s. Harison Pumps Pvt. Ltd . MIDC, Hingana Industrial Area, Nagpur - 28	Mr. Bharath Deshmukh Mobile No. - 9422106645 Ph No. 07104-237100 harisonpump@gmail.com	30.06.2023
iii)	Wilo Matther & Platt	Upto 30 HP	M/s Wilo Matther & Platt Pvt Ltd Chinchwad, Pune Ph. No. 020 66147100	Mr. Indrajit Nandimath Mobile No. - 9922959020 / 9763495517 indrajit.nandimath@wilo.com rajesh.unde@wilo.com	31.03.2022
i)	Topland	Upto 20 HP	M/s. Topland Pumps Pvt. Ltd.1-Umakant Pandit Udyog Nagar, Mavdi Plot, Rajkot - 360004.	Mr. Bhavin Shah Mobile No. - 9374125002 bhavin.shah@topland-india.com Mr. Prakash Tale Mobile No. - 9409103401 prakash.tale@topland-india.com	31.10.2024
i)	Ajanta	Upto 15 HP	M/s.Ajanta Industries, Kishan gate, 3, Behind Sahyog Complex, Plot No. G-413 GIDC Metoda, Rajkot-21.	Mr. Ritesh Patel Mobile No. - 9825215350 Mr. Kamlesh Patel Mobile No. - 9727681901 / 8866010555 info@ajantaindustries.co.in	31.03.2024
ii)	M.Tech	Upto 15 HP	M/s. M.Tech Engineering Com. Vavadi Rajkot - 360004.	Mobile No. - 9824232165. Email id - info@m-techpump.in	30.11.2022
B) Open Well Submersible Monoblock Pump					
i)	Amrit	No Limit	M/s Amrit Engineering Pvt Ltd, GIDC, Visanagar, North Gujarat 384315.	Mobile No. - 09426302658 Ph. No. 079-27546932 / 6710 amrutpump@gmail.com, amrutpump@yahoo.com	30.04.2022
i)	Deccan-Karvel	Upto 50 HP	M/s. Deccan Industries No 1390, Sathy Main Road, Ganpathy, Coimbatore-641006 Tamilnadu	Mr. Gopal Krishnan Mobile No. - 9965796960 gopal@deccanindustries.com Mr. Rohan Inamdar Mobile No.- 9623830404 rohan@karvel.in	31.12.2023

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Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
i)	Calama	Upto 30 HP	M/s Calama Technologies Pvt Ltd, Indore 452007 Ph. No. 0731-2535601	Mobile No. - 09425081772 sales@calama.com vinodrai1963@ymail.com	31.03.2022
ii)	Lubi	Upto 30 HP	M/s. LUBI industries LLP, Near Kalyan Mills, Naroda Road, Ahmedabad - 380025	Mr. Alkesh Dalwadi Mobile No.:- 9052044887 Mr. Avinash Ingrulkar Mobile No.:- 9619492067 adalwadi@lubipumps.com	31.01.2024
iii)	MBH Pumps	Upto 30 HP	M/s. MBH Pumps (Guj) Pvt. Ltd, 14, GIDC Industrial Estate, Naroda, Ahmedabad - Phone no. 079 / 22823066, 22822094	Mr. Yogesh Vachhani Asst. Manager Marketing Mobile No. - 9427533830 marketing@mbhpumps.com Mr. Parth Kamania Mobile No. - 9825467472	30.09.2024
i)	Duke	Upto 25 HP	M/s. Duke Plasto Technique Pvt. Ltd, N.H. 27, deesa highway, Opp. Greenwood Hotel, Badarpura, Palanpur - 385510	Mr. Parth Patel Mobile No.- 9978905921 parth@dukeplasto.com Mr. Nirav Gajjar Mobile No.- 9408701762 / 9724506183 info@dukeplasto.com niravgajjar@dukeplasto.com	31.03.2024
ii)	Harison	Upto 25 HP	M/s. Harison Pumps Pvt. Ltd . MIDC, Hingana Industrial Area, Nagpur. 440 028	Mr. Bharath Deshmukh Mobile No. - 9422106645 Ph No. 07104-237100 harisonpump@gmail.com	30.06.2023
iii)	JASCO	Upto 25 HP	M/s.JASCO Pumps Pvt. Ltd. Plot No.47, phase-1, Opp Mangal Estate, GIDC, Naroda, Ahmedabad- 382330, Ph. No. 079-22821240	Mr. Hires Pandya Mobile No. - 9374063726 hires.pandya@yahoo.com Mr. Manish Puranik Mobile No. - 9898059021 jascopump47@gmail.com	30.06.2024
i)	Ajanta	Upto 15 HP	M/s.Ajanta Industries, Kishan gate, 3, Behind Sahyog Complex, Plot No. G-413 GIDC Metoda, Rajkot-360021.	Mr. Ritesh Patel Mobile No. - 9825215350 Mr. Kamlesh Patel Mobile No. - 9727681901 / 8866010555 info@ajantaindustries.co.in	31.03.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	M.Tech	Upto 15 HP	M/s. M.Tech Engineering Com. Vavadi Rajkot - 360004.	Mobile No. 9824232165. Email id - info@m-techpump.in	30.11.2022
iii)	Topland	Upto 15 HP	M/s. Topland Pumps Pvt. Ltd. 1-Umakant Pandit Udyog Nagar, Mavdi Plot, Rajkot - 360004.	Mr. Bhavin Shah Mobile No. - 9374125002 bhavin.shah@topland-india.com Mr. Prakash Tale Mobile No. - 9409103401 prakash.tale@topland-india.com	31.10.2022
iv)	U-neel	Upto 15 HP	M/s. Unnati Industrial Corporation, D-61, Diamond Park, GIDC Naroda, Ahmedabad- 382330 Phone No. 079 - 22811320 / 21	Mr. G. B. Patel Mobile No. - 9825044355 / 9825039815 Mr. Chetan Prajapati Mobile No. - 9979508668 pump.uneel@gmail.com	30.06.2024
v)	Unnati	Upto 15 HP	M/s. Unnati Pumps Pvt. Ltd. 81 to 86, Amarnath Industrial Estate, Opp. Shayona Estate, Naroda Road, Ahmedabad 380025	Mr. Vishal Modasariya Mobile No. - 9825400370 Mr. Parag Modak Mobile No. - 9130036911 sales@unnatipumps.com liaison@unnatipumps.com	31.03.2024
C) Centrifugal Monoblock Pump					
i)	Texmo Brand	Upto 30 HP	M/s Texmo Industries, Fursungi, Pune 412308	Mobile No. 07094484312 / 13, 8806088866, Email id - kaa@texmo.net, mgk@texmo.net	31.12.2021
i)	Amrit	Upto 20 HP	M/s Amrit Engineering Pvt Ltd, GIDC, Visanagar, North Gujarat 384315.	Mobile No. - 09426302658 Ph. No. 079-27546932 / 6710 amrutpump@gmail.com, amrutpump@yahoo.com	30.04.2022
ii)	Wilo Matther & Platt	Upto 20 HP	M/s Wilo Matther & Platt Pvt Ltd Chinchwad, Pune Ph. No. 020 66147100	Mr. Indrajit Nandimath Mobile No. - 9922959020 / 9763495517 indrajit.nandimath@wilo.com rajesh.unde@wilo.com	31.03.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
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Contractor

No. of correction

City Engineer

i)	Topland	Upto 5 HP	M/s. Topland Pumps Pvt. Ltd. 1-Umakant Pandit Udyog Nagar, Mavdi Plot, Rajkot - 360004.	Mr. Bhavin Shah Mobile No. - 9374125002 bhavin.shah@topland-india.com Mr. Prakash Tale Mobile No. - 9409103401 prakash.tale@topland-india.com	31.10.2022
D) Polder Submersible Pumps					
i)	JASCO	Upto 200 HP	M/s. JASCO Pumps Pvt. Ltd. Plot No. 47, phase-1, Opp Mangal Estate, GIDC, Naroda, Ahmedabad- 382330, Ph. No. 079-22821240	Mr. Hiresh Pandya Mobile No. - 9374063726 hiresh.pandya@yahoo.com Mr. Manish Puranik Mobile No. - 9898059021 jascopump47@gmail.com	30.06.2024
ii)	MBH Pumps	Upto 125 HP	M/s. MBH Pumps (Guj) Pvt. Ltd, 14, GIDC Industrial Estate, Naroda, Ahmedabad - Phone no. 079 / 22823066, 22822094	Mr. Yogesh Vachhani Asst. Manager Marketing Mobile No. - 9427533830 marketing@mbhpumps.com Mr. Parth Kamania Mobile No. - 9825467472	30.09.2024
iii)	Harison	Upto 25 HP	M/s. Harison Pumps Pvt. Ltd. MIDC, Hingana Industrial Area, Nagpur. 440 028	Mr. Bharath Deshmukh Mobile No. - 9422106645 Ph No. 07104-237100 harisonpump@gmail.com	30.06.2023
iv)	U-neel	Upto 20 HP	M/s. Unnati Industrial Corporation, D-61, Diamond Park, GIDC Naroda, Ahmedabad- 382330	Mr. G. B. Patel Mobile No. - 9825044355 / Mr. Chetan Prajapati Mobile No. - 9979508668 pump.uneel@gmail.com	30.06.2022
E) Submerged Centrifugal Pump Horizontal					
i)	Aqua	No Limit	M/s. Aqua Machineries Pvt Ltd. Vatva, Ahmedabad-382445 Ph. No. 079-25840954 / 240 / 915	Mr. Ram Ghanvat Contact No:- 9284711342 / 9975174552 Mr. Ajay Kulkarni Contact No :- 8983223966 ace@aquapumps.com bpg@aquapumps.com	31.10.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
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ii)	JASCO	Upto 200 HP	M/s. JASCO Pumps Pvt. Ltd. Plot No.47, phase-1, Opp Mangal Estate, GIDC, Naroda, Ahmedabad- 382330, Ph. No. 079-22821240	Mr. Hiresh Pandya Mobile No. - 9374063726 hires.pandya@yahoo.com Mr. Manish Puranik Mobile No. - 9898059021 jascopump47@gmail.com	30.06.2024
iii)	MBH Pumps	Upto 150 HP	M/s. MBH Pumps (Guj) Pvt. Ltd, 14, GIDC Industrial Estate, Naroda, Ahmedabad - Phone no. 079 / 22823066, 22822094	Mr. Yogesh Vachhani Asst. Manager Marketing Mobile No. - 9427533830 marketing@mbhpumps.com Mr. Parth Kamania Mobile No. - 9825467472	30.09.2024
F) Submerged Centrifugal Pump Vertical					
i)	Aqua	No Limit	M/s. Aqua Machineries Pvt Ltd. Vatva, Ahmedabad-382445 Ph. No. 079-25840954 / 240 / 915	Mr. Ram Ghanvat Mobile No:- 9284711342 / 9975174552 Mr. Ajay Kulkarni Mobile No :- 8983223966 ace@aquapumps.com bpg@aquapumps.com	31.10.2024
ii)	JASCO	Upto 200 HP	M/s.JASCO Pumps Pvt. Ltd. Plot No.47, phase-1, Opp Mangal Estate, GIDC, Naroda, Ahmedabad- 382330, Ph. No. 079-22821240	Mr. Hiresh Pandya Mobile No. - 9374063726 hires.pandya@yahoo.com Mr. Manish Puranik Mobile No. - 9898059021 jascopump47@gmail.com	30.06.2024
iii)	MBH Pumps	Upto 150 HP	M/s. MBH Pumps (Guj) Pvt. Ltd, 14, GIDC Industrial Estate, Naroda, Ahmedabad Phone no. 079 / 22823066, 22822094	Mr. Yogesh Vachhani Asst. Manager Marketing Mobile No. - 9427533830 marketing@mbhpumps.com Mr. Parth Kamania Mobile No. - 9825467472	30.09.2024
G) Vertical Submersible Turbine Pump					
i)	Aqua	No Limit	M/s. Aqua Machineries Pvt Ltd. Vatva, Ahmedabad-382445 Ph. No. 079-25840954 / 240 / 915	Mr. Ram Ghanvat Mobile No:- 9284711342 / 9975174552 Mr. Ajay Kulkarni Mobile No :- 8983223966 ace@aquapumps.com bpg@aquapumps.com	31.10.2024
Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	

Contractor

No. of correction

City Engineer

ii)	JASCO	Upto 100 HP	M/s. JASCO Pumps Pvt. Ltd. Plot No.47, phase-1, Opp Mangal Estate, GIDC, Naroda, Ahmedabad- 382330, Ph. No. 079-22821240	Mr. Hires Pandya Mobile No. - 9374063726 hires.pandya@yahoo.com Mr. Manish Puranik Mobile No. - 9898059021 jascopump47@gmail.com	30.06.2024
H) Submersible Dewatering Pump					
i)	Amrit	No Limit	M/s Amrit Engineering Pvt Ltd, GIDC, Visanagar, North Gujarat 384315.	Mobile No. - 09426302658 Ph. No. 079-27546932 / 6710 amrutpump@gmail.com, amrutpump@yahoo.com	30.04.2022
ii)	WPIL (Gaziybad)	No Limit	M/s. WPIL Ltd, Wagle Industrial Estate , Thane 400604	Mr. K. C. Mandowara Mobile No. 9324699512 Ph No 022 - 25829319 mandowara@wpil.co.in	31.03.2022
iii)	Mody	Upto 50 HP	M/s. Mody Pumps India Pvt Ltd, MIDC, Ambarnath East	Ph. No. 0251 - 2620220 / 1 Email id - indiasales@modypump.com	31.03.2022
iv)	CRI	Upto 50 HP	M/s. C.R.I Pumps Pvt. Ltd. Saravanampatty, Coimbatore - 641035 Ph. No. 022 - 25335975	Mr. Arunkumar Mobile No. 9894192276 7738365318 mumbai@cripumps.com chandrakant@cripumps.com	31.3.2022
v)	JASCO	Upto 30 HP	M/s.JASCO Pumps Pvt. Ltd. Plot No.47, phase-1, Opp Mangal Estate, GIDC, Naroda, Ahmedabad- 382330, Ph. No. 079-22821240	Mr. Hires Pandya Mobile No. - 9374063726 hires.pandya@yahoo.com Mr. Manish Puranik Mobile No. - 9898059021 jascopump47@gmail.com	30.06.2024
vi)	Harison	Upto 30 HP	M/s. Harison Pumps Pvt. Ltd . MIDC, Hingana Ind. Area Nagpur 440 028	Mr. Bharath Deshmukh Mobile No. - 9422106645 Ph No. 07104-237100 harisonpump@gmail.com	30.06.2023
I) Submersible Non Clog Sewage Pump					
i)	Aqua	No Limit	M/s. Aqua Machineries Pvt Ltd. Vatva, Ahmedabad-382445 Ph. No. 079-25840954 / 240 / 915	Mr. Ajay Kulkarni Mobile No :- 8983223966 ace@aquapumps.com Mrs. Hetal Shah Mobile No:- 8000153324 marketing@aquapumps.com	31.10.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	Kishor Pumps	No Limit	M/s. Kishor Pumps Pvt. Ltd, A - 13 / H, MIDC, IBMR College Road, Pimpri, Pune - 411018 Ph. No 020 / 27473570, 27472616	Mr. Vinit Kulkarni Mobile No. - 9011011339 vineet.kulkarni@kishorpumps.com Mr. Prasad Deshpande Mobile No. - 9607999317 prasad.deshpande@kishorpumps.com	31.05.2022
iii)	Kirloskar	No Limit	M/s. Kirloskar Brothers Ltd, Chembur, Mumbai 71 Ph No 022 - 25289320	Mr. Ganesh Kadam Mobile No. - 9820789647 kblin@kbl.co.in ganesh.kadam@kbl.co.in	31.03.2022
iv)	Wilo Matther & Platt	No Limit	M/s Wilo Matther & Platt Pvt Ltd Chinchwad, Pune Ph. No. 020 66147100	Mr. Indrajit Nandimath Mobile No. - 9922959020 / 9763495517 indrajit.nandimath@wilo.com	31.03.2022
v)	WPIL (Gaziybad)	No Limit	M/s. WPIL Ltd, Wagle Industrial Estate, Thane 400604 Ph No 022 - 25829319	Mr. K. C. Mandowara Mobile No. 9324699512 Ph No 022 - 25829319 mandowara@wpil.co.in	31.03.2022
vi)	JASCO	Upto 350 HP	M/s.JASCO Pumps Pvt. Ltd. Plot No.47, phase-1, Opp Mangal Estate, GIDC, Naroda, Ahmedabad- 382330, Ph. No. 079-22821240	Mr. Hiresh Pandya Mobile No. - 9374063726 hiresh.pandya@yahoo.com Mr. Manish Puranik Mobile No. - 9898059021 jascopump47@gmail.com	30.06.2024
vii)	Harison	Upto 25 HP	M/s. Harison Pumps Pvt. Ltd. MIDC, Hingana Industrial Area, Nagpur. 440 028	Mr. Bharath Deshmukh Mobile No. - 9422106645 Ph No. 07104-237100 harisonpump@gmail.com	30.06.2023
viii)	Mody	Upto 10 HP	M/s. Mody Pumps India Pvt Ltd, MIDC, Ambarnath East	Ph. No. 0251 - 2620220 / 1 Email id - indiasales@modypump.com	31.03.2022
J)	Horizontal Non Clog Pump				
i)	Flowmore	Upto 250 HP	M/s. Flowmore Ltd, 714 / 715, Marathon Max, Mulund Goregaon Link Road, Mulund (W), Mumbai - 400080	Mr. Ajishkumar Mobile No. 9323805918 / 9930105918 ajish.kumar@flowmoregroup.com Mr. Ramanuj Pandey Mobile No. 9322876872 ramanujpandey@flowmoregroup.in	30.09.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
K) Vertical Non Clog Pump					
i)	Flowmore	Up to 250 HP	M/s. Flowmore Ltd, 714 / 715, Marathon Max, Mulund Goregaon Link Road, Mulund (W), Mumbai - 400080	Mr. Ajishkumar Mobile No. 9323805918 / 9930105918 ajish.kumar@flowmoregroup.com Mr. Ramanuj Pandey Mobile No. 9322876872 ramanujpandey@flowmoregroup.in	30.09.2022
L) Solar Pumping system					
i)	CRI	Upto 10 HP	M/s. C.R.I Pumps Pvt. Ltd. Saravanampatty, Coimbatore - 641035 Ph. No. 022 - 25335975	Mr. Arunkumar Mobile No. 9894192276 7738365318 mumbai@cripumps.com chandrakant@cripumps.com	31.03.2022
ii)	Flowmore	Upto 10 HP	M/s. Flowmore Ltd, 714 / 715, Marathon Max, Mulund Goregaon Link Road, Mulund (W), Mumbai - 400080	Mr. Ajishkumar Mobile No. 9323805918 / 9930105918 ajish.kumar@flowmoregroup.com Mr. Ramanuj Pandey Mobile No. 9322876872 ramanujpandey@flowmoregroup.in	30.09.2022
iii)	Silver	Upto 10 HP	M/s. Silver engg. Co. Dhebar Road, Rajkot - 360004	Ph. No. 0281 - 2222156 / 2222017 sales@silverpumps.com branch@silverpumps.com	31.03.2022
M) Vertical Turbine Pump					
i)	Flowmore	No Limit	M/s. Flowmore Ltd, 714 / 715, Marathon Max, Mulund Goregaon Link Road, Mulund (W), Mumbai - 400080	Mr. Ajishkumar Mobile No. 9323805918 / 9930105918 ajish.kumar@flowmoregroup.com Mr. Ramanuj Pandey Mobile No. 9322876872 ramanujpandey@flowmoregroup.in	30.09.2024
ii)	Jyoti	No Limit	M/s Jyoti Ltd, Santacruz, East Mumbai Ph No 022 - 26122848 / 26134403	Mr. Bapurao Wani Mobile No. - 9324028701 Email-mumbai@jyoti.com bwani@jyoti.com	31.03.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
iii)	Kirloskar	No Limit	M/s. Kirloskar Brothers Ltd, Chembur , Mumbai 71 Ph No 022 - 25289320	Mr. Ganesh Kadam Mobile No. - 9820789647 kblin@kbl.co.in ganesh.kadam@kbl.co.in	31.03.2022
iv)	WPIL (Kolkatta)	No Limit	M/s. WPIL Ltd, Wagle Industrial Estate , Thane 400604	Mr. K. C. Mandowara Mobile No. 9324699512 Ph No 022 - 25829319 mandowara@wpil.co.in	30.09.2022
v)	WPIL (Gaziybad)	No Limit	M/s. WPIL Ltd, Wagle Industrial Estate , Thane 400604 Ph No 022 - 25829319	Mr. K. C. Mandowara Mobile No. 9324699512 Ph No 022 - 25829319 mandowara@wpil.co.in	31.03.2022
vi)	Wilo Matther & Platt	No Limit	M/s Wilo Matther & Platt Pvt Ltd Chinchwad, Pune Ph. No. 020 66147100	Mr. Indrajit Nandimath Mobile No. - 9922959020 / 9763495517 indrajit.nandimath@wilo.com rajesh.unde@wilo.com	31.03.2022
i)	Xylem	Upto 600 HP	M/s. Xylem water solutions India Pvt Ltd Noida - 201309 Ph No. 020 - 26122848 / 26134403	Mr. Dharmendra Chokshi Mobile No. 7490001981 Email- dharmendra.chokshi@xyleminc.com	31.03.2022
ii)	Deccan-Karvel	Upto 200 HP	M/s. Deccan Industries No 1390, Sathy Main Road, Ganpathy, Coimbatore-641006 Tamilnadu	Mr. Gopal Krishnan Mobile No. - 9965796960 gopal@deccanindustries.com Mr. Rohan Inamdar Mobile No.- 9623830404 rohan@karvel.in	31.12.2023
N) Centrifugal Horizontal Split Case Pump					
i)	Kirloskar	No Limit	M/s. Kirloskar Brothers Ltd, Chembur , Mumbai 71 Ph No 022 - 25289320	Mr. Ganesh Kadam Mobile No. - 9820789647 kblin@kbl.co.in ganesh.kadam@kbl.co.in	31.03.2022
ii)	Flowmore	No Limit	M/s. Flowmore Ltd, 714 / 715, Marathon Max, Mulund Goregaon Link Road,Mulund (W), Mumbai - 400080	Mr. Ajishkumar Mobile No. 9323805918 / 9930105918 ajish.kumar@flowmoregroup.com Mr. Ramanuj Pandey Mobile No. 9322876872 ramanujpandey@flowmoregroup.in	30.09.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
iii)	Jyoti	No Limit	M/s Jyoti Ltd, Santacruz, East Mumbai Ph No 022 - 26122848 / 26134403	Mr. Bapurao Wani Mobile No. - 9324028701 Email-mumbai@jyoti.com bwani@jyoti.com	31.03.2022
iv)	Wilo Matther & Platt	No Limit	M/s Wilo Matther & Platt Pvt Ltd Chinchwad, Pune Ph. No. 020 66147100	Mr. Indrajit Nandimath Mobile No. - 9922959020 / 9763495517 indrajit.nandimath@wilo.com rajesh.unde@wilo.com	31.03.2022
v)	WPIL (Gaziabad)	No Limit	M/s. WPIL Ltd, Wagle Industrial Estate , Thane 400604	Mr. K. C. Mandowara Mobile No. 9324699512 Ph No 022 - 25829319 mandowara@wpil.co.in	31.03.2022
i)	Xylem	Upto 300 HP	M/s. Xylem water solutions India Pvt Ltd Noida - 201309 Ph No. 020 - 26122848 / 26134403	Mr. Dharmendra Chokshi Mobile No. 7490001981 Email- dharmendra.chokshi@xyleminc.com	31.03.2022
ii)	Deccan-Karvel	Upto 200 HP	M/s. Deccan Industries No 1390, Sathy Main Road, Ganpathy, Coimbatore-641006 Tamilnadu	Mr. Gopal Krishnan Mobile No. - 9965796960 gopal@deccanindustries.com Mr. Rohan Inamdar Mobile No.- 9623830404 rohan@karvel.in	31.12.2023
iii)	MBH Pumps	Upto 100 HP	M/s. MBH Pumps (Guj) Pvt. Ltd, 14, GIDC Industrial Estate, Naroda, Ahmedabad - Phone no. 079 / 22823066, 22822094	Mr. Yogesh Vachhani Asst. Manager Marketing Mobile No. - 9427533830 marketing@mbhpumps.com Mr. Parth Kamania Mobile No. - 9825467472	30.09.2024
2	Cast Iron Valves PN 1.0 & 1.6 rating				
A)	Cast Iron Sluice Valves as per IS 14846 : 2000				
i)	Durga & DVPL	Upto 1500 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2024

Contractor

No. of correction

City Engineer

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	MARCK Brand	Up to 1500 mm dia	M/s. Hawa Engineers Ltd., 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad - 382405	Mr. Zafar Hawa Mobile No. 9825005766 zafar@hawaengltd.com hawaengineers@gmail.com Mr. Yogesh Mishra Mobile No.: 7879145143 marckhawa.cair@gmail.com	30.09.2024
iii)	Jupiter	Upto 1400 mm dia	M/s. Jupiter Engineer Co., Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022
i)	Balaji	Upto 1200 mm dia	M/s. Shree Balaji Industries, 72/A, Manikpirtala, 2nd bye lane, Shibtola, Baltikuri, Howrah – 711 113.	Mr. Yash Surekha Mobile No. 9748225649 / 9331006076 balajivalveskol@gmail.com	31.10.2024
ii)	Cair	Upto 1200 mm dia	M/s. Cair Euromatic Automation Pvt. Ltd., Plot No.177 - 179, Shiv Shakti Estate, Nr. V-trans, Narol Road, Ahmedabad - 382405. gov.cairindia@gmail.com	Mr. Shaukat Inamdar Mobile No. 9545550059 / mkt@caireuromatic.com Mr. Tousif Sayyed Mobile No.: 9545519666 Mr. Shakir Tamboli Mobile No.: 9545558156	30.06.2024
iii)	Infra	Upto 1200 mm dia	M/s. Shree Krishna Industries, P - 261 / 1, Benaras Road, Belgachia, Howrah – 711108 (West Bengal)	Mr. Rahul Nandy Mobile No.: / 9163905657 skivalves@gmail.com Mr. Premjit Mohanty Mobile No.: 9348602402 skivalves.mkt@gmail.com	31.08.2024
iv)	IVI	Upto 1200 mm dia	M/s. Indian valve international, Balitikuri Industrial estate, Howrah 711113	Ph. No. 033 / 25553501 Email -sales@ivivalves.com	31.01.2022
v)	Kamala	Up to 1200 mm dia	M/s. Kamala Valves & Engineering Pvt. Ltd. 41 / 2, 'Q' Road, Belgachia, Howrah - 711108.	Mr. Bimal Mukherjee Mobile No.: - 9433023637 kamalavalves@rediffmail.com	31.03.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
vi)	KEW	Up to 1200 mm dia	M/s. Ketan Engineering Works, Plot No. 34, Nr. Pooja Dhanadal, Opp. Pramukh Packaging, Surendranagar - Rajkot Highway, Surendranagar - 363001.	Mr. Sandip B Patel Mobile No. 8238036592/9925236592 Email- ketanengiw@yahoo.in Mr. Ajay D Chandesara Mobile No. 8160509267/7211110575	31.10.2024
vii)	KPM	Up to 1200 mm dia	M/s K P Mondal & Sons, 206 / 1 , Panchanantala Road , Howrah 711101	Ph. No. 033 26435812 contact@kpmvalves.com	31.03.2022
viii)	KVMC Brand	Up to 1200 mm dia	M/s. Kamala Valves Manufacturing Concern, Kazipara, Howrah. 711 108 Ph. No. 033- 26517016	Mr. Kamal Mukherjee Mobile No. 9830089590 kamalkvmc@gmail.com kamalkvmc@yahoo.in	30.06.2023
ix)	LP	Up to 1200 mm dia	M/s. Perfect Valves Pvt. Ltd., Wariana Industrial Complex, Sangal Sohal Road, Jalandhar-144013	Mr. Vivek Sehgal, Director Mobile No. : 9814060747 / 8700258549 mktg.lpvalve@gmail.com	30.11.2023
x)	Mahadevi	Up to 1200 mm dia	M/s. Mahadevi Industries, Salap, NH-6, Domjur, Howrah-711409. (WB) Phone No. 033 – 26537777	Mr. Shashikant Sharma Mobile No. 9421801904 / 9130943964 mahadevi.maharashtra@gmail.com mahadevi.kolkata@gmail.com	30.09.2024
xi)	R.D. Multiples	Up to 1200 mm dia	M/s. R.D.Multiples (Metal cast) Pvt. Ltd. GIDC Pardi, Valsad, Gujarat - 396125	Ph. No. 022- 40044425 to 29 Email id - mumbai@rdmultiples.com, pardi@rdmultiples.com	31.01.2023
xi)	GM Brand	Up to 1000 mm dia	M/s G.M.Engineering Pvt Ltd. Village Metoda, Rajkot - 3600 21 Ph. No. 02827- 287658	Mr. H. Rajarama Associate V.P. (Mktg) Mobile No. 9869763109 valve@gmengg.com, hrajarama@gmengg.com	31.08.2023
xiii)	MEC	Upto 1000 mm dia	M/s. Makali Engineering Corporation, Belagachi, Howrah - 711105.	Mobile No.9831014676 Ph. No.033 26516610 / 1498 mecvalve@vsnl.net mecvalve@hotmail.com	31.08.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
i)	Calsens	Up to 800 mm dia	M/s. Calsens Private Ltd., 40 / 1 A, Makardah Road, P. O. Kadamtala, Howrah -711101	Mobile No. - 9903022200. Phone No. 033- 22486527 / 22430665. E-mail ho@calsens.com	30.06.2023
ii)	Sigma	Upto 800 mm dia	M/s. Tobacco House, Old Court House Corner, Kolkatta - 700001	Ph. No. 033 - 22624871 Email id - enquiry@sigmaflow.in	30.06.2022
iii)	Agro	Upto 600 mm dia	M/s. Jay Ess Industries, S-141, Industrial Area, Sodal Road, Jalandhar, Punjab. 144004 Ph. No. 0181/ 5054790	Mr. Amrik Singh Mobile No.: 9815035140 / 9592130301 Mr. G. P. Singh Mobile No.: 9316998889 agrovalve@gmail.com, amrik_singh55@yahoo.in	31.05.2024
iv)	DECO	Up to 600 mm dia	M/s. Tirupati Industries, 38/3 , Kantapukur lane, Howrah, 711 101.	Mr. Girish Nargunde Mobile No. 9819983497 / 9433119199. tirupati.valves@gmail.com Phone No. 033- 26771007	30.06.2023
v)	Kartar	Up to 600 mm dia	M/s. Kartar Valves Pvt. Ltd., Juneja Complex, Villlage Varina, Kapurthala Road, Jalandhar - 144013	Ph No. 0181-2651500, 1551, 0321 Mob.No- 09915762416 info@kartarvalves.com, tilak@kartarvalves.com	31.08.2023
vi)	Leader	Up to 500 mm dia	M/s. Leader Valves Ltd., S-3, S-4 Industrial Area, Jalandhar – 144004 Punjab.	Mr. Jogesh Saini Mobile No.: 9216976955 Mr. Rajeev Gupta Mobile No.: 9223174939 info@leadervalves.com	31.03.2024
B) Cast Iron Non Return Valves as per IS 5312 (Part 1) : 2004					
i)	MARCK Brand	Up to 1800 mm dia	M/s. Hawa Engineers Ltd., 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad - 382405	Mr. Zafar Hawa Mobile No. 9825005766 zafar@hawaengltd.com hawaengineers@gmail.com Mr. Yogesh Mishra Mobile No.: 7879145143 marckhawa.cair@gmail.com	30.09.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
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Contractor

No. of correction

City Engineer

ii)	Durga & DVPL	Upto 1500 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2024
iii)	Jupiter	Upto 1400 mm dia	M/s. Jupiter Engineer Co., Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022
i)	Calsens	Up to 800 mm dia	M/s. Calsens Private Ltd., 40 / 1 A, Makardah Road, P. O. Kadamtala, Howrah -711101	Mobile No. 9903022200 Phone No. 033- 22486527 / 22430665. E-mail ho@calsens.com	30.06.2023
ii)	Mahadevi	Up to 800 mm dia	M/s. Mahadevi Industries, Salap, NH-6, Domjur, Howrah-711409. (WB) Phone No. 033 – 26537777	Mr. Shashikant Sharma Mobile No. 9421801904 / 9130943964 mahadevi.maharashtra@gmail.com mahadevi.kolkata@gmail.com	30.09.2024
iii)	Sigma	Upto 800 mm dia	M/s. Tobacco House, Old Court House Corner, Kolkatta - 700001	Ph. No. 033 - 22624871 Email id - enquiry@sigmaflow.in	30.06.2022
iv)	Agro	Upto 600 mm dia	M/s. Jay Ess Industries, S-141, Industrial Area, Sodal Road, Jalandhar, Punjab. 144004 Ph. No. 0181/ 5054790	Mr. Amrik Singh Mobile No.: 9815035140 / 9592130301 Mr. G. P. Singh Mobile No.: 9316998889 agrovalve@gmail.com, amrik_singh55@yahoo.in	31.05.2024
v)	Balaji	Upto 600 mm dia	M/s. Shree Balaji Industries, 72/A, Manikpirtala, 2nd bye lane, Shibtola, Baltikuri, Howrah – 711 113.	Mr. Yash Surekha Mobile No. 9748225649 / 9331006076 balajivalveskol@gmail.com	31.10.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
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vi)	GM Brand	Up to 600 mm dia	M/s. G.M.Engineering Pvt Ltd. Village Metoda, Rajkot - 3600 21 Ph. No. 02827- 287658	Mr. H. Rajarama Associate V.P. (Mktg) Mobile No. 9869763109 valve@gmengg.com, hrajarama@gmengg.com	31.08.2023
vii)	Infra	Upto 600 mm dia	M/s. Shree Krishna Industries, P - 261 / 1, Benaras Road, Belgachia, Howrah – 711108 (West Bengal)	Mr. Rahul Nandy Mobile No.: / 9163905657 skivalves@gmail.com Mr. Premjit Mohanty Mobile No.: 9348602402 skivalves.mkt@gmail.com	31.08.2024
viii)	IVI	Upto 600 mm dia	M/s. Indian valve international, Balitikuri Industrial estate, Howrah 711113	Ph. No. 03325553501 Email -sales@ivivalves.com	31.01.2022
ix)	Kartar	Up to 600 mm dia	M/s. Kartar Valves Pvt. Ltd., Juneja Complex, Village Varina, Kapurthala Road, Jalandhar - 144013	Ph No. 0181-2651500, 1551, 0321 Mob.No- 09915762416 Email- info@kartarvalves.com, tilak@kartarvalves.com	31.08.2023
x)	KEW	Up to 600 mm dia	M/s. Ketan Engineering Works, Plot No. 34, Nr. Pooja Dhanadal, Opp. Pramukh Packaging, Surendranagar - Rajkot Highway, Surendranagar - 363001.	Mr. Sandip B Patel Mobile No. 8238036592/9925236592 Email- ketanengiw@yahoo.in Mr. Ajay D Chandesara Mobile No. 8160509267/7211110575	31.10.2024
xi)	KPM	Up to 600 mm dia	M/s K P Mondal & Sons, 206 / 1 , Panchanantala Road , Howrah 711101	Ph. No. 033 26435812 contact@kpmvalves.com	31.03.2022
xii)	KVMC Brand	Up to 600 mm dia	M/s. Kamala Valves Manufacturing Concern, Kazipara, Howrah. 711 108 Ph. No. 033- 26517016	Mr. Kamal Mukherjee Mobile No. 9830089590 kamalkvmc@gmai.com kamalkvmc@yahoo.in	30.06.2022
xiii)	MEC	Upto 600 mm dia	M/s. Makali Engineering Corporation, Belagachi, Howrah	Mobile No.9831014676 Ph. No.033 26516610 / 71498 mecvalve@vsnl.net mecvalve@hotmail.com	31.08.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
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i)	Leader	Up to 500 mm dia	M/s. Leader Valves Ltd., S-3, S-4 Industrial Area, Jalandhar – 144004 Punjab, India.	Mr. Jogesh Saini Mobile No.: 9216976955 Mr. Rajeev Gupta Mobile No.: 9223174939 info@leadervalves.com	31.03.2024
ii)	LP	Up to 300 mm dia	M/s. Perfect Valves Pvt. Ltd., Wariana Industrial Complex, Sangal Sohal Road, Jalandhar-144013	Mr. Vivek Sehgal, Director Mobile No. : 9814060747 / 8700258549 mktg.lpvalve@gmail.com	30.11.2023
C) Cast Iron Duel Plate Check Valves					Nil
D) Cast Iron Knife Edge Gate Valves					
i)	Durga & DVPL	Upto 1200 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2022
ii)	MARCK Brand	Up to 1200 mm dia	M/s. Hawa Engineers Ltd., 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad - 382405	Mr. Zafar Hawa Mobile No. 9825005766 zafar@hawaengltd.com hawaengineers@gmail.com Mr. Yogesh Mishra Mobile No.: 7879145143 marckhawa.cair@gmail.com	30.09.2024
i)	Infra	Upto 500 mm dia	M/s. Shree Krishna Industries, P - 261 / 1, Benaras Road, Belgachia, Howrah – 711108 (West Bengal)	Mr. Rahul Nandy Mobile No.: / 9163905657 skivalves@gmail.com Mr. Premjit Mohanty Mobile No.: 9348602402 skivalves.mkt@gmail.com	31.08.2022
ii)	Leader	Up to 400 mm dia	M/s. Leader Valves Ltd., S-3, S-4 Industrial Area, Jalandhar – 144004 Punjab, India.	Mr. Jogesh Saini Mobile No.: 9216976955 Mr. Rajeev Gupta Mobile No.: 9223174939 info@leadervalves.com	31.03.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
E) Cast Iron Butterfly Valves as per IS 13095 : 1991					

i)	Durga & DVPL	Upto 2000 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2024
ii)	Jupiter	Upto 2000 mm dia	M/s. Jupiter Engineer Co., Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022
iii)	KEW	Up to 2000 mm dia	M/s. Ketan Engineering Works, Plot No. 34, Nr. Pooja Dhanadal, Opp. Pramukh Packaging, Surendranagar - Rajkot Highway, Surendranagar - 363001.	Mr. Sandip B Patel Mobile No. 8238036592/9925236592 Email- ketanengiwa@yahoo.in Mr. Ajay D Chandesara Mobile No. 8160509267/7211110575	31.10.2024
iv)	MARCK Brand	Up to 2000 mm dia	M/s. Hawa Engineers Ltd., 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad - 382405	Mr. Zafar Hawa Mobile No. 9825005766 zafar@hawaengltd.com hawaengineers@gmail.com Mr. Yogesh Mishra Mobile No.: 7879145143 marckhawa.cair@gmail.com	30.09.2024
v)	Dynamic	Upto 1800 mm dia	M/s. Dynamic Valves Pvt. Ltd. R-353, Rabale MIDC, Navi Mumbai.– 400701	Mr. Nagesh Soparkar Mobile No. 9892276921 info@dynamicvalves.com	30.09.2024
vi)	R.D. Multiples	Up to 1600 mm dia	M/s. R.D.Multiples (Metal cast) Pvt. Ltd., GIDC Pardi, Valsad, Gujarat - 396125	Ph. No. 022- 40044425 to 29 Email id - mumbai@rdmultiples.com, pardi@rdmultiples.com	31.01.2023

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
vi)	Infra	Upto 1500 mm dia	M/s. Shree Krishna Industries, P - 261 / 1, Benaras Road, Belgachia, Howrah – 711108 (West Bengal)	Mr. Rahul Nandy Mobile No.: / 9163905657 skivalves@gmail.com Mr. Premjit Mohanty Mobile No.: 9348602402 skivalves.mkt@gmail.com	31.08.2024

i)	Cair	Up to 1200 mm dia	M/s. Cair Euromatic Automation Pvt. Ltd., Plot No.177 - 179, Shiv Shakti Estate, Nr. V-trans, Narol Road, Ahmedabad - 382405.	Mr. Shaukat Inamdar Mobile No. 9545550059 / mkt@caireuromatic.com Mr. Tousif Sayyed Mobile No.: 9545519666 gov.cairindia@gmail.com	30.06.2024
ii)	GM Brand	Up to 1200 mm dia	M/s G.M.Engineering Pvt Ltd. Village Metoda, Rajkot - 3600 21, Ph. No. 02827- 287658	Mr. H. Rajarama Associate V.P. (Mktg) Mobile No. 9869763109 valve@gmengg.com, hrajarama@gmengg.com	31.08.2023
iii)	IVI	Upto 1200 mm dia	M/s. Indian valve international, Balitikuri Industrial estate, Howrah 711113	Ph. No. 03325553501 Email -sales@ivivalves.com	31.01.2022
iv)	Kamala	Up to 1200 mm dia	M/s. Kamala Valves & Engineering Pvt. Ltd. 41 / 2, 'Q' Road, Belgachia, Howrah - 711108.	Mr. Bimal Mukherjee Mobile No.:- 9433023637 Email id :- kamalavalves@rediffmail.com	31.03.2024
v)	KPM	Up to 1200 mm dia	M/s K P Mondal & Sons, 206 / 1 , Panchanantala Road , Howrah 711101	Ph. No. 033 26435812 contact@kpmvalves.com	31.03.2022
vi)	Mahadevi	Up to 1200 mm dia	M/s. Mahadevi Industries, Salap, NH-6, Domjur, Howrah-711409. (WB) Phone No. 033 – 26537777	Mr. Shashikant Sharma Mobile No. 9421801904 / 9130943964 mahadevi.maharashtra@gmail.com mahadevi.kolkata@gmail.com	30.09.2024
vii)	Sigma	Upto 1000 mm dia	M/s. Tobacco House, Old Court House Corner, Kolkatta - 700001	Ph. No. 033 - 22624871 Email id - enquiry@sigmaflow.in	30.06.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
i)	Leader	Up to 400 mm dia	M/s. Leader Valves Ltd., S-3, S-4 Industrial Area, Jalandhar – 144004 Punjab, India.	Mr. Jogesh Saini Mobile No.: 9216976955 Mr. Rajeev Gupta Mobile No.: 9223174939 info@leadervalves.com	31.03.2024

ii)	Balaji	Upto 300 mm dia	M/s. Shree Balaji Industries, 72/A, Manikpirtala, 2nd bye lane, Shibtoala, Baltikuri, Howrah – 711 113.	Mr. Yash Surekha Mobile No. 9748225649 / 9331006076 balajivalveskol@gmail.com	31.10.2022
F) Cast Iron Air Valve & Kinetic Air Valves as per IS 14845 : 2000					
i)	Durga & DVPL	Upto 300 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2024
ii)	Balaji	Upto 200 mm dia	M/s. Shree Balaji Industries, 72/A, Manikpirtala, 2nd bye lane, Shibtoala, Baltikuri, Howrah – 711 113. (	Mr. Yash Surekha Mobile No. 9748225649 / 9331006076 Email id - balajivalveskol@gmail.com	31.10.2022
iii)	Calsens	Up to 200 mm dia	West Bengal) M/s. Calsens Private Ltd., 40 / 1 A, Makardah Road, P. O. Kadamtala, Howrah -711101	Phone No. 033- 22486527 / 22430665. Mobile No. 9903022200. E-mail ho@calsens.com	30.06.2023
iv)	Infra	Upto 200 mm dia	M/s. Shree Krishna Industries, P - 261 / 1, Benaras Road, Belgachia, Howrah – 711108 (West Bengal)	Mr. Rahul Nandy Mobile No.: / 9163905657 skivalves@gmail.com Mr. Premjit Mohanty Mobile No.: 9348602402 skivalves.mkt@gmail.com	31.08.2024
v)	IVI	Upto 200 mm dia	M/s. Indian valve international, Balitikuri Industrial estate, Howrah 711113	Ph. No. 03325553501 Email -sales@ivivalves.com	31.01.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
vi)	Jupiter	Upto 200 mm dia	M/s. Jupiter Engineer Co., Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022
vii)	Kamala	Up to 200 mm dia	M/s. Kamala Valves & Engineering Pvt. Ltd. 41 / 2, 'Q' Road, Belgachia, Howrah - 711108.	Mr. Bimal Mukherjee Mobile No.: - 9433023637 Email id :- kamalavalves@rediffmail.com	31.03.2024

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viii)	Kartar	Up to 200 mm dia	M/s. Kartar Valves Pvt. Ltd., Juneja Complex, Villlage Varina, Kapurthala Road, Jalandhar - 144013	Ph No. 0181-2651500, 1551, 0321 Mob.No- 09915762416 Email- info@kartarvalves.com, tilak@kartarvalves.com	31.08.2023
xi)	KEW	Up to 200 mm dia	M/s. Ketan Engineering Works, Plot No. 34, Nr. Pooja Dhanadal, Opp. Pramukh Packaging, Surendranagar - Rajkot Highway, Surendranagar - 363001.	Mr. Sandip B Patel Mobile No. 8238036592/9925236592 Email- ketanengiw@yahoo.in Mr. Ajay D Chandesara Mobile No. 8160509267/7211110575	31.10.2024
x)	KPM	Up to 200 mm dia	M/s K P Mondal & Sons, 206 / 1 , Panchanantala Road , Howrah 711101	Ph. No. 033 26435812 contact@kpmvalves.com	31.03.2022
xi)	KVMC Brand	Up to 200 mm dia	M/s. Kamala Valves Manufacturing Concern, Kazipara, Howrah. 711 108 Ph. No. 033- 26517016	Mr. Kamal Mukherjee Mobile No. 9830089590 kamalkvmc@gmail.com kamalkvmc@yahoo.in	30.06.2023
xii)	LP	Up to 200 mm dia	M/s. Perfect Valves Pvt. Ltd., Wariana Industrial Complex, Sangal Sohal Road, Jalandhar-144013	Mr. Vivek Sehgal, Director Mobile No. : 9814060747 / 8700258549 Email id :- mktg.lpvalve@gmail.com	30.11.2023
Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
xiii)	Mahadevi	Up to 200 mm dia	M/s. Mahadevi Industries, Salap, NH-6, Domjur, Howrah-711409. (WB) Phone No. 033 – 26537777	Mr. Shashikant Sharma Mobile No. 9421801904 / 9130943964 mahadevi.maharashtra@gmail.com mahadevi.kolkata@gmail.com	30.09.2024
xiv)	MARCK Brand	Up to 200 mm dia	M/s. Hawa Engineers Ltd., 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad - 382405	Mr. Zafar Hawa Mobile No. 9825005766 zafar@hawaengltd.com hawaengineers@gmail.com Mr. Yogesh Mishra Mobile No.: 7879145143 marckhawa.cair@gmail.com	30.09.2024

xv)	Sigma	Upto 200 mm dia	M/s. Tobacco House, Old Court House Corner, Kolkatta - 700001	Ph. No. 033 - 22624871 Email id - enquiry@sigmaflow.in	30.06.2022
G) Cast Iron Temper Proof Air Valves					
i)	Durga & DVPL	Upto 300 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2024
ii)	KEW	Up to 200 mm dia	M/s. Ketan Engineering Works, Plot No. 34, Nr. Pooja Dhanadal, Opp. Pramukh Packaging, Surendranagar - Rajkot Highway, Surendranagar - 363001.	Mr. Sandip B Patel Mobile No. 8238036592/9925236592 Email- ketanengiw@yahoo.in Mr. Ajay D Chandesara Mobile No. 8160509267/7211110575	31.10.2024
iii)	Infra	Upto 200 mm dia	M/s. Shree Krishna Industries, P - 261 / 1, Benaras Road, Belgachia, Howrah – 711108 (West Bengal)	Mr. Rahul Nandy Mobile No.: / 9163905657 skivalves@gmail.com Mr. Premjit Mohanty Mobile No.: 9348602402 skivalves.mkt@gmail.com	31.08.2024
iv)	Jupiter	Upto 200 mm dia	M/s. Jupiter Engineer Co., Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 /	31.01.2022

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Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
H) Cast Iron Sluice Gates					
i)	Durga & DVPL	Upto 1500 x 1500 mm	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2022
3	Ductile Iron / S. G. Iron Valves PN 1.0 & 1.6 rating				

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A) Ductile Iron / S. G. Iron Sluice Valve Metal & Resilient Seated Glandless Type					
i)	Durga & DVPL	Upto 1500 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2024
ii)	Jupiter	Upto 1400 mm dia	M/s. Jupiter Engineer Co., Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022
iii)	Infra	Upto 1200 mm dia	M/s. Shree Krishna Industries, P - 261 / 1, Benaras Road, Belgachia, Howrah – 711108 (West Bengal)	Mr. Rahul Nandy Mobile No.: / 9163905657 skivalves@gmail.com Mr. Premjit Mohanty Mobile No.: 9348602402 skivalves.mkt@gmail.com	31.08.2024
iv)	IVC	Up to 1200 mm dia	M/s Indian Valve Pvt Ltd. Satpur, Nashik 422007 Ph. 0253 - 2350261 / 170	Mobile No 9922713637 Email id -sales@ivc-valves.com	31.03.2022
v)	LP	Up to 1200 mm dia	M/s. Perfect Valves Pvt. Ltd., Wariana Industrial Complex, Sangal Sohla Road, Jalandhar-144013	Mr. Vivek Sehgal, Director Mobile No. : 9814060747 / 8700258549 mktg.lpvalve@gmail.com	30.11.2023

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
vi)	Mahadevi	Up to 1200 mm dia	M/s. Mahadevi Industries, Salap, NH-6, Domjur, Howrah-711409. (WB) Phone No. 033 – 26537777	Mr. Shashikant Sharma Mobile No. 9421801904 / 9130943964 mahadevi.maharashtra@gmail.com mahadevi.kolkata@gmail.com	30.09.2024
vii)	MARCK Brand	Up to 1200 mm dia	M/s. Hawa Engineers Ltd., 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad - 382405	Mr. Zafar Hawa Mobile No. 9825005766 zafar@hawaengltd.com hawaengineers@gmail.com Mr. Yogesh Mishra Mobile No.: 7879145143 marckhawa.cair@gmail.com	30.09.2024

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City Engineer

i)	AVM - Avishkar	Up to 1000 mm dia	M/s Avishkar Engineers Pvt Ltd Hadapsar, Pune 28	Ph. No. 020 - 26970924 / 533 avishkar2@vsnl.com, salesavishkar@gmail.com	31.03.2022
ii)	GM Brand	Up to 1000 mm dia	M/s G.M.Engineering Pvt Ltd. Village Metoda, Rajkot - 3600 21, Ph. No. 02827- 287658	Mr. H. Rajarama Associate V.P. (Mktg) Mobile No. 9869763109 valve@gmengg.com, hrajarama@gmengg.com	31.08.2023
iii)	KEW	Up to 1000 mm dia	M/s. Ketan Engineering Works, Plot No. 34, Nr. Pooja Dhanadal, Opp. Pramukh Packaging, Surendranagar - Rajkot Highway, Surendranagar - 363001.	Mr. Sandip B Patel Mobile No. 8238036592/9925236592 Email- ketanengiw@yahoo.in Mr. Ajay D Chandesara Mobile No. 8160509267/7211110575	31.10.2024
iv)	Sigma	Upto 800 mm dia	M/s. Tobacco House, Old Court House Corner, Kolkatta - 700001	Ph. No. 033 - 22624871 enquiry@sigmaflow.in	30.06.2022
v)	Raphel by Talis	Upto 600 mm dia	M/s. Talis Valve India Pvt. Ltd. Gachibowli, Hyderabad, 500 032.	Ph. No. 040 - 67454050 . enquiryindia@talis-group.com	31.10.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
B) Ductile Iron / S. G. Iron Non return Valves					
i)	Durga & DVPL	Upto 1500 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 2677871	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2024
ii)	R.D. Multiples	Up to 1500 mm dia	M/s. R.D.Multiples (Metal cast) Pvt. Ltd. GIDC Pardi, Valsad, Guajrat - 396125	Ph. No. 022- 40044425 to 29. Email id - mumbai@rdmultiples.com, pardi@rdmultiples.com	31.01.2023
iii)	Jupiter	Upto 1400 mm dia	M/s. Jupiter Engineer Co., Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 /	31.01.2022

iv)	IVC	Up to 1200 mm dia	M/s Indian Valve Pvt Ltd. Satpur, Nashik 422007 Ph. 0253 - 2350261 / 170	9029041480 Mobile No 9922713637 Email id -sales@ivc-valves.com	31.03.2022
i)	AVM - Avishkar	Up to 1000 mm dia	M/s Avishkar Engineers Pvt Ltd Hadapsar, Pune 28	Ph. No. 020 - 26970924 / 533 avishkar2@vsnl.com, salesavishkar@gmail.com	31.03.2022
ii)	Mahadevi	Up to 800 mm dia	M/s. Mahadevi Industries, Salap, NH-6, Domjur, Howrah-711409. (WB) Phone No. 033 – 26537777	Mr. Shashikant Sharma Mobile No. 9421801904 / 9130943964 mahadevi.maharashtra@gmail.com mahadevi.kolkata@gmail.com	30.09.2024
iii)	Sigma	Upto 800 mm dia	M/s. Tobacco House, Old Court House Corner, Kolkatta - 700001	Ph. No. 033 - 22624871 Email id - enquiry@sigmaflow.in	30.06.2022
i)	GM Brand	Up to 600 mm dia	M/s. G. M. Engineering Pvt Ltd. Village Metoda, Rajkot - 3600 21, Ph. No. 02827- 287658	Mr. H. Rajarama Associate V.P. (Mktg) Mobile No. 9869763109 valve@gmengg.com, hrajarama@gmengg.com	31.08.2023

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	Infra	Upto 600 mm dia	M/s. Shree Krishna Industries, P - 261 / 1, Benaras Road, Belgachia, Howrah – 711108 (West Bengal)	Mr. Rahul Nandy Mobile No.: / 9163905657 skivalves@gmail.com Mr. Premjit Mohanty Business Development Mobile No.: 9348602402 skivalves.mkt@gmail.com	31.08.2024
iii)	Raphel by Talis	Upto 600 mm dia	M/s. Talis Valve India Pvt. Ltd., Gachibowli, Hyderabad, 500 032.	Ph. No. 040 - 67454050 . Email id - enquiryindia@talis-group.com	31.10.2022
iv)	KEW	Up to 300 mm dia	M/s. Ketan Engineering Works, Plot No. 34, Nr. Pooja Dhanadal, Opp. Pramukh Packaging, Surendranagar - Rajkot Highway, Surendranagar - 363001.	Mr. Sandip B Patel Mobile No. 8238036592/9925236592 Email- ketanengiw@yahoo.in Mr. Ajay D Chandesara Mobile No. 8160509267/7211110575	31.10.2024
v)	LP	Up to 300 mm dia	M/s. Perfect Valves Pvt. Ltd., Wariana Industrial Complex, Sangal Sohla Road, Jalandhar-144013	Mr. Vivek Sehgal, Director Mobile No. : 9814060747 / 8700258549 mktg.lpvalve@gmail.com	30.11.2023

Contractor

No. of correction

City Engineer

C) Ductile Iron / S. G. Iron Duel Plate Check Valves					
i)	MARCK Brand	Up to 1800 mm dia	M/s. Hawa Engineers Ltd. , 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad 05	Mr. Zafar Hawa Mobile No. 9825005766 zafar@hawaengltd.com hawaengineers@gmail.com Mr. Yogesh Mishra Mobile No.: 7879145143 marckhawa.cair@gmail.com	30.09.2024
D) Ductile Iron / S. G. Iron Butterfly Valves Metal & Resilient Seated					
i)	Durga & DVPL	Upto 2000 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	Jupiter	Upto 2000 mm dia	M/s. Jupiter Engineer Co. , Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022
iii)	MARCK Brand	Up to 2000 mm dia	M/s. Hawa Engineers Ltd. , 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad - 382405	Mr. Zafar Hawa Mobile No. 9825005766 zafar@hawaengltd.com hawaengineers@gmail.com Mr. Yogesh Mishra Mobile No.: 7879145143 marckhawa.cair@gmail.com	30.09.2024
iv)	Dynamic	Upto 1800 mm dia	M/s. Dynamic Valves Pvt. Ltd. R-353, Rabale MIDC, Navi Mumbai.– 400701	Mr. Nagesh Soparkar Mobile No. 9892276921 info@dynamicvalves.com	30.09.2024
v)	KEW	Up to 1600 mm dia	M/s. Ketan Engineering Works , Plot No. 34, Nr. Pooja Dhanadal, Opp. Pramukh Packaging, Surendranagar - Rajkot Highway, Surendranagar - 363001.	Mr. Sandip B Patel Mobile No. 8238036592/9925236592 Email- ketanengiw@yahoo.in Mr. Ajay D Chandesara Mobile No. 8160509267/7211110575	31.10.2024

i)	AVM - Avishkar	Up to 1200 mm dia	M/s Avishkar Engineers Pvt Ltd Hadapsar, Pune 28	Ph. No. 020 - 26970924 / 533 avishkar2@vsnl.com, salesavishkar@gmail.com	31.03.2022
ii)	GM Brand	Up to 1200 mm dia	M/s G.M.Engineering Pvt Ltd. Village Metoda, Rajkot - 3600 21, Ph. No. 02827- 287658	Mr. H. Rajarama Associate V.P. (Mktg) Mobile No. 9869763109 valve@gmengg.com, hrajarama@gmengg.com	31.08.2023
iii)	IVC	Up to 1200 mm dia	M/s Indian Valve Pvt Ltd. Satpur, Nashik 422007 Ph. 0253 - 2350261 / 170	Mobile No 9922713637 Email id -sales@ivc-valves.com	31.03.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
iv)	Mahadevi	Up to 1200 mm dia	M/s. Mahadevi Industries, Salap, NH-6, Domjur, Howrah-711409. (WB) Phone No. 033 – 26537777	Mr. Shashikant Sharma Mobile No. 9421801904 / 9130943964 mahadevi.maharashtra@gmail.com mahadevi.kolkata@gmail.com	30.09.2024
v)	Calsens	Up to 1000 mm dia	M/s. Calsens Private Ltd., 40 / 1 A, Makardah Road, P. O. Kadamtala, Howrah -711101	Phone No. 033- 22486527 / 22430665. Mobile No. 9903022200. E-mail ho@calsens.com	30.06.2023
vi)	Infra	Upto 1000 mm dia	M/s. Shree Krishna Industries, P - 261 / 1, Benaras Road, Belgachia, Howrah – 711108 (West Bengal)	Mr. Rahul Nandy Mobile No.: / 9163905657 skivalves@gmail.com Mr. Premjit Mohanty Mobile No.: 9348602402 skivalves.mkt@gmail.com	31.08.2022
vii)	Sigma	Upto 1000 mm dia	M/s. Tobacco House, Old Court House Corner, Kolkatta - 700001	Ph. No. 033 - 22624871 Email id - enquiry@sigmaflow.in	30.06.2022
i)	Raphel by Talis	Upto 600 mm dia	M/s. Talis Valve India Pvt. Ltd., Gachibowli, Hyderabad, 500 032.	Ph. No. 040 - 67454050 . enquiryindia@talis-group.com	31.10.2022
E)	Ductile Iron / S. G. Iron Knife Edge Gate Valves				

i)	Durga & DVPL	Upto 1200 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2022
F) Ductile Iron / S. G. Iron Air Valve & Kinetic Air Valves					
i)	Durga & DVPL	Upto 300 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032	31.10.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	AVM - Avishkar	Up to 200 mm dia	M/s Avishkar Engineers Pvt Ltd Hadapsar, Pune 28	Ph. No. 020 - 26970924 / 533 avishkar2@vsnl.com, salesavishkar@gmail.com	31.03.2022
iii)	GM Brand	Up to 200 mm dia	M/s. G. M. Engineering Pvt Ltd. Village Metoda, Rajkot - 3600 21 Ph. No. 02827- 287658	Mr. H. Rajarama Associate V.P. (Mktg) Mobile No. 9869763109 valve@gmengg.com, hrajarama@gmengg.com	31.08.2023
iv)	IVC	Up to 200 mm dia	M/s Indian Valve Pvt Ltd. Satpur, Nashik 422007 Ph. 0253 - 2350261 / 170	Mobile No 9922713637 Email id -sales@ivc-valves.com	31.03.2022
v)	Jupiter	Upto 200 mm dia	M/s. Jupiter Engineer Co., Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022
vi)	KEW	Up to 200 mm dia	M/s. Ketan Engineering Works, Plot No. 34, Nr. Pooja Dhanadal, Opp. Pramukh Packaging, Surendranagar - Rajkot Highway, Surendranagar - 01.	Mr. Sandip B Patel Mobile No. 8238036592/9925236592 Email- ketanengiw@yahoo.in Mr. Ajay D Chandesara Mobile No. 8160509267/7211110575	31.10.2024

vii)	KPM	Up to 200 mm dia	M/s K P Mondal & Sons, 206 / 1 , Panchanantala Road , Howrah 711101	Ph. No. 033 26435812 Email - contact@kpmvalves.com	31.03.2022
viii)	LP	Up to 200 mm dia	M/s. Perfect Valves Pvt. Ltd., Wariana Industrial Complex, Sangal Sohal Road, Jalandhar-144013	Mr. Vivek Sehgal, Director Mobile No. : 9814060747 / 8700258549 Email id :- mktg.lpvalve@gmail.com	30.11.2023
ix)	Mahadevi	Up to 200 mm dia	M/s. Mahadevi Industries, Salap, NH-6, Domjur, Howrah-711409. (WB) Phone No. 033 – 26537777	Mr. Shashikant Sharma Mobile No. 9421801904 / 9130943964 mahadevi.maharashtra@gmail.com mahadevi.kolkata@gmail.com	30.09.2024
x)	R.D. Multiples	Up to 200 mm dia	M/s. R.D.Multiples (Metal cast) Pvt. Ltd. GIDC Pardi, Valsad, Gujarat - 396125	Ph. No. 022- 40044425 to 29. Email id - mumbai@rdmultiples.com, pardi@rdmultiples.com	31.01.2023

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
xi)	Sigma	Upto 200 mm dia	M/s. Tobacco House, Old Court House Corner, Kolkatta - 700001	Ph. No. 033 - 22624871 Email id - enquiry@sigmaflow.in	30.06.2022
G) Ductile Iron / S. G. Iron Temper proof Air Valves					
i)	Durga & DVPL	Upto 300 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2024
ii)	Infra	Upto 200 mm dia	M/s. Shree Krishna Industries, P - 261 / 1, Benaras Road, Belgachia, Howrah – 711108 (West Bengal)	Mr. Rahul Nandy Mobile No.: / 9163905657 skivalves@gmail.com Mr. Premjit Mohanty Mobile No.: 9348602402 skivalves.mkt@gmail.com	31.08.2022
iii)	Jupiter	Upto 200 mm dia	M/s. Jupiter Engineer Co., Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022

Contractor

No. of correction

City Engineer

iv)	KEW	Up to 200 mm dia	M/s. Ketan Engineering Works , Plot No. 34, Nr. Pooja Dhanadal, Opp. Pramukh Packaging, Surendranagar - Rajkot Highway, Surendranagar - 01.	Mr. Sandip B Patel Mobile No. 8238036592/9925236592 Email- ketanengiwi@yahoo.in Mr. Ajay D Chandesara Mobile No. 8160509267/7211110575	31.10.2024
v)	MARCK Brand	Up to 200 mm dia	M/s. Hawa Engineers Ltd. , 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad - 382405	Mr. Zafar Hawa Mobile No. 9825005766 zafar@hawaengltd.com hawaengineers@gmail.com Mr. Yogesh Mishra Mobile No.: 7879145143 marckhawa.cair@gmail.com	30.09.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
4)	Cast Steel Valves Class 150 & Class 300 rating				
A)	Cast Steel Double Flanged Sluice Valves				
i)	Jupiter	Upto 1400 mm dia	M/s. Jupiter Engineer Co. , Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022
ii)	IVC	Up to 1200 mm dia	M/s Indian Valve Pvt Ltd. Satpur, Nashik 422007 Ph. 0253 - 2350261 / 170	Mobile No 9922713637 Email id -sales@ivc-valves.com	31.03.2022
iii)	Durga & DVPL	Upto 1000 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032	31.10.2024
B)	Cast Steel Double Flanged Non Return Valves				
i)	Jupiter	Upto 1400 mm dia	M/s. Jupiter Engineer Co. , Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022

ii)	IVC	Up to 1200 mm dia	M/s Indian Valve Pvt Ltd. Satpur, Nashik 422007 Ph. 0253 - 2350261 / 170	Mobile No 9922713637 Email id -sales@ivc-valves.com	31.03.2022
iii)	Durga & DVPL	Upto 1000 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032	31.10.2024
C) Cast Steel Double Flanged Butterfly Valves					
i)	Durga & DVPL	Upto 2000 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104.	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com	31.10.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	Jupiter	Upto 2000 mm dia	M/s. Jupiter Engineer Co., Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022
iii)	IVC	Up to 1200 mm dia	M/s Indian Valve Pvt Ltd. Satpur, Nashik 422007 Ph. 0253 - 2350261 / 170	Mobile No 9922713637 Email id -sales@ivc-valves.com	31.03.2022
D) Cast Steel Air Valve & Kinetic Air Valves					
i)	Durga & DVPL	Upto 300 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2024
ii)	IVC	Up to 200 mm dia	M/s Indian Valve Pvt Ltd. Satpur, Nashik 422007 Ph. 0253 - 2350261 / 170	Mobile No 9922713637 Email id -sales@ivc-valves.com	31.03.2022

iii)	Jupiter	Upto 200 mm dia	M/s. Jupiter Engineer Co., Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022
E) Cast Steel Temper proof Air Valves					
i)	Durga & DVPL	Upto 200 mm dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2024
ii)	Jupiter	Upto 200 mm dia	M/s. Jupiter Engineer Co., Kashipur, Dasnagar, Howrah – 711105 Ph. No. 033 - 26531285 / 8759	Mr. Avijeet Karar Mobile No. 9830266882 jupitorvalve@gmail.com Mr. Sunil Pawar Mobile No. 7021264379 / 9029041480	31.01.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
5 Hydraulic Control Valves					
A) Flow Control Valve					
ii)	Alpine & AFC	Upto 800 mm dia	M/s. Alpine Flowtech, Unit No. 1, B Wing, Swarajya Complex, Rajlaxmi Compound, Opp. Bewakoof Textile Factory Outlet, Kasheli, Kalher, Tal. Bhiwandi, Thane	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 alpineflowtech@gmail.com Mr. Manish Gupta Mobile No.: 8978558585	31.05.2024
i)	Aira	Upto 600 mm dia	M/s. Aira Euro Automation Pvt. Ltd., 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad - 382405.	Mr. Yogesh Mishra Contact No: 7879145143 airaeuroym@gmail.com Mr. Zafar Hawa Mobile No. 9825005766 airaeuroautomation@gmail.com	30.09.2022
iii)	AVM - Avishkar	Upto 200 mm	M/s. Avishkar Engineers Pvt Ltd., Hadapsar, Pune 28	Ph. No. 020 - 26970924 / 0533 avishkar2@vsnl.com, salesavishkar@gmail.com	31.03.2022

v)	Raphel by Talis	Up to 300 mm	M/s. Talis Valve India Pvt. Ltd. Gachibowli, Hyderabad, 500 032.	Ph. No. 040 - 67454050 . enquiryindia@talis-group.com	31.10.2022
iv)	Darling Muesco	Upto 450 mm	M/s. Darling Muesco (India) Pvt Ltd., Plot No 97 / A Ph 1, GIDC vatva Ahmedabad 382445	Ph No 07925893791 / 92 sales@darlingmuesco.com	31.3.2022
B) Pressure Reducing Valve					
i)	Aira	Upto 600 mm dia	M/s. Aira Euro Automation Pvt. Ltd., 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad - 382405.	Mr. Yogesh Mishra Contact No: 7879145143 airaeuroym@gmail.com Mr. Zafar Hawa Mobile No. 9825005766 airaeuroautomation@gmail.com	30.09.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	Alpine & AFC	Upto 500 mm dia	M/s. Alpine Flowtech, Unit No. 1, B Wing, Swarajya Complex, Rajlaxmi Compound, Opp. Bewakoof Textile Factory Outlet, Kasheli, Kalher, Tal. Bhiwandi, Dist. Thane -	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 alpineflowtech@gmail.com Mr. Manish Gupta Mobile No.: 8978558585	31.05.2024
iii)	Darling Muesco	Upto 400 mm	M/s Darling Muesco (India) Pvt Ltd ,Plot No 97 / A Ph 1, GIDC vatva Ahmedabad 382445	Ph No 07925893791 / 92 sales@darlingmuesco.com	31.03.2022
iv)	Cair Euromatic	Upto 300 mm dia	M/s. Cair Euromatic Automation Pvt. Ltd., Plot No.177 - 179, Shiv Shakti Estate, Nr. V-trans, Narol Road, Ahmedabad - 382405.	Mr. Shaukat Inamdar Mobile No. 9545550059 / mkt@caireuromatic.com Mr. Tousif Sayyed Mobile No.: 9545519666 Mr. Shakir Tamboli Mobile No.: 9545558156 gov.cairindia@gmail.com	30.06.2024
C) Pressure Relief Valve					

i)	Aira	Upto 600 mm dia	M/s. Aira Euro Automation Pvt. Ltd., 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad - 382405.	Mr. Yogesh Mishra Contact No: 7879145143 airaeuroym@gmail.com Mr. Zafar Hawa Mobile No. 9825005766 airaeuroautomation@gmail.com	30.09.2022
D) Altitude Control Valve					
i)	Aira	Upto 600 mm dia	M/s. Aira Euro Automation Pvt. Ltd., 267/2, Near Balkrishna Textiles Unit No. 2, Behind Eagle Motors, N.H. 8, Shahwadi, Narol, Ahmedabad - 382405.	Mr. Yogesh Mishra Contact No: 7879145143 airaeuroym@gmail.com Mr. Zafar Hawa Mobile No. 9825005766 airaeuroautomation@gmail.com	30.09.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	Alpine & AFC	Upto 500 mm dia	M/s. Alpine Flowtech, Unit No. 1, B Wing, Swarajya Complex, Rajlaxmi Compound, Opp. Bewakoof Textile Factory Outlet, Kasheli, Kalher, Tal. Bhiwandi, Dist. Thane 421302.	Mr. Mayank DK Dube Mobile No.: 9324515987/ 9867025324 alpineflowtech@gmail.com Mr. Manish Gupta Mobile No.: 8978558585	31.05.2024
iii)	Darling Muesco	Upto 300 mm dia	M/s Darling Muesco (India) Pvt Ltd , Plot No 97 / A Ph 1, GIDC vatva Ahmedabad 382445	Ph No 07925893791 / 92 sales@darlingmuesco.com	31.03.2022
E) Surge Anticipating Valve					
i)	Alpine & AFC	Upto 400 mm dia	M/s. Alpine Flowtech, Unit No. 1, B Wing, Swarajya Complex, Rajlaxmi Compound, Opp. Bewakoof Textile Factory Outlet, Kasheli, Kalher, Tal. Bhiwandi, Thane 421302.	Mr. Mayank DK Dube Mobile No.: 9324515987/ 9867025324 alpineflowtech@gmail.com Mr. Manish Gupta Mobile No.: 8978558585	31.05.2024
F) Zero Velocity Valve MS					

i)	Durga and DVPL Brand	Upto 100 mm Dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032	31.10.2022
G) Air Cushion Valve					
i)	Durga and DVPL Brand	Upto 300 mm Dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
6) Electrical Valve Actuators					
i)	Auma	No limit	M/s. Auma India Pvt. Ltd., Plot No. 38-A, & 39-B, II Phase, Peenya Industrial Area, Bangalore – 560058 Karnataka Ph. No. 080 / 30412222	Mr. N. C. Patil, Business Head – West & East Mobile No: +91-9763728261 aumapune@auma.co.in ncpatil@aumaindia.com	30.11.2023
ii)	Limitorque	No limit	M/s. Limitorque India Ltd., Worli, Mumbai - 400018 Ph. No. 022 / 24965943 libabom@vsnl.net	Mr. Anil Sing Mobile No. - 9619434317 Mr. Mane Mobile No. - 9619652890 Email id - bso@limitorqueindia.com	30.06.2022
iii)	Rotork Controls	No limit	M/s. Rotork Controls (India) Pvt. Ltd. Ambattur, Chennai - 600098 Ph. No. - 044 / 39555600	Mr. Mangesh Basmatkar Mobile No. 9004474124 mangesh.basamatkar@rotork.com Mr. Gaurav Shinde Mobile No. 9987077676 gaurav.shinde@rotork.com	30.06.2022

iv)	SDTORK	No limit	M/s. Sdtork Controls Pvt. Ltd., Gat No 94/2, Plot No 2, Alandi – Markal Road, Village – Dhanore, Taluka – Khed, Pune-412105	Mr. Sunil P. Kurkute, Director Mobile No.: 9822980003 Email: scpl@sdtork.com	30.11.2023
v)	Cair Euromatic	Upto 1000 mm dia	M/s. Cair Euromatic Automation Pvt. Ltd., Plot No.177 - 179, Shiv Shakti Estate, Nr. V-trans, Narol Road, Ahmedabad - 382405.	Mr. Shaukat Inamdar Mobile No. 9545550059 / mkt@caireuromatic.com Mr. Tousif Sayyed Mobile No.: 9545519666 Mr. Shakir Tamboli Mobile No.: 9545558156 gov.cairindia@gmail.com	30.06.2024
7) Dismantaling & Expansion Joint					
i)	Anant	Upto 2200 mm dia	M/s Anant Engineers and Fabricators , MIDC Ahmednagar Ph No 0241-2777440/8440	Mr. Pradeep Natu Mobile No. 9823021335 Mr. Bhushan Natu Mobile No. 9404283505 accounts@anantengg.com enquiry@anantengg.com	31.03.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	Durga and DVPL Brand	Upto 1200 mm Dia	M/s. Durga Valves Pvt. Ltd. Ichapur Road, Canal Side, Santragachi, Howrah – 711104. Ph. No. 033 – 26778088 / 26778713	Mr. Mayank DK Dube Mobile No.: 9324515987 / 9867025324 mumbai@durgavalves.com dvplmum.offers@gmail.com Mr. Pijush Roy Mobile No.: 9830023032 kolkatta@durgavalves.com	31.10.2022
8 Lifting Arrangement					
A) Chain Pulley Block with travelling trolley					
i)	Shree Abhay Cranes	Upto 5 MT	M/s. Shree Abhay Cranes Pvt. Ltd. Shegaon Buldhana. Ph. No. 07265-252401 / 254200	Mr. Bharat Paldiwal Mobile No. 9420497004 Email id - shreeabhaygroup@gmail.com	31.03.2022
B) HOT Cranes					
i)	Shree Abhay Cranes	Upto 5 MT	M/s. Shree Abhay Cranes Pvt. Ltd. Shegaon Buldhana. Ph. No. 07265-252401 / 254200	Mr. Bharat Paldiwal Mobile No. 9420497004 shreeabhaygroup@gmail.com	31.03.2022

ii)	Anant Brand	Upto 5 MT	M/s Anant Engineers and Fabricators, MIDC Ahmednagar. Ph No 0241-2777440/8440 accounts@anantengg.com	Mr. Pradeep Natu Mobile No. 9823021335 Mr. Bhushan Natu Mobile No. 9404283505 enquiry@anantengg.com	31.03.2022
C) EOT Cranes					
i)	Shree Abhay Cranes	Upto 20 MT	M/s. Shree Abhay Cranes Pvt. Ltd. Shegaon Buldhana. Ph. No. 07265-252401 / 254200	Mr. Bharat Paldiwal Mobile No. 9420497004 shreeabhaygroup@gmail.com	31.03.2022
D) Jib Cranes					
i)	Shree Abhay Cranes	Upto 5 MT	M/s. Shree Abhay Cranes Pvt. Ltd. Shegaon Buldhana. Ph. No. 07265-252401 / 254200	Mr. Bharat Paldiwal Mobile No. 9420497004 shreeabhaygroup@gmail.com	31.03.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
9) Motors					
A) 3 Phase Energy Efficient Low Voltage Horizontal Motors					
i)	Lhp	No Limit	M/s. Laxmi Hydraulics Pvt.Ltd, B - 11 & B -16, MIDC Chincholi, Solapur- 413255 Ph. No. 0217-2357001 lhpindia@lhpmotor.com	Mr. Aditya Thakre, Director, Mobile No:- 9922111524 aditya.thakre@lhpmotor.com Mr. Atish Deo Mobile No:-9011048143 atish.deo@lhpmotor.com	31.08.2024
ii)	Karad	No Limit	M/s. Karad Projects & Motors Ltd. Plot No. B-67 / 68, Karad Industrial Area, MIDC, Tasawade Dist. Satara – 415109.	Mr. Amit Deshpande Mobile No:- 9850983352 amit.deshpande@kpml.co.in Mr. Ramesh Prasannawar Mobile No :- 7888010397	31.07.2024
B) Vertical Solid Shaft Motors					Nil
C) Vertical Hollow Shaft Motors					Nil
D) H.T. Motors					

i)	Jeumont	Upto 1675 HP, Voltage Level upto 6.6 kV	M/s. Jeumont Electric India Pvt. Ltd., 22 km Stone, Vadodara – Halol Express Highway, 328/13, Jarod, Vadodara – 391510. Ph.No. 02668 –671009	Mr. Ankit Raj Kulshrestha Mobile No: 8007074786 / 9766451782 ankit.kulshrestha@jeumontelectrics.com india@jeumontelectric.com	30.09.2024
ii)	Marathon	Upto 2000 HP, Voltage level upto 6.6 kV	M/s. Marathon Electrics Motors India Ltd. R tala Rd, Kolkatta. 700 024., Ph. 033 4403 0500 / 2469 8530.	Mr. Anand Jadhav Mobile No. 9766623158 anand.jadhav@marathone.com	30.06.2023

10) LT & HT Control Panels

A) L. T. Control Panel (MCC, APFC, Feeder Piller Distribution)

i)	Chandra	No limit	M/s. Chandra Electrical & Electronics, Plot No. L - 11 /6, MIDC, Waluj, Aurangabad – 431136	Mr. Narayan Pawar Mobile No: 9225313111 Mr. Samir Nimbalkar Mobile No: 9561321163 chandraelec1@gmail.com Ph. No. 0240-2984151	31.10.2024
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Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	Chavare	No limit	M/s Chavare Engineering Pvt Ltd, Dombivli East 421204 parikshit.rumale@chavare.com	Ph. No. 0251 - 2871737 / 2870531 Mobile No. 8691004604 / 8691004611 Email id - sandeep.patil@chavare.com	31.03.2022
iii)	Success Engineers	No limit	M/s. Success Engineers, EL-60, ELBlock, MIDC Bhosari, Pune - 411026. Ph. no. 020 - 27119384	Mr. Rajeev Chhetry Mobile No: 7710052279 Mr. Sushil Nagare Mobile No: 9766631722 successquotation@gmail.com contactus@successengineers.in	31.05.2024
B) LT Switchgears					
i)	C & S Power Contactor	Upto 800 Amps	M/s. C & S Electric Ltd. Sewri (West) Mumbai 400015	Ph No 02224114727/28 Email id - vivek.dhule@cselectric.co.in paritosh.oza@cselectric.co.in	31.03.2022
C) Soft Start Starters					

i)	Innovative	LT upto 275 kW, HT upto 800 kW	M/s. Innovative Electrosoft (I) Pvt. Ltd Chakan, Pune 410501	Ph No 02135 - 680110 Mobile No. 8380065907 Email id - marketing@ielectrosoft.com service@ielectrosoft.com ,	31.03.2022
D) VFD Drives					
i)	Fuji Electric	All type	M/s. Fuji Electric India Pvt. Ltd., I - 6, Survey No. 79, Sumeet Logistics, Village - Kukse, Near Shangrila Resort, Off. Mumbai Nashik Hway, Bhiwandi Thane 421302	Mr. Pankaj Wankhade, Senior Sales Engineer, Mobile No.: 9987221588 / 9920664308 Phone No. 022 / 42524850 pankaj-wankhade@fujielectric.com	30.11.2023
E) Switch Disconnector Fuse & COS Unit, HRC Fuses					
i)	C & S	Upto 800 Amps	M/s C & S Electric Ltd, Sewri (West), Mumbai 400015	Ph No 02224114727/28 vivek.dhule@cselectric.co.in paritosh.oza@cselectric.co.in	31.03.2022
F) AIR CIRCUIT BREAKER / MCCB / MCB					
i)	C & S Brand	Upto 800 Amps	M/s C & S Electric Ltd, Sewri (West), Mumbai 400015	Ph No 02224114727/28 vivek.dhule@cselectric.co.in paritosh.oza@cselectric.co.in	31.03.2022

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
G) Vacuum Circuit Breaker					
i)	Megawin	Upto 33 kV	M/s. Megawin Switchgear Pvt. Ltd. Perumal, Malai Post Salem, Tamilnadu industries@megawin.co.in	Ph. No. 0427 - 2330288 / 498 Mobile No. 9823063772 / 9790014085 Email id - utilities@megawin.co.in	30.09.2023
11) Transformers					
i)	Urja	Upto 10 MVA & Voltage Level upto 33 kV	M/s. Urja Techniques (India) Pvt. Ltd. R-653, TTC, MIDC, Thane - Belapur Road, Rabale, Navi Mumbai-400701	Mr. Pradeep Dixit, Mobile No: 9820401606 / 9820081474 Other Contacts :- +91-9820081474 / 9930430606 responce@urjatransformers.com	30.11.2023

ii)	Trinity	Upto 5000 kVA, Voltage level upto 33 kV	M/s. Trinity Electrical Industries, Bangalore - 560091	Ph. No. 080 - 28361413 / 7074 Email id - trinityelectricals@gmail.com	31.12.2022
iii)	Transdelta	Upto 2500 kVA, Voltage level upto 33 kV	M/s. Transdelta Transformers Pvt. Ltd., B - 8 & 9, MIDC Area, Chikalthana, Aurangabad-431006	Mr. Prashant Nankar Mobile No. :- 9822611379 Email id :- transdelta@rediffmail.com	31.08.2024
iv)	MSC	Upto 2000 kVA, Voltage level upto 22 kV	M/s. MSC Transformers Pvt. Ltd., Plot No. E - 18 / 2, MIDC, Jejuri, Pune - 412303 msc.transformers@gmail.com	Mr. Sandesh Mahadev Chavan Mobile No: 9960655777 Mrs. Snehal Chavan Mobile No: 9960633777, 9975444666	30.06.2024
v)	JDS	Upto 630 kVA, Voltage level upto 11 kV	M/s. JDS Transformers Pvt. Ltd., Plot No. 33 / 34 & Part of 32 & 26, AKVN, Boregaon, Sausar, Dist. Chhindwara (MP) - 480106.	Mr. Riyaj Sheikh, Manager Marketing Mobile No. 8805088835	31.08.2024

Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
vi)	Voltamp	Upto 6.5 mVA & Voltage Level upto 33 kV	M/s. Voltamp Transformers Ltd. Makarpura, Vadodara - 390014	Mr. P. N. Jibi Mobile No. :- 9325401171 Mr. Amit Brande Mobile No. :- 9960700805 order_pune@voltamptransformers.com	30.06.2024
12) PVC / XLPE Cables					
A) PVC / XLPE Submersible (Copper Conductor) Cable					
i)	Ajanta	Upto 6 sqmm size	M/s. Ajanta Industries, Kishan gate, 3, Behind Sahyog Complex, Plot No. G-413 GIDC Metoda, Rajkot-21.	Mr. Ritesh Patel Mobile No. - 9825215350 Mr. Kamlesh Patel Mobile No. - 9727681901 / 8866010555 info@ajantaindustries.co.in	31.03.2024
ii)	Falcon & Fabcon Brand	Upto 35 sqmm size	M/s. Fabtech Cabels Pvt Ltd. Vavdi, Rajkot, 360 004.	Ph No. 0281- 2921307 info@fabtechcables.com	30.06.2023
B) 1.1 kV Allum. & Copper Cable					

Contractor

No. of correction

City Engineer

i)	Kothari	Multicore Up to 50 sqmm & single core 300 sqmm	M/s. Kothari Cables, 8516 / 11, Sun Plaza Level III, Murarji Peth, Solapur-413001	Mob. No. – 9765550540 project.pipe@kotharigroupindia.com Ph No.:- 0217 / 2721490,	31.12.2021
ii)	Polycab	Multicore Up to 400 sqmm & single core 1000 sqmm	M/s. Polycab India Ltd., Polycab House, Mahim (West) Mumbai - 400016.	Mr. Smit Wasnik Mobile No. 9890766789 / 7045535564 Ph. No. 022- 24327070 -74 Email id - info@polycab.com	31.12.2021
iii)	Vishal	Multicore Up to 400 sqmm & single core 1000 sqmm	M/s. Vishal Cables Pvt. Ltd. Plot No. E-41, Anand Nagar, Additional Ambernath MIDC, Ambernath East Dist Thane – 421506.	Mr. Hirasing Ailsinghani Mobile No:- 9049777777 / 7841078410 Mr. Dilipsingh Ailsinghani Mobile No:- 9766442288 sales@vishalcables.com	31.03.2024

13) Water Treatment Plant Equipments

A) Worm, Helical Gear Boxes & Geared Motors

i)	Limitorque	No Limit	M/s. Limitorque India Ltd., Worli, Mumbai - 400018 Ph. No. 022 / 24965943 libabom@vsnl.net	Mr. Anil Sing Mobile No. - 9619434317 Mr. Mane Mobile No. - 9619652890 bso@limitorqueindia.com	30.06.2022
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Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	Rotork Controls	No Limit	M/s. Rotork Controls (India) Pvt. Ltd. Ambattur, Chennai - 600098 Ph. No. - 044 / 39555600	Mr. Mangesh Basmatkar Mobile No. 9004474124 mangesh.basamatkar@rotork.com Mr. Gaurav Shinde Mobile No. 9987077676 gaurav.shinde@rotork.com	30.06.2022
B) WTP Equipments					
i)	Indofab Industries	Upto 100 Mid	M/s. Indofab Industries, Kashimira - Bhayander Road, Post Mira, Dist Thane 401104	Ph No 022 - 28111326 / 3414 Email-sales@indofab.com operations@indofab.com	31.03.2022
ii)	Parchure	Upto 100 Mid	M/s. Parchure Engineers Pvt Ltd, MIDC Jejuri, Dist . Pune	Mr. Anand Parchure Mobile No. 8308744102 / 9850433104 Email - parchureengineers@gmail.com	31.03.2022

C) Air Blowers Twin & Tri Lobo & Turbo					
i)	Kay International	No Limit	M/s. Kay International Pvt. Ltd., 302, Lusa Tower, Azadpur Commercial Complex, Delhi – 110033.	Mr. Anil Suri Contact No:- 8572899504 a.suri@kayblowers.com Mr. Saurabh Deshmukh Contact No :- 9996940489 pune@kayblowers.com	31.03.2024
D) Chlorination System					
i)	Achala	Gas Chlorination System, Vacuum Operated (Fully Automatic & Manual), Pressure feed Chlorinators & Chlorine Handling equipment		M/s Achala Engineering and Electronics, Kalva,Thane Mr. Anant Padigudri Mobile No. 7498070219 / 8652270219 achalae@gmail.com, anantpadubidri@gmail.com	31.03.2022
ii)	"Chlorojeevan " plus	Sodium Dichloroisocyanurate Dosing Potable water Chlorination system	M/s. Bhavani Enviro Technologies Pvt. Ltd. Unit No. 6 & 7, Globe estate, Pot No. C – 9, Phase 1, MIDC, New Kalyan Road, Dombivli (East), Thane - 421203	Mr. Deepak Deshpande Contact No: - 9167023869 Mr. Dilip Nar Contact No:- 9324630332 admin@bhavanienviro.com info@bhavanienviro.com Ph. 0251 / 2423393 / 2423392	31.01.2024
iii)	SM Polymer	Gas Chlorination System, Vacuum Operated (Fully Automatic & Manual) Chlorinator	M/s. S.M. Polymers, Plot no. 27 , Shree Guru Gajanan Industrial Area, Ambad - Vilholi Link Road, Vilholi, Nashik - 422010. Ph. no. 0253 – 2975576	Mr. Rahul M. Patil Contact No:- 9869116003 Mr. Raj Patil Contact No :- 9021125576 Mr. Manoj Patil Contact No:- 9869010571 smpolymer@gmail.com sales@smpolymers.com	31.03.2024
iv)	Toshcon	Gas Chlorination System, Vacuum Operated (Fully Automatic & Manual) Chlorinators & Chlorine Handling equipment & Residual Chlorine Analyser		M/s. Toshcon Jesco (India) Pvt. Ltd., 401, Manish Chamber, Sonawala Cross Lane,Goregaon (E) Mumbai 63 Mr. Ashok Rathore Contact No:- 09351497757 Mr. Uday Kulkarni Contact No:- 9372417787	30.11.2024
14) STP Accessories					
i)	Parchure	Upto 100 Mld	M/s Parchure Engineers Pvt Ltd, MIDC Jejuri,1 Dist . Pune 412303	Mr. Anand Parchure Mobile No. 8308744102 / 9850433104 Email - parchureengineers@gmail.com	31.03.2022
15) SCADA & Automation products					

A) SCADA and Automation System					
i)	Chavare Brand	PLC, SCADA, DCS, RTU	M/s. Chavare Engineering Pvt Ltd, MIDC Dombivli East 421204	Ph. No. 0251 - 2871737 / 2870531 Mobile No. 8691004604 / 8691004611 sandeep.patil@chavare.com parikshit.rumale@chavare.com	31.03.2022
ii)	Fuji Electric	PLC, SCADA	M/s. Fuji Electric India Pvt. Ltd., I - 6, Survey No. 79, Sumeet Logistics, Village - Kukse, Near Shangrila Resort, Off. Mumbai Nashik Highway, Bhiwandi Thane - 302	Mr. Pankaj Wankhade, Senior Sales Engineer, Mobile No.: 9987221588 / 9920664308 Phone No. 022 / 42524850 pankaj-wankhade@fujielectric.com	30.11.2023
B) Transmitters Level, Pressure, Temperature					
i)	Electronet	All type	M/s. Electronet Equipments Pvt. Ltd., Plot No. 84, 85 & 86, Tiny Industrial Estate, Pisoli Road, Kondwa (Bk.), Pune - 411048	Mr. Rajendra Nagavkar, Managing Director Contact No: 9822015256 rmn@eeplindia.com Mr. Tushar Patil Contact No: 8275518875	31.03.2022
ii)	Endress + Hauser	All type	M/s. Endress + Hauser (India) Pvt. Ltd., M 171-176, Walunj Industrial Estate, MIDC, Aurangabad - 431136	Mr. Sunil Bhor Mobile No: 9930306449 sunil.bhor@endress.com Ph no. 0240 / 2563695 info@in.endress.com	31.08.2024
iii)	Fuji Electric	All type	M/s. Fuji Electric India Pvt. Ltd., I - 6, Survey No. 79, Sumeet Logistics, Village Kukse, Near Shangrila Resort, Off. Mumbai Nashik Highway, Bhiwandi, Thane - 421302	Mr. Pankaj Wankhade, Senior Sales Engineer, Mobile No.: 9987221588 / 9920664308 Phone No. 022 / 42524850 pankaj-wankhade@fujielectric.com	30.11.2023
iv)	SBEM	All type	M/s. SBEM Pvt. Ltd., 39, Electronics Coopratve estate, Pune - Satara Road, Pune 09	Ph. No. 020 / 24215133, 24214782 Mobile No. - 8600042365 bhushan.g@sbem.co.in mumbaii@sbem.co.in	31.05.2022
v)	Vega	All Type	M/s. Vega India Level & Pressure Measurement Pvt Ltd., Tal. Haveli, Dist Pune- 412 206.	Mobile No. 8879488223 Ph. No. 020 -67314015, Email id - v.narkar@vega.com	30.6.2022.
C) Turbidity, pH, Conductivity, DO, ORP, TDS, Cl₂, TSS, COD, BOD Analyzers					

Contractor

No. of correction

City Engineer

i)	Electronet	All	M/s. Electronet Equipments Pvt. Ltd., Plot No. 84 to 86, Tiny Industrial Estate, Pisoli Road, Kondwa (Bk.), Pune 48	Mr. Rajendra Nagavkar, Managing Director Contact No: 9822015256 rmn@eeplindia.com Mr. Tushar Patil Contact No: 8275518875	31.03.2022
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Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	Endress + Hauser	All	M/s. Endress + Hauser (India) Pvt. Ltd., M 171-176, Walunj Industrial Estate, MIDC, Aurangabad – 431136	Mr. Sunil Bhor Contact No: 9930306449 sunil.bhor@endress.com Ph no. 0240 / 2563695 info@in.endress.com	31.08.2024
iii)	Forbes Marshall	All	M/s Forbes Marshall Pvt Ltd Chakan, Pune 410501	Ph. No. 02027442020/39851199 ppanchal@forbesmarshall.com bizdev@forbesmarshall.com	31.03.2022

16) Water Meters

A) ISI Marked Domestic Water Meters as per IS:779:1994

i)	Chambal	Single Jet upto 15 mm dia, Multi Jet upto 50 mm dia	M/s. N. B. Industries (Meters) Pvt. Ltd., 12-B, Laxmibai Nagar, Indore 452006 Madhya Pradesh	Mrs. Jaya Samase Mobile No. 9229182344 Mr. Prashant Ladda Mobile No. 9372255553 Ph No 0731 – 2415277 / chambalmeters@gmail.com	30.09.2023
ii)	Kranti	Single Jet upto 15 mm, Multi Jet upto 50 mm dia	M/s. Aman Engineering Works, C 54-55, Focal Point Extension, Jalandhar, Punjab - 144004	Ph. No. 0181 – 2603614 / 15 / 16 Mobile No. 9815544438 krantimeters@gmail.com info@krantimeters.com	31.10.2023
iii)	Zeener Aquament	Single Jet upto 15 mm, Multi Jet upto 40 mm	M/s. Zenner Aquamet India Pvt Ltd, Faridabad - 121003., Ph. No. 0129-4042040 / 2276077	Mobile No. 9818201440, info@zenneraquament.comopcn gp@gmail.com	31.01.2023

B) Domestic Multi Jet Water Meters OIML / MID certified AMR / AMR Compatible as per ISO - 4064

i)	Baylan	Up to 40 mm	M/s. Aquameas Instruments Pvt. Ltd. 3, Gangadip Appts, Opp. Post office, Model Colony, Shivajinagar, Pune 46	Mr. Avinash Jape Mobile No: 9822057521 avinash.jape@aquameas.com sales@aquameas.com	30.09.2024
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Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	Itron	Up to 40 mm dia & Ultrasonic Upto 40 mm dia	M/s Itron India Pvt. Ltd., Borivali (East) Mumbai - 400 066 Ph. No. 022- 28706633 /44	Mr. Kundan Virulkar Mobile No.9769334452 kundan.virulkar@itron.com ,	30.9.2022
iii)	TEKSAN	Upto 20 mm dia	M/s. Accumeasure Systems Pvt. Ltd. Survey No. 84, Katraj Shop No. 26, Manik Moti Complex, Bldg – A / 2, Pune - 411046	Mr. Abhishek Shinde Mobile No: 7798356666 abhishek.accumeasure@gmail.com	31.01.2024

C) Bulk Woltman Type Water Meters OIML / MID certified AMR / AMR Compatible Multi Jet as per ISO - 4064

i)	Baylan	Upto 200 mm dia	M/s. Aquameas Instruments Pvt. Ltd. 3, Gangadip Apprtments, Opp. Post office, Model Colony, Shivajinagar, Pune — 411046	Mr. Avinash Jape Mobile No: 9822057521 avinash.jape@aquameas.com sales@aquameas.com	30.09.2024
ii)	Itron	Up to 150 mm	M/s Itron India Pvt. Ltd., Borivali (East) Mumbai - 400 066 Ph. No. 022- 28706633 /44	Mr. Kundan Virulkar Mobile No.9769334452 kundan.virulkar@itron.com ,	30.9.2022

D) Bulk Woltman Type Water Meters Multi Jet as per ISO - 4064

i)	Zeener Aquament	Upto 300 mm dia	M/s. Zenner Aquamet India Pvt Ltd, Faridabad - 121003.,	Mobile No. 9818201440, info@zenneraquament.comopcn gp@gmail.com Ph. No. 0129-4042040 / 2276077	31.01.2023
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E) Ultrasonic AMR Domestic Water Meters

Nil

F) Electromagnetic Domestic AMR / AMI Water meter.

Contractor

No. of correction

City Engineer

	Sensus, a Xylem brand	Upto 20 mm dia	M/s. Xylem Water Solutions India Pvt. Ltd, Plot No 731, GIDC Savli, Savli - Manjusr Road, Vadodara – 391775	Mr. Ajit Magar Mobile No. 9819338303 Ph No 02667- 265800 / 615800 ajit.magar@xyleminc.com	31.10.2023
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Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
G)	Ultrasonic AMR Bulk Water Meters				
i)	Adept	Upto 300 mm Dia	M/s. Adept Fluidyne Pvt. Ltd, Plot 4, S. No. 17 / 1-B, Kothrud Industrial Estate, Kothrud, Pune 38.	Mr. Vinayak Gadre, Director Mobile No.: 9881478230 info@adeptfluidyne.com	30.11.2023
ii)	Electronet	Upto 300 mm Dia	M/s. Electronet Equipments Pvt. Ltd., Plot No. 84 to 86, Tiny Industrial Estate, Pisoli Road, Kondwa (Bk.), Pune 48	Mr. Rajendra Nagavkar, Managing Director Contact No: 9822015256 rmn@eeplindia.com Mr. Tushar Patil Contact No: 8275518875	31.03.2022
H)	Ultrasonic Flow Meters (Insertion, Portable & Clamp on Fixed Type)				
i)	ADDMAS	No Limit	M/s. Instronix Process Controls, Plot No E-148, Phase-2, Bol GIDC, Opp. GEB Sub- Station, Rasulpur, Village :- Bol, Tal:- Sanand, Ahmedabad- 382481	Mr. Divyang Patel Contact No: 9879007526 / 7486892642 / 8733807526 admin@addmas.in, sales@addmas.in, divyangkp@hotmail.com	28.02.2024
ii)	Adept	No Limit	M/s. Adept Fluidyne Pvt. Ltd, Plot 4, S. No. 17 / 1-B, Kothrud Industrial Estate, Kothrud, Pune 38.	Mr. Vinayak Gadre, Director Mobile No.: 9881478230 info@adeptfluidyne.com	30.11.2023
iii)	SBEM	No Limit	M/s. SBEM Pvt. Ltd., 39, Electronics Cooperative estate, Pune - 411009	Ph. No. 020 / 24215133, 24214782 Mobile No. - 8600042365 bhushan.g@sbem.co.in mumbaii@sbem.co.in	31.05.2022
I)	Full Bore Electromagnetic Flowmeter AC & Battery Operated				

i)	ADDMAS	Upto 1000 mm	M/s. Instronix Process Controls , Plot No E-148, Phase-2, Bol GIDC, Opp. GEB Sub- Station, Rasulpur, Village :- Bol, Tal:- Sanand, Ahmedabad- 382481	Mr. Divyang Patel Contact No: 9879007526 / 7486892642 / 8733807526 admin@addmas.in, sales@addmas.in, divyangkp@hotmail.com	28.02.2024
Sr. No.	Name of Company / Brand	Category Awarded	Manufacturer's Correspondence address	Contact Details	
ii)	Adept	Upto 900 mm dia	M/s. Adept Fluidyne Pvt. Ltd. , Plot 4, S. No. 17 / 1-B, Kothrud Industrial Estate, Kothrud, Pune 38.	Mr. Vinayak Gadre, Director Mobile No.: 9881478230 info@adeptfluidyne.com	30.11.2023
iii)	Electronet (Pune)	Upto 1000 mm dia	M/s. Electronet Equipments Pvt. Ltd. , Plot No. 84 to 86, Tiny Ind. Estate, Pisoli Road, Kondwa (Bk.), Pune – 48	Mr. Rajendra Nagavkar, Managing Director Contact No: 9822015256 rmn@eeplindia.com Mr. Tushar Patil Contact No: 8275518875	31.05.2024
iv)	Endress + Hauser	Upto 1200 mm dia	M/s. Endress + Hauser (India) Pvt. Ltd. , M 171-176, Walunj Industrial Estate, MIDC, Aurangabad – 431136	Mr. Sunil Bhor Contact No: 9930306449 sunil.bhor@endress.com Ph no. 0240 / 2563695 info@in.endress.com	31.08.2024
v)	Nivo	Up to 350 mm dia	M/s. NIVO Controls Pvt. Ltd. 104-115 Electronic Complex, Indore – 452010. 0731 / 4081305 / 07	Mrs. Suwarna Karwade Sr. Engineer Marketing Mobile No:-9584132258 sales@nivocontrols.com	30.06.2024
vi)	SBEM	Upto 1200 mm dia	M/s. SBEM Pvt. Ltd. , 39, Electronics Cooperative estate, Pune - 411009	Ph. No. 020 / 24215133, 24214782 Mobile No. - 8600042365 bhushan.g@sbem.co.in mumbaii@sbem.co.in	31.05.2022
vii)	Leak Detection System Software		M/s. Siemens India	48, Thane-Belapur Road, Midc Industrial Area, Airoli, Mumbai, Maharashtra 400708 · ~15.9 km Ph. No. <u>022 3326 5005</u>	

Note : Any make of Software, equipment or material shall got approved from Engineer Incharge Navi Mumbai Municipal Corporation prior finalisation of Data Sheet and purchase of the material.

SCHEDULE OF THIRD PARTY INSPECTION.

THIRID PARTY INSPECTION OF ELECTRICAL /MECHANICAL EQUIPMENT

In order to improve the quality of Electrical and Mechinal equipments, the scope of THIRD PARTY INSPECTION is as under,

Sr. No.	Equipment	Limits	Scope of Inspection
1	Vertical Turbine Pumps.	30 HP & Above	I) Review of Raw Materials test certificates and quality control procedures. ii) Hydrostatic test on bowl assembly, discharge head, hydrostatic test on 20% quantity of shaft enclosing tubes and column pipes. iii) Performance Test. iv) Strip inspection for one random pump after performance test to check Rubbing if any Wearing ring clearance Dynamic balancing of impeller.
2	Electric Motor	100 H.P Above	I) Review of Raw Materials test certificates and quality control procedures. II) Routine test for all. iii) Type test for one no random motor for 300H P. and above including vibration & noise level
3	FCMA starters	ALL	I) Review of Raw Materials test certificates and quality control procedures. ii) High voltage test. iii) Insulation Resistance Test. iv) Full load test of Auto transformer winding. vi) Fault simulation for testing protecting relays except short circuit and earth fault.
4	L.T. Panel and L.T. Breaker Isolating load break switch Panel	All	I) Review of Raw Materials test certificates and quality control procedures. ii) High voltage test.

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			iii) Insulation Resistance Test.
			iv) Routine test.
			v) Checking phase and earth clearance of bus- bars.
			vi) Checking wiring diagram and contact circuit and operating of panel.
			vii) Fault simulation for testing protecting relays except short circuit and earth fault.
5	Transformer.	315 kVA & Above	<p>I) Review of Raw Materials test certificates and quality control procedures.</p> <p>ii) Routine test for all.</p> <p>iii) Temperature rise for one number up to and including 3000 kVA and all transformers above 3000 kVA.</p> <p>iv) Type test excluding impulse test for random one transformer above 1000 kVA and up to 3000 kVA</p> <p>v) Type test including impulse test for transformer of 3000 kVA and above.</p>
6	H.T.Panel /H.T.braker/ Vaccum contractors.		<p>I) Review of Raw Materials test certificates and quality control procedures.</p> <p>ii) High voltage test.</p> <p>iii) Insulation Resistance Test.</p> <p>Power frequency test.</p> <p>iv) Routine test.</p> <p>v) Checking phase and earth clearance of bus- bars.</p> <p>vi) Checking components and wiring diagram and control circuit and operation of panel.</p> <p>Fault simulation.</p> <p>vii)Review of type test certificate of breaker</p>
7	Relay & Metering Panel	All	<p>I) Review of Raw Materials test certificates and quality control procedures.</p> <p>ii) High voltage and insulation test.</p> <p>iii) Checking wiring digram.</p> <p>iv) Relay operation test for over current,earth fault by D.C. injection.</p> <p>High voltage test.</p> <p>vii)Rviewing test certificate of relays.</p>
8	Scanner Panel	All	I) Review of Raw Materials test certificates and quality control

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			procedures.
			ii) Operation test for indication of lamp.
			of bearing , windings and oil
			iii) Hooter test with respective setting of alarm
			and tripping circuit. v) H.V and I.R. test. vi) Checking wiring diagram and control circuit.
9	D.C.Battery and Battery charger and distribution panel.	All	I) Review of Raw Materials test certificates and quality control procedures. ii) Checking components. vi) Checking wiring diagram and control circuit. v) H.V and I.R. test.
10	Cables LT	300 Sqmm & above & if length is 300 mtr or above.	I) Review of Raw Materials test certificates and quality control procedures. ii) Routine test. iii) Overload test. iv) High voltage test. v) Insulation Resistance Test.
11	Cable H.T.	95 Sqmm & above & if length is 300 mtr or above.	I) Review of Raw Materials test certificates and quality control procedures. ii) Routine test. iii) Overload test. iv) High voltage test.
			v) Insulation Resistance Test.
12	Sluice Valve / Butterfly Valve	350mm and above.	I) Review of Raw Materials test certificates and quality control procedures. ii) Body and seat test. iii) Test with operation of actuator and reduction gear box fully assembled with valve opening and closing (in case actuators are provided) with synchronizing. iv) Checking wear travel for sluice valve only.
13	Non return valve.	350 mm and above with	I) Review of Raw Materials test certificates and quality control procedures.
		by pass fitted if specified.	ii) Body and seat test.

15	Air valve	150 mm and above.	I) Review of Raw Materials test certificates and quality control procedures. ii) Body and seat test.
			iii) Operation test for functioning of small orifice
			and large orifice.
16	Valve actuator	ALL	I) Review of Raw Materials test certificates and quality control procedures. ii) High voltage test. iii) Insulation Resistance Test. iv) Routine test and operation test. v) Operation test with limit switches. vi) Checking components diagram circuit.
17	Capacitors	50 KVAR bank or above	I) Review of Raw Materials test certificates and quality control procedures. ii) High voltage test. iii) Insulation resistance test. iv) Routine test.
It must be carefully noted by the contractor that it is the responsibility of the contractor to organise the third party inspection (by approved agency of NMMC) and the contractor has to bear all expenses including inspection charges. The contractor should furnish the details of specifications / test etc. to the inspection agency and the inspection agency shall furnish the copy of inspection report to the Department and copy to the contractor.			

Note : Any make of equipment or material shall got approved from Engineer Incharge Navi Mumbai Municipal Corporation prior finalisation of Data Sheet and purchase of the material.