

**MAHARASHTRA JEEVAN PRADHIKARAN
WATER MANAGEMENT DIVISION, AMBERNATH**

WATER SUPPLY DEPARTMENT



e- TENDER NOTICE NO 68 FOR 2025-26

-

**NAME OF WORK : AUGMENTATION TO KULGAON BADLAPUR WATER SUPPLY
SCHEME,
(MAHARASHTRA SUVARNA JAYANTI NAGAROTHAN MAHA-ABHIYAN)**

TENDER DOCUMENTS

EXECUTIVE ENGINEER,MJP, WM DIVISION

AMBERNATH

SAVE WATER, EVERY DROP COUNTS

PRESS TENDER NOTICE



म. जी. प्रा. जल व्यवस्थापन विभाग, अंबरनाथ

ई- निविदा सुचना क्र. ६८ सन २०२५-२६

महाराष्ट्र सुवर्ण जयंती नगरोत्थान महाभियान अंतर्गत वाढीव कुळगाव बदलापूर पाणी पुरवठा योजना ता. अंबरनाथ जि. ठाणे कामाची ई-निविदा जल व्यवस्थापन विभाग, अंबरनाथ यांचेकडून मागविण्यात येत आहे. कामाची अंदाजीत किंमत रु. १८३,१७,०३,११०/- (एकशे त्र्यांशे कोटी सतरा लाख तीन हजार एकशे दहा रुपये फक्त) इतकी आहे.

सदर निविदाचा सविस्तर तपशील दि. २०/०२/२०२६ पासून www.mahatender.gov.in या वेबसाईटवर उपलब्ध करून देण्यात आलेला आहे. निविदा प्रक्रिया कार्यक्रमाच्या सर्व तारखा www.mahatender.gov.in या वेब पोर्टल वर अपलोड करण्यात आलेल्या ऑनलाइन निविदा सूचनेनुसार राहतील.

ठिकाण :- अंबरनाथ

दिनांक: १६/०२/२०२६

सही/-

कार्यकारी अभियंता

जल व्यवस्थापन विभाग, अंबरनाथ

**Maharashtra Jeevan Pradhikaran
Water Management Division, Ambernath**

“Under Maharashtra Suvarna Jayanti Nagarothan Maha-Abhiyan Program, Maharashtra Jeevan Pradhikaran Water Management Division, Ambernath invites e-tender for the work of “Augumentation to Kulgaon Badlapur Water Supply Scheme, Tal.Ambernath” valued at Rs. 183,17,03,110/- (One hundred eighty three crore seventeen lakh three thousand one hundred and ten only) The E-Tender Detailes are available on www.mahatenders.gov.in from dated 20/02/2026.

All relevent date will be as per the tender Published on web portal www.mahatenders.gov.in.

Place: Ambernath

Date: 1 6 /0 2 / 2026

Sd/-

Executive Engineer
MJPWN Dn., Ambernath

Maharashtra Jeevan Pradhikaran
Water Management Division, Ambernath

Name of work : AUGMENTATION TO KULGAON BADLAPUR WATER SUPPLY SCHEME

Tal. Ambernath Dist. Thane

TENDER NOTICE NO. 68 FOR 2025-26

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DETAILED TENDER NOTICE

Contractor

No. of correction

Executive Engineer

Maharashtra Jeevan Pradhikaran
WATER MANAGEMENT DIVISION, AMBERNATH
DETAILED TENDER NOTICE NO.68 OF 2025-26

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 and above(civil) or registered in CIDCO/MIDC/ PWD OR ANY GOVERNMENT DEPARTMENT IN INDIA in equivalent class of MJP, by the Executive Engineer, Water Management Division, Ambernath, MJP (on behalf of The Chief Engineer, MJP, Thane on the Government of Maharashtra

e-Tendering Portal : [http://. mahatenders.gov.in](http://.mahatenders.gov.in)

Note : In order to participate in e-tendering process, it is mandatory for new contractors (first time users of this website) to complete the Online Registration Process for the e-Tendering website. For guidelines, kindly refer to Bidders Manual Kit documents provided on the website

- a) **NAME OF WORK** : Augumentation to Kulgaon Badlapur Water Supply Scheme
- b) **ESTIMATED TENDER COST** : Rs 183,17,03,110/-
- c) **EARNEST MONEY DEPOSIT:** Rs 91,58,516/- (0.50% of the cost put to tender)
- d) **DOWNLOADING COST OF TENDER DOCUMENTS:-** Rs 59,000/- (Including GST)

(Non-refundable)

CLASS OF CONTRACTOR : class I and above (civil) MIDC/CIDCO OR ANY GOVERNMENT DEPARTMENT IN INDIA in class AA (Civil)(equivalent class of MJP).

Contractor

No. of correction

Executive Engineer

2 EARNEST MONEY DEPOSIT/TENDER FEES :

Tender fee and EMD shall be paid by SBI Net Banking or Other Bank Internet Bank MOPS.

For any assistance please contact help desk. Details are available online.

The online payment procedure can be seen on

<https://mahatenders.gov.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 Chief Engineer/Commissioner/Chief Officer 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 MJP. 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.

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 Executive Engineer, WATER MANAGEMENT DIVISION, AMBERNATH for initial minimum period of **27** months (Completion of work portion of the project- 24 Months & Trial Run of the entire project and commissioning- 3 Months) and shall be extended suitably if the work is not completed within the time limit.

Contractor

No. of correction

Executive Engineer

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 “The Executive Engineer, MJP Water Management Division, Ambernath.”

The tenderer shall submit the Bank Guarantee of Additional Security Deposit (ASD) within 8 days from opening of Financial Bid to the office of “The Executive Engineer, MJP Water Management Division, Ambernath.”

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 Deposite (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/-.

Contractor

No. of correction

Executive Engineer

The bank Guarantee shall be valid up to 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.

3. 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 summarily 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 "Executive Engineer and shall be for a minimum period of 27 months (Completion of work portion of the project- 24 Months & Trial Run of the entire project and commissioning- 3 Months) 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.

Contractor

No. of correction

Executive Engineer

4. 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.

TIME OF COMPLETION

a. Completion of work portion of the project	: 24 months
b. Trial Run of the entire project and commissioning	: 3 month
Sub total	: 27 months

27 Months (Completion of work portion of the project- 24 Months & Trial Run of the entire project and commissioning- 3 Months) calendar months, including Monsoon. This will be counted from the date of issue of the work order.

5. DETAILED TENDER SCHEDULE

Sr. No.	Activities	Date & Time
1	Tender publishing date	20/02/2026 at 15:00 Hrs
2	Documents download start date	20/02/2026 at 18:00 Hrs
3	Documents download end date	06/04/2026 at 17:00 Hrs
4	Pre-bid meeting date	27/02/2026 at 15:00 Hrs
5	Bid submission start date	02/03/2026 at 15:00 Hrs
6	Bid submission closing date	06/04/2026 at 17:00 Hrs
7	Bid opening date (Technical Bid)	07/04/2026 at 17:00 Hrs
8	Bid opening date (Commercial Bid)	Shall be communicated separately after opening of Technical Bid

6. PRE QUALIFICATION CRITERIA

The firm / contractor should registered with MJP in class I and above/MIDC/CIDCO OR ANY GOVERNMENT DEPARTMENT IN INDIA in class AA (Civil)(equivalent class of MJP). The validity of registration should be at least up to 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.

Contractor

No. of correction

Executive Engineer

Special Pre-Qualification conditions as per C.V.C. Guidelines.

Particular Construction Experience and Key Production Rates

Average annual financial turnover during the last 3 years, ending 31st March 2025 of the previous financial year should be at least 30 % of the estimated cost. $(Rs. 183,17,03,110 \times 30\%) = Rs. 54,95,10,933/-$.

The applicant should have experience:

1. Successfully completed similar works during last five years ending last day of month previous to the one in which applications are invited should be either of the following: -

1.1 Three similar completed works costing not less than the amount equal to 40 (forty) percent of the estimated cost.
 $(Rs. 183,17,03,110 \times 40\%) = Rs. 73,26,81,244/-$.

or

1.2 Two similar completed works costing not less than the amount equal to 50 (fifty) percent of the estimated cost.
 $(Rs. 183,17,03,110 \times 50\%) = Rs. 91,58,51,555/-$.

or

1.3 One similar completed work costing not less than the amount equal to 80 (eighty) percent of the estimated cost.
 $(Rs. 183,17,03,110 \times 80\%) = Rs. 146,53,62,488/-$.

“Similar work” shall mean successful commissioning of construction or augmentation of a project consisting of Headworks, SCADA operated Water Treatment Plant of minimum Capacity 30 MLD along with Pipeline work, Pumping Station, ESR and distribution system. Bidder is allowed to claim Similar Work experience for any new Construction or augmentation of existing project.

a) The agency shall have experience successful completion and commissioning of the Similar works listed below with any Govt./Semi Govt./corporation or equivalent organization. The experience of each work should be under single agreement.

Sr.No	Components in project	Experience required for
1	Jack-well/intake well etc.	The contractor shall have experience of Designing, providing, construction and successful completion of work of RCC Jack - well in the submergence of Dam or bank of major river in a single agreement.
2	RCC Approach Bridge	The contractor shall have experience of designing, providing, construction and successful completion of work of RCC Approach Bridge minimum 2.5 m width and 30m length in a single agreement
3.	a) Raw water Rising mains pipelines	The contractor shall have experience of successful completion of work of providing lowering, laying, jointing and satisfactory hydraulic testing of minimum 500 mm dia. (I.D.) MS pipeline minimum 575 m length in a single agreement.
4	Water Treatment Plant	The contractor shall have experience of Designing, providing, construction, satisfactory hydraulic testing and successful completion of 30 MLD capacity WTP in single agreement.
5	Pumping Machinery	1) The contractor shall have experience of successful completion of work of Providing, Erecting, Installation, testing, commissioning & completion of Pumping Machinery of total installed capacity not less than 2541 HP & individual capacity of minimum 170 HP Vertical Turbine pump and minimum 170HP submercible non colg pump in a single agreement. 2) The contractor shall have experience of successful completion of work of Providing, Erecting, Installation, testing, commissioning & completion of Transformer substation of total installed capacity minimum 1600 kVA capacity and individual minimum 400 kVA capacity in a single agreement
6	MBR/ESR	The contractor shall have experience of Designing, providing, construction, satisfactory hydraulic testing and successful completion of 12.50 Lakhs lit capacity ESR in single agreement.
7	Pure water rising main and gravity main	The contractor shall have experience of successful completion of work of providing lowering, laying, jointing and satisfactory hydraulic testing of minimum 250 mm dia.in DI pipeline minimum 7014 m length in a single agreement

8	Distribution system	a) DI Pipe: The contractor shall have experience of successful completion of work of providing lowering, laying, jointing and satisfactory hydraulic testing of minimum 350 mm dia.in DI pipeline minimum 3812 m length in a single agreement b) HDPE Pipe: The contractor shall have experience of successful completion of work of providing lowering, laying, jointing and satisfactory hydraulic testing of minimum 110 mm dia. in HDPE pipeline minimum 19428 m length in a single agreement.
9	Trail Run	The contractor shall have experience of successful completion of work of successful installation and commissioning of automation in minimum one Urban/ Rural water supply scheme with automation at head work, pumping machinery operations, WTP, water quality monitoring and ESR operations in a single Agreement.
10	Automation/SCADA	a) Bidder shall be Contractor or manufacturer or authorized dealer or system integrater for all types of sensors required for automation or SCADA, like Pressure transmitters, level transmitter, PLC integration, Energy monitoring systems, PLC based control monitoring and communication systems, flow meters and water quality parameters etc. b) Experience of successful installation and commissioning of automation in minimum one water supply scheme with automation at head works, pumping machinery operations, WTP, water quality monitoring and ESR operations c) 50 % of required annual maintenance period and d) If bidder is not a manufacturer or dealer of Sensor /PLC, he shall have Joint Venture with manufacturer/dealers.
11	Road Restoration	The contractor shall have experience of successful completion of Road Restoration work of Concrete and Bitumen Road in a single agreement.

Contractor

No. of correction

Executive Engineer

C) 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 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.

D) In case LT installation The certificate of experience shall have to be issued by the officer not below the rank of Executive Engineer or equivalent officer or Head of Govt/Semi Govt./, Corporation or councils.

E) The firm shall have valid GST registration No

F) The firm shall have valid PAN No.

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

Contractor

No. of correction

Executive Engineer

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.

Available bid capacity = $(1.5 \times N \times A) - B$, where

A = Maximum value of engineering (Civil/ Electrical/ Mechanical as relevant to work being procured) works executed in any one year during the last five years (updated at the current price level), taking into account the completed as well as works in progress.

M = Multiplier Factor i.e 1.5

N = Number of years prescribed for completion of the work in question.

B = Value (updated at the current price level) of the existing commitments and ongoing works to be completed in the next 'N' years

ठेकेदाराने Self Declaration सादर करणे आवश्यक राहिल. (Annexure 7)

Bid capacity calculation ठेकेदाराने सादर करताना

1. प्रगतीपथावरील तसेच ठेकेदाराने न्यूनतम देकार भरलेल्या निविदा व निविदा स्वीकृत झालेल्या तथापि कार्यदिश देणे बाकी निविदा इ. कामांची माहिती दर्शविणारा Annexure-1,4,5,10 मधील सर्व विवरणपत्रांमध्ये किमान कार्यकारी अभियंता पेक्षा कमी नसलेल्या पदावरील अधिका-यांची स्वाक्षरी असणे आवश्यक आहे किंवा सनदी लेखापालामार्फत प्रमाणित करणे आवश्यक आहे. या सर्व विवरणपत्रांमध्ये ठेकेदारांची साक्षरी अनिवार्य राहिल तसेच नगरपालिका/ महानगरपालिका इ. स्थानिक स्वराज्य संस्थांच्या कामाच्या बाबतीत संस्थेतील प्रशासकीय प्रमुखांची स्वाक्षरी असणे आवश्यक आहे किंवा सनदी लेखापालामार्फत प्रमाणित करणे आवश्यक आहे. या सर्व विवरण पत्रांमध्ये ठेकेदारांची स्वाक्षरी अनिवार्य राहिल.
2. वर्ष निहाय Turnover त्याच प्रमाणे Bid Capacity Calculations चार्टर्ड अकाउंटंटचे कडून तपासून घेऊन 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 नमुना Annexure-20 नुसार संलग्न केला आहे.
4. ठेकेदाराने त्याच्याकडील प्रगतीपथावरील कामे व त्याच प्रमाणे न्यूनतम देकार भरण्यात आलेल्या निविदांच्या बाबतीत Letter of Indent मिळालेल्या कामाचा समावेश करावा , मात्र निविदा प्रक्रियेत भाग घेऊन, केवळ न्यूनतम देकार भाकिलेल्या कामांचा समावेश करण्यात येऊ नये.

Contractor

No. of correction

Executive Engineer

5. Contractor should submit Bid Capacity calculations with works in hand also lowest Bid and letter of indent in Annexure-20
6. Contractor should submit Statement of work in hand or incomplete work duly signed by not less than Executive Engineer, in case of municipal council or municipal corporation statement should be signed by Chief Officer 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-20).

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.

Net worth = PRE-QUALIFICATIONS CRITERIA (FINANCIAL)

The net worth is applicable to tenders costing more than 25 crores.

The net worth calculations should be certified by chartered accountants.

The Bidder should have net worth 8% of tender cost of continues 3 years from the financial year. In which he desires to take work.

Net Worth :

The Contractor has to submit certificate of net worth duly certified by Chartered Accountant for previous three consecutive years Average of which should be more than Rs.14.65 Crores.

7 COLLABORATION & JOINT VENTURE

Collaboration :-

The contractor who is willing to participate in tender process, and if he is not having experience of particular sub-work, then he is allowed to have collaboration with other agency or contractor registered with Maharashtra Jeevan Pradhikaran or any government department in India or any contractor (in case of automation) in appropriate class and having experience of the particular sub-work as specified in pre-qualification criteria. Contractor with whom above collaboration is done shall be responsible for successful completion of the works. However it will be the responsibility of the principal contractor to get the work done.

In no case value of work to be done by collaborator, with whom collaboration is made, should exceed the value of work to be done by the Principal Contractor.

The collaborating firm shall have collaboration with only one principal contractor.

The principal Contractor shall be ultimately responsible for completion of entire work.

Moreover with whom collaboration is made will only be binding to carry out the work to the effect of principal contractor & should submit an agreement on Rs. 500/- stamp paper as per prescribed form (**Annexure 2**)

Duly Notarized at the time of pre-qualification of bidder

Joint Venture :-

The contractor who is interested to have blank tender form and if he Do not have necessary experience of mechanical /electrical /automation /particular civil work then he is allowed to have joint venture with another agency having the experience of mechanical/electrical/automation/particular civil work.

If there is joint venture, same shall be in appropriate format as per **Annexure 3** and it shall be clearly mentioned in the agreement that both the contractor will be jointly and severally responsible for the successful completion of works included in the tender with all test and trials for full tender period. It is necessary to enclose the registration certificates of joint venture firm with the Registrar of the Partnership Firm or the receipt of payment made to Registrar of the Partnership Firm on account of fees toward joint venture firm with condition of submitting registration certificate before issue of work order. Then only prequalification application will be considered. In the case of joint venture, the contractor having higher class of registration will only be considered.

For pre-qualification, the JV should fulfil the criteria specified in the pre-qualification document. The attributes to be evaluated will be the same as for individual contractors; however, certain parameters up to the specified limits have to be essentially met by them collectively, some by the lead partner, and some by the other partner, as briefly described below:

Qualifying factors to be met collectively: (i) annual turnover from construction; (ii) particular construction experience and key production rates; (iii) construction cash flow for the subject contract; (iv) personnel capabilities; and (v) equipment capabilities;

Qualifying factors for lead partner: (i) Annual Turnover from Construction; (ii) particular construction experience; (iii) financial capability to meet cash flow requirement of subject contract -not less than of 50 % (fifty per cent) of the respective limits prescribed in case of individual contractors may be accepted; (iv) adequate sources to meet financial commitments on other contracts; (v) financial soundness;

Qualifying factors for other partner: Same as for lead partner except that for the factors specified in (2) (iii) above, a lower limit of % (twenty-five percent) may be accepted instead of 50% (fifty per cent.)

(g) Disqualification

Even if an applicant meets the eligibility and PQC, he shall be subject to disqualification if he or any of the constituent partners is found to have: made misleading or false representations in the forms, statements, affidavits and attachments submitted in proof of the qualification requirements; and/ or; Records

in awards against the contractor or any of the constituents, or financial failure due to bankruptcy, and so on. The rescission of a contract of venture JV on account of reasons other than non-performance, such as the most experienced partner (major partner) of JV pulling out; On account of currency of debarment by any Government agency.

In case of work of erection of High Tension Installations, main contractor shall have joint venture with the registered Mechanical/Pumping Machinery contractor. Manufacturer representative shall be present during the erection.

8. COST OF BLANK TENDER FORM

Rs.59,000/-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 <http://mahatenders.gov.in> as per online schedule.

10. PRE-TENDER CONFERENCE

Pre-Tender conference is open to all prospective tenderers and will be held on **27/02/2026 at 15:00 hours** in the office of the Chief Engineer, MJP Thane wherein the prospective tenderers will have opportunity to obtain clarifications regarding the work and the tender conditions.

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

06/04/2026 up to 17:00 Hrs.

13. DATE & TIME OF ONLINE OPENING OF TENDER

07/04/2026 at 17:00 Hrs. in the office of the Executive Engineer, MJP WM Div, Ambarnath

14 SUBMISSION OF TENDER

Bids must be accompanied with:

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

(Annexure-4)

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

Scanned copy of Joint Venture/Collaboration in prescribed format.

EPFO/ESIC Registration Certificate as per related Act.

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 "<http://mahatenders.gov.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

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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. I (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.

- Copy of online payment receipt of Tender documents .
- Copy of online payment receipt of EMD
- Scanned copy of all documents, certificates specified in Pre-qualification Criteria in Point No.6.
- Scanned copy of duly signed declaration of contractor in prescribed format filled in agency's letter head attached with the tender.
- (Annexure-4)**
- Scanned copy of minutes of Pre-bid meeting duly signed by Contractor.
- Scanned copy of Joint Venture/Collaboration in prescribed format.
- EPFO/ESIC Registration Certificate as per related Act.

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 MJP. The tendered rate shall then be read out by the tender opening authority.

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.

Sd/-

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GENERAL CONDITIONS OF CONTRACT

**Maharashtra Jeevan Pradhikaran
WATER MANAGEMENT DIVISION, AMBERNATH
Name of work : AUGUMENTATION OF KULGAON BADLAPUR WATER SUPPLY
SCHEME**

Tal. AMBERNATH Dist. THANE

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) "NAGAROTHHAN" means Maharashtra Suvarna Jayanti Nagarotthan Maha-abhiyan
- 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 equipment's, 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, Executive Engineer, MJP, Water Management Division, Ambernath 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) "The Pradhikaran" shall mean the Maharashtra Jeevan Pradhikaran, a Pradhikaran constituted under the Pradhikaran Ordinance

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issued on 10.03.1997.

- j) "M.C" means Municipal Corporation/Council
 - k) "M. J. P." means, Maharashtra Jeevan Pradhikaran.
 - l) "The Chief Engineer M.J.P. " shall mean Chief Engineer M.J.P., the person, for the time being holding that Office and also his successors and shall include any Engineer authorized by him.
 - m) "The Superintending Engineer, Maharashtra Jeevan Pradhikaran Thane-Circle, Thane" means the Engineer, so designated by the Pradhikaran or any other Engineer who is for the time being entrusted with his functions, duties and powers and so notified.
 - n) "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.
 - o) "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.
 - p) "Month" means calendar month.
 - q) "Site" means location at which the contractor will have to execute the contracted work.
 - r) "The Engineer or Engineer-in-charge" shall mean the Engineer / water supply Engineer authorized by the MJP, Water Management Division, Ambernath
 - s) PMC means Project Management consultant appointed by the MJP Water Management Division, Ambernath.
- 2) The contractor shall erect temporary sheds for storage for material supplied by Corporation/Council and brought by him on site. Also at each construction site contractor shall have separate storage space for cement and other material.
 - 3) All the water retaining structures shall be designed in M25 and constructed in M30.
 - 4) Contractor shall 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.
 - 5) Contractor shall submit designs and drawings for all structures such as, Jack well, Pump House, Water Treatment Plant. (Hydraulic and structural), Sump, ESR, GSR, Thrust blocks/anchor blocks, contractor shall working survey and submit fresh Distribution network design,

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Pumping machinery and its layout, all allied electrical and mechanical equipment's as directed by Executive Engineer/Engineer in charge/Chief officer. This designs and drawings shall be got checked from Government Engineering College or IIT at contractors own cost.

Preparation of System improvement Plan SIP within specified period and according to the contract conditions. SIP Preparation & Implementation shall include but not limited to the Survey & investigations of existing assets, distribution network, mapping, freezing selected DMA boundaries, Hydraulic Modelling, ascertain the necessity and the extent of rehabilitation required. SIP submission for priority zones shall be within 30 days and other zones submission within 45 days from the commencement date.

- 6) The contractor shall maintain the record of these materials in the prescribed proforma and registers as directed by the Executive Engineer/Engineer in charge/Chief officer. 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.
- 7) Contractor shall take photographs and videos of all sub-works during construction and submit two copies in hard and soft along with final bill.
- 8) Contractor shall prepare record drawings of all sub-works as per execution in details by using Auto Cad programme; as directed by Executive Engineer/Engineer in charge/Chief officer. 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.
- 9) Contractor shall maintain register for dewatering having details such as BHP of pumps, start and stop of dewatering pumps, Fuel consumed etc.
- 10) 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.

- 11) All the formwork used for construction shall be of steel or with lining of steel. Wooden shutters may be allowed at the discretion of the Executive Engineer/Engineer in charge for minor works.
- 12) Contractor shall have Cube Testing machine on site. Test cubes shall be tested in front of Executive Engineer/Engineer in charge or his representative and a register for it shall also be maintained.
- 13) 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.

14) 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 Executive Engineer, M.J.P., Water Management Division, Ambernath.

The term contract and firms means the agency entering into contract with the Executive Engineer, M.J.P, Water Management Division, Ambernath

The MJP, an Government undertaking /urban local body of Government of Maharashtra, has proposed to execute the following work under sanctioned scheme “-Augmentation Of Kulgaon Badlapur Water Supply Scheme”
Tal. Ambernath, Dist. Thane

This tender includes-

- 1) Jack well 14 m dia.-2 Nos.
- 2) Approach Road-----200 m
- 3) RCC Approach Bridge-60 m
- 4) RCC Platform for Electrical sub station of size 30m*15m,adjucent to Approach Bridge.
- 5) M S R W Rising Main,1000 mm dia.L-1800 m
- 6) Water Treatment Plant-60 MLD Cap. Including recirculation sump, compound wall and staff quarters
- 7) P W Rising main-DI K9,900 MM Dia.L-500 Rm
- 8) R W Pumping Machinery-335 HP(3w+3s), 238.43lps,H=72M
- a) P W Pumping Machinery-250 HP(2w+1s), 335.29lps,H=28M
- b) P W Pumping Machinery-100 HP(2w+1s),104.2lps,H=47M
- c) P W Pumping Machinery-100 HP(1w+1s),76lps,H=57M
- d) P W Pumping Machinery-150 HP(1w+1s),134.01lps,H=40M
- e) P W Pumping Machinery-250 HP(2w+1s),155.50lps,H=68M
- f) P W Pumping Machinery-30 HP(1w+1s),43 lps,H=32M

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- 9) MBR -CAP- 25 Lakh lits 2 Nos.
- 10) RCC Pump houses-At various sumps
- 11) Elevated Service Reservoirs-9 Nos
- 12) Rising mains- 300 to 600 mm dia. DI L= 8 Km
- 13) Gravity mains-250 to 600 mm dia.DI L=15.255 Km
- 14) Distribution system-DI K7,Dia.300 mm to 450 mm, L- 15.34 Km and HDPE 6Kg,dia.110 mm to 280 mm-77.77 Km
- 15) Trial Run
- 16) RoadRestoration-As per requirement
- 17) Leading main from Bhoj Dam, dia. 500 mm DI K7
- 18) SCADA-As per BOQ
- 19) Repairing of 18 MLD WTP and Old ESR

15) 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.

16) 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 Executive Engineer, M.J.P WATER MANAGEMENT DIVISION, AMBERNATH, 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.

17) OBSTRUCTIONS IN THE WORK :

All obstructions such as electric cables, telephone line, water and sewer mains, manholes, natural drainage, culverts, storm water drains etc. coming 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.

18) 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 MJP for stacking his materials, stores, erection of temporary structures, sheds etc with prior written permission of Executive Engineer, M.J.P. WATER MANAGEMENT DIVISION, AMBERNATH. The location of the temporary structures to be erected shall be got approved from the Executive Engineer MJP, WATER MANAGEMENT DIVISION, AMBERNATH and all the products obtained after cutting the same shall be stacked at suitable place as directed by Engineer in charge. All concern MJP land occupied by the contractor for temporary use shall be handed over back in good conditions to the entire satisfactions of the concern MJP. 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.

19. 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.

20. WORK THROUGH OTHER AGENCY IN THE SAME AREA :

The Executive Engineer, M.J.P, WATER MANAGEMENT DIVISION, AMBERNATH 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.

21. 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 Executive Engineer/Engineer in charge/Chief officer 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 Executive Engineer/Engineer in charge/Chief officer shall be final in case of interpretation of specifications.

22. 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 MJP Water Management Division Ambarnath/Municipal council 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 MJP, 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 MJP 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. MJP does not take guarantee for continuous power supply at site.

23. LINE OUT

The contractor shall himself carry out the line out of works in the presence of the representative of the MJP 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.

24. 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, equipment's and their time of submissions to the MJP. 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 endeavour 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.
- iii. If deviation exceeds 10% in scheduled programme, competent authority has right to reject the tender of successful tenderer.
- iv. 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.

25. 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.

26. 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.

27. 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 as per labour law 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 M.J.P therein.

28. ARBITRATION

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 Member Secretary, MJP Mumbai shall be held Valid and final and remain binding on both parties.

29. INTENT AND INTERPRETATION OF CONTRACT DOCUMENTS

29.1 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'.

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.

29.2 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.

29.3 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.

29.4 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.

29.5 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.

LANDS, CONDITION AND LAYOUT

1 Line out of the Work

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.

30.3 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.

30.4 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 almeries, 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 MJP/IRMA/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 constructed/components to be executed.

SECURITY DEPOSIT AND INDEMNITY BOND

31.1 *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.

31.2 *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 defence 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.

32. SUPERVISION AND SUPERINTENDENCE

32.1 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.

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32.2 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

33. 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.

34. 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.

35. 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.

36. MANUFACTURER'S INSTRUCTIONS

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

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

37. 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.

38. 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.

38.1 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.

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.

39.1 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.

39.2 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.

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.

40.1 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

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.

LAWS AND REGULATIONS

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.

Resolving the disputes:

In case of disputes, between a Contractor and MJP, the decision of the Chief Engineer shall be final and binding. In case of any further dispute, the decision of Secretary UDD-2 / Member Secretary MJP or any other person appointed by the Secretary UDD-2 will be final.

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.

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.

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 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.

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.

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.

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 MJP/Corporation/Chief Officer 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.

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.

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 final inspection, and he will notify the Contractor in writing of particulars in which this inspection reveals that work is the 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.

CONTINUING OBLIGATION OF THE CONTRACTOR

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

TAXES TO BE DEDUCTED AT SOURCE

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

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 levelling instruments (Auto setting), tapes, staffs, camera, paints, brushes and required labour.

Contractor

No. of correction

Executive Engineer

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 Pradhikaran/Municipal Council/Corporation. and shall not be used for campaigning, advertising without permission of the Pradhikaran/ Council/Corporation.

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.

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 be 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.

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.

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.

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.

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.

- Workman compensation Act 1923.
- Payment of Gratuity Act 1972.
- Employees PF and miscellaneous provisions Act 1952.
- Maternity Benefit Act 1951.
- Contract Labour (Regulations and Abolition) Act 1970.
- Minimum Wages Act 1948.
- Payment of Wages Act 1936.
- Equal Remuneration Act 1979.
- Payment of Bonus Act 1965.
- Industrial Disputes Act 1947.
- Industrial Employment (Standing orders) Act 1946.
- Trade Union Act 1926.

Child labour act 1926.

- Inter-state Migrant Workmen's (Regulation of Employment and Conditioned of Services) Act 1979.
- The Building and other construction works (Regulation of employment and conditions of Services Act 1946 and the cess Act of 1996).
- Factories Act 1948.

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

STATUTORY INCREASE IN DUTIES, TAXES ETC.

All the taxes excluding 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.

INSPECTION, TESTING & FEES.

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

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.

WORK ORDER BOOK

A well bound work order book shall be maintained on site and it shall be the property of MJP and the Contractor/ his agent shall promptly sign orders given therein by the Engineer in charge of Maharashtra Jeevan Pradhikaran . 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 MJP 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 there in.

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.

PRICE VARIATION - AUTHORITY

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

NO INTEREST ON DUES

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

Any recovery advised by the MJP shall be recovered from any RA 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.

Mobilization Advance will not be granted.

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 avail.

SPECIAL CONDITIONS

Contractor

No. of correction

Executive Engineer

Maharashtra Jeevan Pradhikaran

Name of work : AUGUMENTATION OF KULGAON BADLAPUR WATER SUPPLY SCHEME

-

Tal.Ambernath Dist. Thane

SPECIAL CONDITIONS

Payment against Excess quantities of various items.

Before making payment of excess quantities as per rules, the concerned Executive Engineer/ Engineer in charge of Maharashtra Jeevan Pradhikaran 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 Maharashtra Jeevan Pradhikaran 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 Executive Engineer/Engineer in charge of Maharashtra Jeevan Pradhikaran in writing.

While asking the contractor to execute such excess quantity, the concerned Executive Engineer/Engineer in charge of Maharashtra Jeevan Pradhikaran 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.

Special Conditions for Tender

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.

The contractor shall provide 2 SUV vehicles for MJP Ambernath Delegates for the purpose of site visits, factory visits for material testing etc. at his own cost

for the entire time period of the project. Contractor is also supposed to provide site office with all required furnishings and 4 Nos desktop computers/Laptops in the office. If vehicle is not provided penalty of Rs.70000/- per month per vehicle will be charged and deducted from subsequent RA bills.

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.

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.

Unit

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

Site conditions

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

Set of tender documents and conditions (up to a maximum of three sets) at the discretion of the Executive Engineer, Maharashtra Jeevan Pradhikaran/Engineer in charge of Corporation/Council will be supplied to the contractor after acceptance of tender.

Extras, Omissions and Discrepancies.

In all the cases of the omissions, doubts or discrepancies in the dimension in the drawing and items of works, reference shall be made to the Executive Engineer, Maharashtra Jeevan Pradhikaran /Engineer in charge of Corporation/Council , whose elucidation and elaboration shall be considered final.

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 vendors.. All types of pipes, valve and specials will be accepted only after due third party inspection and satisfactory inspection by the third party inspection agencies appointed by the MJP. (List of third party inspection agencies appointed is periodically circulated by the MJP central office). 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. -80% payment shall be released after supply, 10% after lowering, laying & jointing, and 10 % after satisfactory hydraulic testing.
10% cost total sub-work 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 Executive Engineer, Maharashtra Jeevan Pradhikaran/Engineer in charge of Corporation/Council 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 Executive Engineer, Maharashtra Jeevan Pradhikaran/Engineer in charge of Corporation/Council , in this behalf.
- 7.6 The contractor shall further at all times satisfy the Executive Engineer, Maharashtra Jeevan Pradhikaran/Engineer in charge of Corporation/Council 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 Executive Engineer, Maharashtra Jeevan Pradhikaran/Engineer in charge of Corporation/Council.

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.

APPOINTMENT OF ARBITRATOR:-

In case of any disputes raised between contractor and Executive 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 Member secretary MJP /secretary UDD2/Any other person appointed by secretary UDD2 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.

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

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.

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.

EXCAVATED MATERIALS:

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

DAMAGES TO UNDER/ABOVE GROUND UTILITY

During the course of excavation and laying of the pipe line utmost care of

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

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

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

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.

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.

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 extra ordinary reason. The same modified Bar Chart/Network diagram should be submitted for approval of Engineer-in-Charge or competent authority of Corporation, who will give approval after consultation with MJP.

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

INCENTIVE BONUS

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

Incentives/ Bonus (e.g. one percent of the contract value per month subject to a maximum of five percent of contract value) for early completion and penalties for delay should, therefore, be built into the contract very judiciously. To avail of the incentive clause, it shall be mandatory on the part of the contractor to report the actual date of completion to the concerned Engineer (Engineer herein refers to PWO/ PSU/ Organisation to which work has been entrusted under Rule 133 of GFR 2017). The Engineer shall report

the actual date of completion of the works as soon as possible through fax or email so that the report is received within seven days of such completion by the concerned CA.

All the bills in R A bill format shall be submitted to the MJP by the contractor. The bills will be checked and scrutinized by MJP and will be submitted to the ULB for Recording, Passing and Payment by the ULB.

The bills vetted and submitted by the PMC will be normally cleared and payment will be released within a period of 15 days from the receipt of such vetted bills by the ULB or executing agency as the case may be. Such payment will be subject to availability of funds with the ULB or executing agency.

Extension of time limit will be granted by Chief Engineer MJP after obtaining approval/consent of competent authority of MJP Thane

Binding to Contractor -

Annexure 17 penalty for contractor (MJP Circular no 231,Corrigendum 231), Annexure 18 (MJP Circular no 105), Annexure 19 Work Sublet (MJP Circular no 223,Corrigendum 223) are binded to contractor during execution of work (during tender period).

INSTRUCTIONS TO TENDERER

**Maharashtra Jeevan Pradhikaran
WATER MANAGEMENT DIVISION, AMBERNATH**

**Name of work : AUGUMENTATION OF KULGAON BADLAPUR WATER SUPPLY
SCHEME**

Tal. AMBERNATH Dist. THANE

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.

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

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

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

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

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

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 maintains additional roads as required at his own expenses.

Contractor

No. of correction

Executive Engineer

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

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

The contractor shall construct trenches, semi permanent latrines for the use of labourers , Separate latrine shall be provided for men and women.

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 Bombo's 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 neighbourhood 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.
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.
- v) The contractor shall construct a sufficient number of bathing places. Washing places should also be provided for the purpose of washing clothes.
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.
- vi) 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.
- vii) 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.

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.

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.

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 fulfilment 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.

HANDING OVER OF WORK

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

**ACQUAINTANCE WITH SITE CONDITIONS
AND WORK CONDITIONS**

**Maharashtra Jeevan Pradhikaran
WATER MANAGEMENT DIVISION, AMBERNATH**

**NAME OF WORK : AUGUMENTATION OF KULGAON BADLAPUR WATER SUPPLY SCHEME
Tal. Ambernath Dist. Thane**

**ACQUAINTANCE WITH SITE CONDITIONS
AND WORK CONDITIONS**

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 Executive Engineer/Engineer in charge, 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.

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 MJP 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.

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:

The Contractor shall make his own arrangements for obtaining rubble, khandki, headers, metal, sand, murum etc. from MJP/Council/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.

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 MJP/Council/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.

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.

Failure to comply with any of the above instructions will result in the MJP 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.

The contractor shall make his own arrangements for quarrying of rubble, stone, murum, sand, lime, metal etc.

Overburden in a quarry will have to be removed by the contractor at his own cost.

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.

Masonry shall be kept wet for at least 15 days and concrete work shall be kept wet for at least 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 MJP 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.

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.

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.

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.

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 elsewhere, 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 MJP/Council/Corporation from his bills. In case MJP/Council/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 Executive Engineer/Engineer in charge , 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.

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.

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 Pradhikaran/Council/Corporation ,

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.

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.

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

ORDER OF PRECEDENCE

- 1) Addendums, corrigendums, pre-bid queries, MOM
- 2) BOQ
- 3) TECHNICAL SPECIFICATIONS
- 4) IS CODES
- 5) RFP
- 6) DRAWINGS

Note :- In case of duplication/interpretation of any clause in this contract document the decision of Engineer-in-charge shall be final.
(Augmentation of Kulgaon Badlapur Water Supply Scheme)

FORM-B.1

FORM B.1
PERCENTAGE RATE TENDER AND CONTRACT FOR WORKS

DEPARTMENT MAHARASHTRA JEEVAN PRADHIKARAN, WATER MANAGEMENT DIVISION,
AMBERNATH

NAME OF WORK AUGUMENTATION OF KULGAON BADLAPUR WATER SUPPLY SCHEME

GENERAL RULES AND DIRECTIONS FOR THE GUIDANCE OF CONTRACTORS

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 Executive Engineer/Engineer in charge and signed by the Executive Engineer/Engineer in charge.

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 Executive Engineer/Engineer in charge for the propose of identification shall also be open for Inspection by contractors at the office of the Executive Engineer/Engineer in charge 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 Maharashtra Jeevan Pradhikaran, such specification with designs drawings shall form part of the accepted tender.

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.

The contractor shall pay along with the tender the sum, of (Rs. 91,58,516 /- 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

Contractor

No. of correction

Executive Engineer

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

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 Pradhikaran hereunder, or in law, Pradhikaran shall be entitled to forfeit the full amount of the earnest money deposited by him.

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.

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.

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.

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, the Executive Engineer/Engineer in charge authorized to refund the amount of the earnest money deposited to the tenderer, on his giving a receipt for the return of the money.

Competent authority is the final authority to reject all or any of the tenders.

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 Pradhikaran/Council/Corporation unless it is signed by the Executive Engineer.

The memorandum of the work to be tendered for and the schedule of materials to be supplied by the MJP(herein before and after called as ...MJP) and their rates shall be filled in and completed by the office of the Executive Engineer/Engineer in charge/Chief Officer/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.

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.

Under no circumstances shall any; contractor be entitled to claim enhanced rates for items in this contract.

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.

Corrections and additions should be initialled.

The measurements of work will be taken according to the usual methods in use in the PWD/MJP 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

Executive Engineer

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.

In view of the difficult position regarding the availability of foreign exchange no foreign exchange would be released by the corporation/council for the purchase of plant and machinery or any other purpose for the execution of the work contracted for.

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.

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.

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.

In this tender 15 sub-works 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.

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, MJP/Municipal Council/Municipal Corporation will grant the extension considering the progress of work and in the light of clause 2.

As per Government Resolution Price Variation Clause is applicable to tender.

The tender Rates are inclusive of all taxes such as GST, Service Tax, Cess, and General Tax etc. 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 work site 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).

I / We hereby, tender for the execution for the Maharashtra
Jeevan Pradhikaran/Municipal Corporation/Council (hereinbefore and
hereinafter referred to as MJP) for the work specified
in the underwritten memorandum within the time specified in such
memorandum

at-----

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(-----)

-----) 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 MJP such materials are at the
rates to be paid for them shall be as provided in schedule “A” here to.

Memorandum

a) General description : AUGUMENTATION TO KULGAON
BADLAPUR WATER SUPPLY SCHEME

Tal. Ambernath, Dist. Thane

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

b) Estimated Cost. Rs. 183,17,03,110/-

Earnest Money. Rs. 91,58,516/-

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.

Security Deposit.

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

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

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

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

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

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.

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% Intial + 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.

27 (Twenty seven including trial run) 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 words `.....) is herewith forwarded. The amount of earnest money shall not bear interest and shall be liable to be forfeited to the Pradhikaran/Municipal Council/Corporation should I/We fail to

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 MJPa 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 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

Contractor

No. of correction

Executive Engineer

MJP 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 fulfil all the terms and provisions of the conditions of contract annexed hereto so far as applicable and in default thereof to forfeit and pay MJP 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 Pradhikaran/Municipal Council/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

2026

Witness

Signature of witness to

contractor's signature.

The above tender is hereby accepted by me for and on behalf of the MJP WATER MANAGEMENT DIVISION, AMBERNATH
Dated

**Executive Engineer MJP,
WATER MANAGEMENT
DIVISION, AMBERNATH**

Contractor

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Executive Engineer

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 Chief Engineer 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 MJP 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/Council 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 MJP
 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
 MJP under the terms of his contract
 may be deducted from or paid by the sale of sufficient part of his

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security deposit or from the interest arising there from, or from any sums which may become due by MJP 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. If such date is not over only 90% amount of the security deposit shall be refunded along with the payment of the final bill. The amount of security deposit retained by MJP shall be released after expiry of period 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 MJP shall be adjusted towards the excess cost incurred by the MJP on rectification work.

Clause 2 : The time allowed for carrying out the work as entered in **Compensation** the agreement shall be strictly observed by the Contractor and shall **Delay** 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 Chief Engineer/Commissioner /Chief Officer(whose decision in writing shall

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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 uncompleted 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.

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 Twenty seven 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 case of delay in completion of the contract, liquidated damages (for repair works costing up to Rs. Ten lakh - one percent of the contract value per week and for all other works half percent of the contract value per week of delay subject to a maximum of ten percent of contract value) should be levied. The penalties proposed for identified lapses of omission or commission must be disclosed in the tender documents in clear monetary terms.

Chief Engineer should be the final authority in this respect, irrespective of the fact that tender is accepted by State level technical Committee. However Chief Engineer shall seek the consent of the MJP and/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 instalment) 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 MJP shall have power to adopt any of the following courses, as he may deem best suited to the interest of the MJP

Action when whole of security deposit is forfeited.

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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 MJP.

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.

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 Executive Engineer/Engineer in charge 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 MJP 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 MJP 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 MJP/ Corporation/Council, 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 MJP 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 MJP 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 MJP 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 MJP whose certificate thereof shall be final. In the alternative the MJP 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 MJP 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 MJP 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 *Extension of time* 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 MJP 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/Council or in the opinion of Executive Engineer, 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 Chief Engineer MJP Thane in this matter shall be final.

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

Contractor

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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 equipment's 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 the 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 equipment's 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 unskilful 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 MJP 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 MJP

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 MJP 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 remain -ed unused and in perfectly good condition at the time of completion or termination of the contract shall be returned to the MJP, 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 Engineering 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 MJP 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 MJP 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 MJP 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 such changes from competent authority of MJP 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

*Alteration
specifications
designs not to
invalidate*

*in
&*

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 Chief 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 :

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 MJP 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.

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.

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.

In the event of any total stoppage of work on notice from the Engineer under sub-clause (1) in that behalf.

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.

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 Rs 5,000/-

It shall be open to the Contractor within 90 days from the service of the notice of stoppage of work or the notice of withdrawal from the contractual obligations under the contract on account of the continued suspension of work or 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/Council 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 MJP 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 MJP for the loss suffered by him on account of delay by MJP 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 MJP.*

Difficulties relating to the supply of railway wagons.

Force majeure.

Act of God.

iv) Act of enemies of the State or any other reasonable cause beyond the control of MJP.

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

Contractor

No. of correction

Executive Engineer

Clause 16 : Under no circumstances whatsoever shall the Contractor be entitled to any compensation from MJP 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 MJP, 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 MJP. 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 MJP/Council/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 MJP the amount of such costs, charges and expenses sustained or incurred by the MJP of which the certification of the MJP 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 MJP, the same may be recovered from the Contractor as arrears of land revenue. The MJP, shall also be entitled to deduct the same from any amount which may then be payable or

which may thereafter become payable by the MJP 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 MJP. 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)

Repairs to the works at (a) above.

Five Years

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

a) Based on Contractor's own design.	Five Year.
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, laterals, branch sewers of sewerage system, etc.	Five Years
iii) Repairs to pipe lines under the works at (a) and (b) above.	Five Years

The instructions contained in the Government of Maharashtra (Public

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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 MJP 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.

Suitable scaffolds shall be provided for workmen for all works that cannot be safely done from a ladder or by other means.

A scaffolds shall not be constructed, taken down or substantially allowed except

Under the supervision of a competent and responsible person, and As far as possible by competent workers possessing adequate experience in this kind of work.

All scaffolds and appliances connected herewith and ladders shall.

be of sound material

Be of adequate strength having regard to the loads and strains to which they will be subjected, and iii) Be maintained in proper condition.

Scaffolds shall be so constructed that no part thereof can be displaced in consequence of normal use.

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.

Scaffolds shall be periodically inspected by a competent person.

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.

In the case of working platform, gangways, working places and stairways at a height exceeding 2 meters (to be specified).

every working platform, gangways shall be closely boarded unless other adequate measures are taken to ensure safety,

every working platform, gangway shall have adequate width, and

every working platform, gangway, working place and stairway shall be provided with railing/ barricading

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

Suitable precautions shall be taken to prevent persons being struck by articles, which might fall from scaffolds or other working places.

Safe means of access shall be provided to all working platforms and other working places.

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

- o) The Contractor will have to make payments to laborers as per Minimum Wages Act.

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 be of good mechanical construction, sound material and adequate strength and free from patent defect, and be kept in good repairs and in good working order.

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.

*Employment of female
labor work on Sunday*

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 MJP.

Every chain, ring, hook, shackle, swivel and pulley block used in hoisting or lowering materials or as means of suspension shall be periodically examined.

Every crane driver or hoisting appliance operator shall be properly qualified.

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.

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.

Every hoisting machine and all gear referred to in proceeding

regulation shall be plainly marked with the safe working load
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.

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.

Motors, gearing, transmissions, electric wiring and other dangerous parts of hoisting appliances shall be provided with efficient safeguards.

Hoisting appliances shall be provided with such means, which will reduce to minimum, and the risks of the accidental descend of load.

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 MJP. 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 MJP 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 Chief 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 MJP 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 MJP 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 MJP 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 MJP 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 *Directions and control*

executed under the direction and subject to the approval in all respects of the Executive Engineer MJP, 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.

of the Engineer in charge

Clause 30.1 : Except where otherwise specified in the contract and subject to the powers delegated to him by MJP Corporation under the code, rules then in force, the decision of the Executive Engineer 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 hereinbefore 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 Chief Engineer as aforesaid appeal against it to the Chief Engineer MJP with the contract work or project provided that.

The accepted value of the contract exceeds ` 10 lakhs( ` . Ten lakhs)
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 Chief Engineer/Commissioner/Chief Officer as aforesaid, the contractor may, within thirty days of receipt by him of any such order, appeal against it to the Member Secretary, MJP who if convinced that prima facie, the contractors, claim rejected by Chief Engineer/Commissioner/Chief Officer 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 MS MJP shall be final and binding on the contractor and the Engineer-in-charge.

Clause 31 : Deleted

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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 MJP. (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 MJP as principal under sub-section (1) of Section 12 of the said Act on behalf of the Contractor, it shall be recoverable by the MJP from the Contractor under the sub-section (2) of the said section. *Compensation under Workmen's Compensation Act.*

Such compensation shall be recovered in the manner laid down in Clause 1 above.

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 MJP, the same shall be recoverable from the Contractor forthwith and be deducted without prejudice to any other remedy of the MJP 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.

The workers shall be required to use the equipment's so provided by the Contractor and the Contractor shall take adequate steps to ensure proper use of the equipment by those concerned

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.

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

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 SSR 23-24 prevailing at the time of inviting of tender. The cost of Clause 38 is Rs 183,17,03,110/- **(Rs.One hundred eighty three crore seventeen lakhs three thousand one hundred and ten only)**

This clause is not applicable to extra items.

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.

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/-

The quantities to be paid at the tendered rates shall include,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 Executive engineer MJP/Engineer in charge Chief officer of Municipal council/corporation shall see that claim towards excess quantity under this clause 38 is submitted to higher authority immediately on its cropping up. The Executive Engineer/Engineer in charge Chief officer of Municipal council/corporation 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*

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

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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

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 .

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 .

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 .

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 1.50 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.

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 :

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

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).

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

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 MJP 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.*

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 Executive 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 MJP at the sanctioned tender rates.

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

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 *Method of payment* on Executive Engineer /Commissioner/Chief Officer/ Engineer in charge's account provided the amount exceeds ` 1000/- Amounts not exceeding 1000/- will be paid in cash.

Clause 45: Any Contractor who does not accept these conditions *Acceptance of conditions compulsory before tendering for work.* shall not be allowed to tender 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 Executive Engineer/Engineer in charge Chief officer of Municipal council/corporation, or by any person to whom the Executive Engineer/Engineer in charge Chief officer of Municipal council/corporation 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.*

Clause 47 A : *Rate inclusive of all taxes*
The rates to be quoted by the contractor must be inclusive of all other relevant taxes except GST. No. extra payment

will be made to the **contractor**

Bidder shall quote his rate excluding GST.

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.

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.

a) Bidder shall quote his rate considering the provisions counted under GST Act 2017.

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 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 MJP 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/Council to the Contractor,

hire charges in respect of heavy plant, machinery and equipment given on hire by the MJP to the Contractor for execution by him of the work and/ or for which advances have been given by the MJP to the Contractor shall be deemed to be arrears of the land revenue and MJP without prejudice to any other rights and remedies of the Corporation/Council 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 MJP 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 MJP to such workers shall be deemed to be debt payable by the Contractor and the MJP shall be entitled to recover the same as such from the contractor or deduct same from the amount payable by the MJP to the contractor hereunder or from any other amounts payable to him by the MJP.

Clause 54 : Where the work 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

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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.

The anti malaria and the health measures shall be as directed by the Joint Director (Malaria and Filarial) of Health Service, Pune.

Contractor shall see that most autogenic conditions are not created so as to keep vector population to minimum level

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

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.

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 MJP 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 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

- Labour component
- Material component
- Petrol, oil & lubricant components
- Cement components
- HYSD & mild steel components
- Cement component
- 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 bellow 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) 50%
- ii. Material component (K₂) 45%
- iii. Petrol, oil & lubricant components (K₃) 5%
- Cement components Rs.6000 per MT
- HYSD Long Products-Rs. 60261 per MT
- Mild steel components Rs.60261 per MT
- Bitumen component Rs.49862 per MT
- CI & DI pipes component Rs.68500 per MT
- HSD for Thane- Rs.91.90 (January 2026)

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.

1) Formula for Labour components:

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

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= 148.2 (December 2025) Basic Consumer Price Index for Industriail Labour centre 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 ----- centre for the quarter for the consideration.

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= 157.8 (for January 2026) 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= Rs.91.90 (January 2026) Average price of HSD at Thane, during the preceding months in which the last date prescribed for receipt of tender falls.

P₁= Average price of HSD at Thane 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

$$V_5 = S_0 \times \frac{(S_{l1} - S_{l0})}{S_{l0}} \times T$$

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. S_{l1}= Average steel index as per RBI bulletin during the quarter under consideration

S_{l0}= Average of steel for long products Rs. 137.3 and for flat products Rs. 131.6 (January 2026) index as per RBI bulletin/ office of economy advisor 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

$$V_6 = \frac{\{ C_0(Cl_1 - Cl_0) \}}{Cl_0} T$$

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.

Cl_1 = Rs. 130 (January 2026) Average cement index published in the RBI bulletin for the quarter under consideration

Cl_0 = 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.

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:

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.

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.

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

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.

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.

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

LIQUIDITY DAMAGE:

In case of delay in completion of the contract, liquidated damages (for repair works costing up to Rs. Ten lakh - one percent of the contract value per week and for all other works half percent of the contract value per week of delay subject to a maximum of ten percent of contract value) should be levied. The penalties proposed for identified lapses of omission or commission must be disclosed in the tender documents in clear monetary terms.

Chief Engineer should be the final authority in this respect, irrespective of the fact that tender is accepted by State level technical Committee. However Chief Engineer shall seek the consent of the MJP and/or approval of the State level technical committee.

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 equipment supplied/installed including the materials such as pipes, valves, specials etc. brought on site

Loss of or damage to contractor"s equipment's 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 MJP/Council/Corporation staff or to any other person not connected with
MJP/Council/Corporation /Contractor

- 2 Policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineers 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

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.

Executive Engineer/Engineer in charge

Contractor

No. of correction

Executive Engineer

GENERAL SCOPE OF WORK

**Maharashtra Jeevan Pradhikaran
Water Management Division Ambernath**

WATER SUPPLY DEPARTMENT

AUGUMENTATION OF KULGAON BADLAPUR
NAME OF WORK : **WATER SUPPLY SCHEME**

--

Tal. AMBERNATH Dist. THANE

GENERAL SCOPE OF WORK

SCHEDULE-A

Contractor

No. of correction

Executive Engineer

Maharashtra Jeevan Pradhikaran

NAME OF WORK : AUGUMENTATION OF KULGAON BADLAPUR WATER SUPPLY SCHEME

Tal. Ambernath Dist. Thane

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
	NIL			

Contractor

No. of correction

Executive Engineer

Maharashtra Jeevan Pradhikaran

NAME OF WORK : AUGUMENTATION OF KULGAONBADLAPUR WATER SUPPLY SCHEME
Tal. Ambernath Dist. Thane

CONDITIONS FOR MATERIAL SCHEDULE "A"

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.

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.

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 Municipal Corporation/Council and shall submit the extract of the same monthly to the Executive Engineer/Engineer in charge. The Executive 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/Council, for use on the work and shall return to Government all surplus material after completion of work, if and as ordered by the Executive 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.

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

Contractor

No. of correction

Executive Engineer

provision of store theft, etc. will to the account of the contractor.

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.

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.

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.

Quantities in Schedule "A" are approximate and shall vary according to actual and Bonafede use.

All the materials remaining unused after the completion of the work are to be returned to Municipal Corporation/Council at their store at the cost of the contractor and the credit if due will be given as per rules enforce.

Once the materials are issued to the contractor at the MJP/MC's store, he shall remove the same immediately to his stores, failing which rent as decided by Engineer-in-charge shall be recovered from the contractor.

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 Executive Engineer/Engineer in charge.

The contractor will have to provide the manufacturer test report from Government Laboratory regarding steel to be provided by the contractor.

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.

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.

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 MJP.

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/Council.

Contractor

No. of correction

Executive Engineer

SCHEDULE-B

(Attached Separately)

(Note-Sheet is attached separately)

Contractor

No. of correction

Executive Engineer

GENERAL SPECIFICATION

GS-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.

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.

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.

The contractor shall be responsible and liable to pay for the damages caused by him to public property etc.

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.

Water of good quality for labour, construction, washing and such other purposes shall be provided by the contractor without any claim for extra cost.

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 contractor's risk and cost. The amount so recover shall be credited to contractor's account after recovery of any dues or over payments etc.

The final bill and deposits will not be paid unless the site is cleared off all rubbish materials and contractor's stores etc from the site of the work.

The contractor will have to pay the royalties and municipal taxes, if charged by the Maharashtra Jeevan Pradhikaran. The same will not be refunded.

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.

The contractor shall be responsible for obtaining permission from Government local bodies, private party for storing, stacking of materials required for execution of work.

Necessary sign board, danger flags, red lamps shall be provided by the contractor to avoid accidents. Necessary guarding will also have to be provided.

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.

Materials remaining unsold or unserviceable as per discretion of the Executive 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.

In case of legal disputes for materials brought and stores at site without permission of the Executive 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 Maharashtra Jeevan Pradhikaran during construction and testing of various structures under different sub-works. The contractor shall have to make his own arrangement for the same at is 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 contractor's 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 If the department to the same. 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 shall be subjected to modifications if found necessary and such modification shall not violet 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.

The contractor will make his own arrangement for receiving all materials, tools, etc. required for the work.

No extra charges for the carriages of water will be allowed.

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.

The contractor should not be sublet without written permission of the Engineer-In-Charge.

The conditions in the tender notice will be binding on the contractor and the Tender Notice will form a part of agreement.

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.

The charges for preliminary design of concrete mix shall be entirely borne by the contractor .

For grades of concrete M-20 and above where cement is to be used by weight, the cost of extra cement required to make up under weight bags shall be borne by the contractor.

For the item of concrete and other items in the agreement where cement is not to be used by weight 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 river sand/artificial 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.

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 all strata
2.	100 mm	0.75 M	In all strata
3.	150 mm	0.75 M	In all strata
4.	200 mm	0.85 M	In all strata
5.	250 mm	0.85 M	In all strata
6.	300 mm	0.90 M	In all strata
7.	350 mm	0.95 M	In all strata
8.	400 mm	1.10 M	In all strata
9.	450 mm	1.15 M	In all strata
10.	500 mm	1.20 M	In all strata
11.	550 mm	1.25 M	In all strata
12.	600 mm	1.25 M	In all strata
13.	700 mm	1.30 M	In all strata
14.	750 mm	1.40 M	In all strata
15.	More than 750 mm	OD + 0.60 M	In all strata

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 murum or river sand/artificial sand for bedding hollows, if any, shall be filled with murum 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 chiselling, 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.

PLAIN/REINFORCED CEMENT CONCRETE

PLAIN CEMENT CONCRETE

REINFORCED CEMENT CONCRETE

2.1 (a) Proportions of concrete for types of work

M-100 - For levelling course and foundation of chairs and thrust blocks etc

M-150 PCC with temperature nominal 0.15% reinforcement for footing thrust blocks, anchor blocks, chairs and encasing of pipes etc.

M-200 PCC for water retaining structure

M-300 for Construction of Jack well, Pump House & Water Retaining Structure. Such as ESR, WTP, MBR, BPT.

M-250 Pump house and bridges (excluding sub-merged portion)

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.

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.

Pedestal pier shall be perpendiculars to center line of pipe.

Proper seat shall be left on top of pedestal pier to construct saddle. Seat shall be strictly done within 24 hours, failing which MJP will not

accept it for payment

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.

The contractor will make his own arrangement for receiving all material tools etc. required for the work.

No extra charges for the carriages of water will be allowed.

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.

The contractor should not be Sublette without written permission of the Engineer-in-Charge

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)

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.

The characteristic strength minus 1.35 times the standard deviation. **and**

0.80 times the characteristics strength.

And the average strength of all the samples is not less than the characteristic strength plus

$$\text{standard} \quad 1.65 * \frac{1.65}{\text{No. of samples}} = \text{times the deviation}$$

However, it should be noted that individual variation should not be

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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 ordinarily 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 weight mint, 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 weight ment 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.

3. 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,....

Cost of labour, materials, use of tools, plant and tackle and other incidental items to complete the work satisfactorily.

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.

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 :

Providing and fixing mild steel reinforcement bars or hoop iron strips as mentioned above.

Leaving holes for fixtures or pipes and making them good after completion of the work.

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 up to 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 fo 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 be include the base coat and san 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

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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.

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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,
 All materials and labour for painting.
 All equipment and scaffolding.
 Curing as per specification
 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

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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 strong 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 -

- Providing and fixing the rolling shutters of specified size, material with all accessories, locking arrangement and top hood cover.
- Painting the same with approved synthetic enamel paint in three coats.
- Redoing the damaged works

The item will be measured and paid in Sqmt. Basis of the shutter area.

PROVIDING, FIXING RSJ AND OTHER STRUCTURAL STEEL WORK FOR JACK WELL / WTP

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.

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

Structural steel members
 Steel joints
 Plates and connection
 Steel chair assembly
 Pipe supports and hangers for piping in all locations
 Pipe railing
 Ladders and stairs
 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.

Fabrication and erection of structural steel shall be in accordance with IS:800-1962. (latest edition)

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

The maximum possible fabrication on structural steel work shall be manufactured off-site in a fabrication shop.

Shop connections shall be welded or bolted, unless otherwise indicated.

In so far as possible all work shall be fitted and assembled in shop ready for erection.

12.5 MEMBERS

All members shall be free from twists, kinks, buckness or open joints.

All members, holes and their spacing shall be so accurately made that when assembled the parts shall cone together and bolt without

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distortion.

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.

Bolt holes will be provided to secure special items, if any, to structural members.

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.

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

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.

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

Erection shall include the installation and erection of all steel as called for in this section. The contractor shall verify correctness before starting erection.

As erection progresses, the work shall be securely bolted up to take care of all dead-load, wind and erection stresses.

No final bolting or welding shall be done until each portion of the structure has been properly aligned and plumbed.

Bolts shall be drawn up tight and threads set so that nuts cannot become loose.

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.

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.

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 are 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.

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.

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.

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.

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

STRUCTURAL STEEL AND MISCELLANEOUS METAL WORKS

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.

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.

STEEL JOINTS

These shall be fabricated true to size and details shown on drawings in strict conformance with requirements of reference standards.

COMMON BOLTS

Bolts and nuts shall conform to IS:1363-1967.

WELDING ELECTRODES

The electrodes shall conform to the requirements of IS:814, latest edition.

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.

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.

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.

TEST REPORTS

Certified physical and chemical mill test reports for material used for major structural members shall be furnished by the contractor.

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.

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.

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.

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.

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.

MODE OF MEASUREMENT

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	PN 1.0 of IS: 2906:1984. of various sizes, ranging from 350 mm to 1200 mm.
b)	Sluice Valves	PN 1.0 of IS:780:1980, of various sizes, ranging from 200 mm to 300 mm.

The manufacturer of sluice valves should be from MJPs approved list

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

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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:780:1980 and IS:2906:1984 or sizes of the sluice valves covered under relevant standards.

MARKING OF SLUICE VALVES

Each sluice valve shall be marked as per IS:780:1980, Para-II for sizes (50 mm to 300 mm) and IS:2906:1984, page: 11.1 (for sizes 350 mm to 1200 mm).

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 para 12 of IS:780:1980 and para 12.1 of IS:2906:1984

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 equipment's.

Third party inspection from agency approved by MJP 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 Controller 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

Review of material 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.

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 up to 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 MJP 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

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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

REFILLING OF TRENCHES OF PIPELINE

After lowering, laying, jointing and welding of pipe line, site geniting 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,..

Clearing useful excavated material of rubbish bricking clods, stone, etc.

Conveying the useful excavated material upto 500 M and filling in layers, watering and compacting.

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.

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%

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 of royalties, rents, etc. complete.

CONSTRUCTION

The cofferdam shall be constructed to the satisfaction of the Engineer on the approved alignment with an eye to the safety and convenience for the construction at all times and shall, not have a gradient have a specified width and specified height. 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,

- suitable alignment of the coffer dam.
- construction of the coffer dam as directed by the Engineer.
- providing adequate and necessary barricades, sign boards, signals and watchmen.
- Maintenance of the coffer dam in good condition.
accident over or due to the coffer dam cause by etc. bad condition and compensation, if any on that connection.
- reconstruction of the coffer dam when damaged.

Item to Include

All the labour, material use of equipments, tools and plants necessary for lighting constructing, maintaining the coffer dam satisfactory.

All sorts of compensation and responsibilities arising out of the coffer dam.

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 MJPs 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 anticorrosive paint approved colour including cost of labour, transport, materials etc. complete

Mode of payment

The payment shall be made on running meter basis

TRIAL RUN OF THE SCHEME

(Sub Work No 18)

The period of trial run is 3 month and shall start from the satisfactory commissioning of the scheme.

Daily record of raw water pumped, pure water pumped from WTP, Water reaching each ESR, Alum dose, alum consumed, turbidity, pH, chlorine dose, residual chlorine at consumer end etc. shall be maintained.

Calibration chart for turbidity and chlorine dose shall be prepared.

Daily record of filters washed, head loss before back wash and after backwash, rate of filtration of each filter shall be maintained.

Log book of pumping shall be maintained.

Daily record of bulk meter reading from source to ESR shall be maintained.

During operation and maintenance period all the minor repairs of plant, equipments and machinery and leakages in the network shall be rectified by agency at their own cost.

The plant, equipment's and machinery shall be operated as per design capacity and parameter or else necessary deduction will be done in the bills.

During Trial run period MSEDL Co. charges and raw water charges, chemical charges will be borne by MJP

Staff to be deployed.

	Supervisor	
	Pump operator	
	Helper to pump operator	
	Lab Assistant	
	Filter operator	
	Labour	
	Valve man	
	Labour for distribution	

Alum

Requirement of quantity standard for Alum (Alumino Ferric) are covered by IS:299"1989. This standard has been revised in October 1989. There are 3 grades of material grade 1 & 2 solid form and grade 3 in liquid form. Standard requirement of these grades are as given below as per amendment No.1 January 1995.

Sr. No.	Characteristic	Requirement				
		Grade-I	Grade-II		Grade-III	
			Type - 1	Type -2		
1.	Insoluble matter percent mass max.	0.5		0.5		0.25
2.	Soluble iron compounds percent by mass max.	0.7		0.7		0.35
3.	Water soluble Alluminium compounds (as Al ₂ O ₃ percentage by mass max.	16.0		15.0		7.5
4.	pH (of 5 percent aqueous solution) min.	2.7	2.7		2.3	2.7

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5.	Basically as (Al ₂ O ₃) percent by mass max.	-		-	0.5	-
6.	Free acidity (as H ₂ SO ₄)	-		-	0.5	-
7.	Lead as (Pb) parts per million max.	30.0		30.0		15.0
8.	Arsenic (as Al ₂ O ₃) parts per million max.	6.0		6.0		3.0

Soluble iron compound as (Fe), percent by mass permissible for water purification purpose only shall be 1.0 for Grade-I and II 0.5 for Grade-III. The material of Grade-II can also be supplied as having free acidity (as H₂SO₄) of 0.5 percent by mass max. If required by the purchase, the pH in this case shall not less than 2.3.

TCL Powder.

Requirement of TCL (Stable Bleaching Powder) are covered by IS:1065:1989 (2nd revision). There are 2 grades of Bleaching Powder. Requirement of these grades are as given below.

Sr. No.	Characteristic	Requirement		Method of Test (Ref. Clause No. in Annex. A of IS: Book)
1.	Available chlorine percentage by mass minimum	34%	32%	A-2
2.	Stability, loss of chlorine on the basis of initial available chlorine	1/15	1/11	A-3
3.	Moisture Percentage by Mass max.	0.3	0.5	A-4
4.	Practical size (passing through 1.70 mm IS sieve)	99.50	99	A-5

Chlorine Gas

The quantity of liquid chlorine shall be as per IS:646:1987

(Revised) Supply shall be made in Tonner of 900 Kg.

The arrangement to deliver the filled tonners and to collect the empty tonners from water works including loading and unloading, transportation of tonner shall be the responsibility of contractor.

The contractor shall see for themselves the fitting and the connecting facilities provide at water works for the safety point . The contractor shall be responsible for compliance of the explosive conditions as prescribed by the Government/Central Government from time to time.

Damages to the container shall be brought to the notice of the Engineer-in-Charge within 3 days from the date of receipt of the report from the supplier along with a copy of the report from the supplier.

Mode of Measurement

This item will be measured and paid as per basis.

M.S. ROSE PIECES

(Sub Work No 1, Item No 33)

The rose pieces shall be fabricated out of 10 mm thick M.S. plates. The strength diameter shall be 1% times the diameter specified in the Schedule-B. The holes to be drilled in strainer portion shall be of 12 mm diameter at 50 cm center to center and shall be staggered. The inside and outside surfaces of the rose piece shall be applied with three coats of anticorrosive oil paint. The item includes cost of all material and labor required for the work, and this item will be executed as directed by the Engineer-in-Charge. The mode of payment shall be on weight.

PROVIDING AND FIXING MANHOLES FRAME AND COVER COWL TYPE VENTILATORS

The cost of providing the above item is included in tender item. These are to be properly fixed at place and manner as directed, painting with two coats of anti-corrosive black paint is also included in this item. If locking arrangement are required they shall be done by Contractor as directed without any extra cost.

Mode of Measurement

This item will be measured and paid as per unit basis.

LIGHTING CONDUCTOR

(SubWork No.3, Item No.5)

The contractor shall ensure that any structure. Must or other installation provided by him is adequately designed to minimize damage to the works from lighting strike.

Any lighting conductors shall be design in accordance with the edition of the appropriate Indian Standard Code of Practice IS:2903:1969.

Mode of measurement : Per No.

PENSTOCKS

Penstocks shall be of cast iron with scrapped non-ferrous sealing faces. Each penstocks shall be provided with a suitable hand wheel of adequate diameter for the easy operation and gearing shall be supplied where necessary.

Hand wheels shall have engraved on it the direction of closing which shall be „Clockwise“

Spindles shall have machine cut trapezoidal or square form threads. They shall be of stainless steel or manganese steel with the exception of non-threaded sections of extended spindle installations which may be of mild steel.

Head stocks and foot brackets shall be provided for non-rising spindle penstocks where necessary. Guide bracket shall be provided where necessary. Headstocks with non-rising spindle installation shall have a penstock position indicator.

Penstocks shall be watertight under the conditions of head and direction of maximum design flow.

The frames and door of cast iron penstocks shall be made from close grained gray iron. The penstocks shall be designed so as to ensure tight closure while maintaining freedom of door movement during operation and minimizing sliding wear of the sealing faces.

Mode of Measurement

This item will be measured and paid as per basis.

DETAILED SPECIFICATIONS FOR MS PIPELINE

THE PIPES TO BE SUPPLIED WITH INTERNAL CLEAR DIAMETER WITH INTERNAL FUSION BOUNDED EPOXY COATING.

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).

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.

Identification of plate/strip material for manufacturing.

Qualification of welding process to be used for manufacturing of pipes.

Qualification of welders.

Dimensional check before start of welding to avoid rejection at a later stage.

Inspection of ready built pipes.

MS PIPE COATING

a) **External Coating:** Providing and applying externally 3 layer fusion bonded polyethylene (3LPE) lining to mild steel pipes of minimum 3000 micron confirming to DIN-30670 standards. 150 mm space shall be left uncoated (cutback) on both ends of mild steel pipes for welding purpose & same shall be coated after completion of welding at site with 100% solid, cold applied, polymeric coating as specified in the standards. The rate shall include the cost of material, coating and wrapping over the pipes, handling charges cleaning of

pipe externally with proper blasting preparation of pipes surface dust free as per specifications transportation of pipes from site to works to factory and back to site of works after coating etc complete. Note- Pipe coating shall be done at factory

b) **Internal Coating:** Internal Lining (food grade Epoxy) Providing and applying two part food grade polyamide cured solvent less epoxy lining, meeting BIS 16676 on the internal surface of MS Pipe after blast 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 disbandment 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

MODE OF MEASUREMENT

The payment for MS pipe coating, the measurement of this will be taken on square meter basis and paid on square meter basis at the rate specified in Schedule-B.

26.2 SPECIFICATION FOR LAYING OF MS PIPELINE

Warped or deformed timber shall not be used for shoring. Shoring shall project at least 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 united 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 internal fusion bonded epoxy lining. It is therefore very necessary that the circular shape of the pipes be maintained till these pipes are internal fusion bonded epoxy 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 internal food grade epoxy paint and external 3LPE, with third party inspection report	80% of cost mentioned in
Laying of pipes & outside wrapping of pipes	10% -- 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 be in steel 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.

Contractor

No. of correction

Executive Engineer

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 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” 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” 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 prepared by the MaharashtraJeevan Pradhikaran for Maharashtra Jeevan Pradhikaran.

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 Maharashtra Jeevan Pradhikaran 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 Pradhikaran 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 MJP 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

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 on weight (Kg) basis.

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 conform 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 hot 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 of „V" 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 :

- Manufacturer's 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 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:

Manufacturer's 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:

Type A: 50 to 65 Hardness in IRHD and

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:

The name of manufacturer or the Trade Mark,

Type, Grade and Thickness,

Month and Year of manufacture,

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.

PROVIDING, LOWERING, LAYING AND JOINTING DI PIPES OF GIVEN DIAMETER AND CLASS**28.1.1 Scope**

This specification covers the requirements for manufacturing, supplying, laying, jointing, testing and commissioning of Ductile iron pipeline and fittings including associated civil works required for the same. Reference should also made to the requirements of Part 6 where appropriate.

28.1.2 Standards

The following standards, specifications and codes are part of this specification. In all cases, the latest revision of the codes including all applicable official amendments and revisions shall be referred to. In case discrepancy between this specification and those referred to herein, this specification shall govern.

IS: 8329	Centrifugally Cast (spun) ductile Iron pressure pipes for water, gas and sewage.
IS: 638	Sheet rubber jointing and rubber insertion jointing.
IS: 1387	General requirements for supply of metallurgical materials.
IS: 1500	Methods for Brinell hardness test for metallic materials.
IS: 9523	Ductile Iron fittings for pressure pipes for water, gas and sewage.
IS: 12820	Dimensional requirements of rubber gaskets for mechanical joints and push on joints for use with cast iron pipes and fittings for carrying water, gas and sewage.
ISO: 4179	Ductile iron pipes for pressure and non pressure - Centrifugal cement mortar lining -
ISO: 2531	General requirements. Ductile iron pipes, fittings and accessories for pressure pipe lines.
IS: 5382	Specification for Rubber Sealing Rings for Gas Mains, Water Mains and Sewers
AWWA C600	Installation of ductile iron water mains and their appurtenances. Recommendations for cement-mortar lining for cast iron, mild steel and ductile iron pipes and fittings for transportation of water
IS: 11906	
IS: 3764	Excavation Work - code of Safety.
IS: 12288	Code of practice for use & laying of Ductile iron pipes.
IS: 460	Test sieves - Part I
IS: 8112	Specification for 43 Grade Ordinary Portland Cement. Bitumen based coatings for cold application, suitable for use in contact with potable water
BS: 3416	
BS EN 545	Ductile iron pipes, fittings, accessories and their joints for water pipelines Requirements and Test Methods

Manufacturing**28.2.1 General**

DI pipes and fittings (Class K9) shall be in accordance with IS 8329 and IS 9523. Pipes and fittings shall be procured from reputed manufacturers with Engineer's approval. Engineer shall at all reasonable times have free access to the place where the pipes and fittings are manufactured for the purpose of examining and testing the pipes and fittings and for witnessing the test and manufacturing. All tests specified either in this specification or in the relevant Indian Standards specified above shall be performed by the supplier/contractor at his own cost and in presence of Engineer if desired. For this, sufficient notice before testing of the pipes and fittings shall be given to Engineer. If the test is found unsatisfactory, Engineer may reject any or all pipes and fittings of that lot. The decision of Engineer in this matter shall be final and binding on the contractor and not subject to any arbitration or appeal. The pipes and fittings shall be stripped, with all precautions necessary to avoid warping or shrinking defects. The pipes and fittings shall be free from defects. Any defect in pipes and fittings in the opinion of Engineer shall be rejected and shall be replaced by new one. In the case of spigot and socket pipes and fittings the socket shall be without the centering ring. In the case of flanged pipes the flanges shall be at the right angles to the axis of the pipe and machined on face. The bolt-holes shall be drilled and located symmetrically off the centerline. The bolt hole circle shall be concentric with the bore and bolt holes equally spaced. The flanges shall be integrally cast with the pipes and fittings and the two flanges of the pipe shall be correctly aligned.

28.2.2 Materials

The materials used in the manufacture of pipes and fittings shall comply with requirements specified in IS 8329 and IS 9523

28.2.3 Dimensions and Tolerances

The internal diameter, thickness and length of barrel, dimensions of pipes and fittings shall be as per the relevant tables of IS 8329/ IS 9523 for different class of pipes and fittings. Pipe class K9 or as per requirement, pipe nominal diameters of 450, 800 and 1000mm and standard length of 6m is recommended and other properties for pipes and fittings shall be as per IS 8329/IS 9523. Each pipe supplied shall be of uniform thickness throughout its length. The tolerances for pipes and fittings regarding dimensions, mass, ovality and deviations from straight line in case of pipes shall be as per IS 8329/ IS 9523.

28.2.4 Testing

a) Mechanical Tests

Mechanical tests shall be carried out during manufacture of pipes and fittings as specified in IS 8329/IS 9523. The frequency and sampling of tests for each batch of pipes shall be in accordance with IS 8329. The test results so obtained for all the pipes and fittings of different sizes shall be submitted to Engineer. The method for tensile tests and the minimum tensile strength requirement for pipes and fittings shall be as per IS 8329/ IS 9523.

b) Brinell Hardness Test

For checking the Brinell hardness, the test shall be carried out on the test ring or bars cut from the pipes used for the ring test and tensile test in accordance with IS 1500. The test shall comply with the requirements specified in IS 1500/IS 8329.

c) Retests

If any test piece representing a lot fails in the first instance, two additional tests shall be made on test pieces selected from two other pipes from the same lot. If both the test results satisfy the specified requirements, the lot shall be accepted. Should either of these additional test pieces fail to pass the test, the lot shall be liable for rejection.

d) Hydrostatic Test

For hydrostatic test at works, the pipes and fittings shall be kept under test pressure as specified in IS 8329/ IS 9523 for a period of minimum 15 seconds, during which the pipes shall be struck moderately with 700g hammer for conformation of satisfactory sound. They shall withstand the pressure test without showing any leakage, sweating or other defect of any kind. The hydrostatic test shall be conducted before surface coating and lining.

28.2.5 Joints

a) General

Jointing of DI pipes and fittings shall be done as per IS 12288 and manufacturer's recommendations. After jointing, extraneous material, if any, shall be removed from the inside of the pipe. Rubber sealing rings/gaskets used for jointing shall be of SBR or EPDM rubber and conform to IS 638, IS 12820 and IS 5382.

b) Spigot and Socket joints

These shall have sockets which are integral with the pipe and incorporate an elastomeric rubber ring gasket conforming to IS 12820. The gaskets/sealant used for joints shall be suitable for water conveyance. In jointing DI pipes and fitting, the contractor shall take into account the manufacturer's recommendations as to the methods and equipment to be used in assembling the joints. In particular the Con-

tractor shall ensure that the spigot end of the pipe to be jointed is smooth and has been properly chamfered, so that the rubber ring as per IS 12820 and IS 5382 is correctly positioned in line, before the joint is made. The rubber rings and any recommended lubricant shall be obtained only through the pipe supplier or as otherwise directed by the Engineer.

c) Gaskets for Flanges

The gaskets used between flanges of pipes shall be of SBR or EPDM rubber conforming to IS 638 of thickness between 1.5 to 3 mm suitable for conveyance of sewage and waste water and as specified by manufacturer.

d) Flanged joints

These shall be of PN 16 rating and shall comply with dimensions and drilling details as specified in IS 8329. these shall have isolation gaskets between the flanges, isolation sleeves around all bolts and isolation washers under all bolt heads and nuts. All material shall be supplied by a reputed manufacturer and shall be approved by the Engineer. Each bolt should be tightened a little at a time taking care to tighten diametrically opposite bolts alternatively. The recommended bolting torque to be followed for assembling flanges shall be as specified in manufacturer's instructions. The practice of fully tightening the bolts one after another is highly undesirable. The bolts shall be of mild steel unless otherwise specified. They shall be coated with coal tar epoxy coating after tightening.

28.2.6 Coatings

a) General

Unless otherwise specified, DI pipes and fittings shall be Zinc coated with Bitumen over coating in accordance with following specifications. At buried DI pipes and fittings shall also have factory or site applied polythene sleeving. Coating shall not be applied to pipe and fittings unless its surface is clean, dry and free from rust. Pipe coatings shall be inspected at site and any damage or defective areas shall be made good to the satisfaction of the Engineer.

b) Zinc coating

Zinc coating shall comply with ISO 8179 and shall be applied as a spray coating. The mass of sprayed metal shall not be less than 130g/m³ in accordance with ISO 8179.

c) Bitumen coating

Bitumen coating shall be of normal thickness of 75 microns unless otherwise specified. It shall be a cold applied compound complying with the requirements of BS 3416 Type II, suitable for tropical climates, factory applied in accordance with the manufacturer's instructions. Damaged areas of coating shall be repainted on site after removing any remaining loose coating and wire brushing any rusted areas of pipe.

d) Polythene Sleeving

Where polythene sleeving is specified to be applied in addition to bitumen coating above it shall comply with ISO 8180. Site applied sleeving shall be stored under cover out of direct sunlight and its exposure to sunlight shall be kept to a minimum. Pipes having a factory applied sleeving must be stored in the same conditions. Joints in the sleeving shall be properly overlapped and taped in accordance with manufacturer's instructions to provide in continuous sleeving.

28.2.7 Cement mortar lining

All pipes and fittings shall be internally lined with cement mortar in accordance with ISO 4179/IS: 11906. Cement mortar lining shall be applied at the factory in conformance with the above mentioned standards. No admixtures in the mortar shall be used without the approval of the Engineer. Pipe linings shall be inspected on site and any damage or defective areas shall be made good to the satisfaction of the Engineer. Lining shall be uniform in thickness all along the pipe. The minimum thickness of factory applied cement mortar lining shall be 5 mm for DN 450 mm pipe; and 6 mm for DN 800/1000 mm pipes, respectively.

28.2.8 Marking

Each pipe and fitting shall have cast, stamped or indelibly painted on it the following appropriate marks:

The nominal diameter.

Class reference

Mass of pipe.

Date of manufacture and

Manufacturer's name, initials or identification mark. Marking shall be done as per IS 8329 and IS 9523.

28.2.9 Third party Inspection of the pipes is mandatory in the manufacturing unit. The test certificate shall be produced in this effect by the contractor at his own cost. The agencies performing the TPI shall be enlisted in the list of Maharashtra Jeevan Pradhikaran.

TRANSPORTATION, HANDLING AND INSPECTION.

Transportation - Pipes should be loaded in such a way that they are secured and that no movement should take place on the vehicle during transit.

The pipes should be loaded on vehicles in pyramid or straight sided information. In case of pyramid loading, the pipes in the bottom layer should be restrained by the use of broad wooden wedges secured to the vehicle being loaded. The pyramid is to be formed by resting pipes between the pairs of pieces in the preceding layer with the sockets in layers reversed. Straight sided loading may be used with supports along the sides of the vehicles. The use of straight sided loading is advantageous for utilizing full capacity of the vehicle.

Off - Loading - Cranes should be preferred for off - loading. However, for pipes up to 400 mm nominal bore, skid timbers and ropes may be used.

When using mechanical handling equipment, it is necessary to employ sufficient personnel to carry out the operation efficiently with safety. The pipes should be lifted smoothly without any jarking motion and pipe movement should be controlled by the use of guide ropes in order to prevent damage caused by pipes bumping together or against surrounding objects.

Where the crane operator does not have a clear view, he should be

guided by the personnel supervising the operation. When cranes are used, the whole sequence of operation should be carried out smoothly and without snatch. Properly designed hooks and adequate stead ropes are essential. The hooks should be of suitable shape to ensure positive engagement when entered into the ends of the pipes and then should pass over any protective packing fitted around the pipe ends.

The use of slings passed around bundles of pipes is not recommended because bundles become unstable as the sling is drawn tight or released. However, when it is necessary to use the central slinging method for lifting single pipe, a broad webbing sling is recommended which minimizes the risk of the pipe slipping. Chain slings may slip and are dangerous.

Staking - Pipes being taken to a stock ground for storage and held pending further distribution should be arranged into stacks. The first layer of pipes should be laid on a firm formation consisting of solid timbers set level on the ground. Subsequent layers should be placed according to the method of staking adopted. Care should be taken so that the pipes do not rest on their sockets. The height of any stack should not exceed 2 m.

Methods adopted for staking pipes are described in above paragraph.

Square Stacking - In square stacking method, second and subsequent layers are set at right angles to the previous layer with spigots and sockets alternating in each layer and sockets project beyond spigot end. The pipes rest directly upon those beneath it and care is needed in placing to prevent damage.

Parallel Stacking with Timbers -All the pipes are parallel with the sockets of successive layers reversed end-to-end with sockets projecting beyond spigot end.

Timber battens, placed about 600 mm from each end at right angles to the pipes, are used to separate the successive layers. Wedges at both ends of each batten prevent pipe movement.

Nested Stacking (Pyramid Stacking)-Nested stacking consist of placing each pipe between the two pipes underneath it, with the sockets being all

at one end of each layer and layer should be firmly anchored to prevent the stack collapse.

Stringing - Stringing consist of placing pipes on the ground in line ready for laying. Care should be taken to prevent damage during this operation.

Pipes and fittings/specials shall be transported from the factory to the work sites at places along the alignment of pipeline as directed by Engineer and as specified by manufacturer. Contractor shall be responsible for the safety of pipes and fittings/specials in transit, loading/unloading. Every care shall be exercised in handling pipes and fitting/specials to avoid damage. While unloading, the pipes and fittings/specials shall not be thrown down from the truck on to hard surfaces. They should be unloaded on timber skids with steadying ropes and/or by any other approved means. Padding shall be provided between coated pipes, fittings/specials and timber skids to avoid damage to the coating. Suitable gaps between pipes should be left at intervals in order to permit access from one side to the other. In case of spigot socket pipes, care should be taken regarding orientation of pipes while unloading. As far as possible pipes shall be unloaded on one side of the trench only.

The pipes shall be checked for any visible damage (such as broken edges, cracking or spalling of pipe) while unloading and shall be sorted out for replacement. Any pipe which shows damage in the opinion of Engineer shall be discarded and replaced by new one. Dragging of pipes and fitting/specials along concrete and similar pavement with hard surfaces shall be prohibited.

INSPECTION OF PIPES :-

The pipes shall be got inspected through EIL/SGS/RITES. All charges of EIL/SGS/RITES inspection shall be borne by the contractor. The testing shall be done as per relevant IS.

Mode of Payment :- On receipt of the pipe on site 80% payment shall be released and remaining 20% percent payment will be released after Laying & satisfactory hydraulic testing.

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28.5 Storage

Each stack of pipes shall contain only pipes of same class and size, with consignment or batch number marked on it with particulars of suppliers wherever possible. Storage shall be done on firm level and clean ground and wedges shall be provided at bottom layer to keep the stack shall be in pyramid shape or the pipes laid length wise and crosswise in alternate layers. The pyramid stack shall be made for smaller diameter pipes for conserving space in storing them. The height of the stack shall not exceed 1.5m Fittings/specials shall be stacked under cover and separated from pipes. Rubber rings shall be stored in a clean, cool store away from windows, boiler, electrical equipment and petrol, oils or other chemicals. In the field the rubber rings shall be handled such that they are not left out on the ground in the sun or overnight under heavy frost or snow conditions.

28.6 Laying

28.6.1 Trenching

Trenching includes all excavation, which is carried out either by hand or by machine and shall be carried out in accordance with all general requirements of civil works specifications mentioned for subwork 1. In addition to those general requirements, the following requirements shall apply to pipelines:

The excavation shall be done such that it does not get far ahead of laying operations. Before excavating trench the alignment of pipeline shall be approved by Engineer. Cuttings length and other appurtenances shall be provided to suit detailed pipe configurations required. To protect persons from injury and to avoid damage to property, adequate barricades, construction signs, red lanterns and guards as required shall be placed and maintained during the progress of the construction work and until it is safe for the traffic to use the roadways. The relevant Indian standards and the rules and regulations of local authorities in regards to safety provisions shall be observed. The road metal and also the rubble packing shall first be stripped off for the whole width of the trench/pit and separately deposited in such place or places as may be determined by Contractor and approved by Engineer.

During excavation, large stones and rubble shall be separated and removed from the excavated soil and stacked separately. The material from excavation shall be deposited on either side of the trench leaving adequate clear distance from the edges of the trench and pit, or as may be necessary to prevent the sides of the trench pit to slip or fall, or at such a distance and in such a manner as to avoid covering fire hydrants, sluice valves, manholes covers etc. and so as to avoid abutting the wall or structure or causing inconvenience to the public and other service organizations or otherwise as Engineer may direct.

Contractor shall take into account additional excavation if any as Engineer may require in order to locate the position of water pipes, drains, sewers etc., or any other works which may be met with, in or about the excavation of trenches while quoting the rates for excavation of trenches while quoting the rates for excavation. Such service lines if met with during excavation shall be properly maintained by Contractor, by means of shoring, strutting, planking over, padding or otherwise as Engineer may direct, and shall be protected by the Contractor from damage during the progress of the work. Any damage to the service lines shall be borne by Contractor. All precautions shall be taken during excavation and laying operations to guard against possible damage to any existing structure pipe line of water, gas, sewage etc.

28.6.2 Bedding

The depth and type of bedding shall be as shown on the Drawings and the requirements specified in subwork.

28.6.3 Laying of Pipes and Fittings

Pipes and fittings shall be laid in accordance with IS12288 and manufacturer's instructions. In addition the requirements specified in Part-6 Clause 6.9.5 shall also be followed.

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 of 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 levelled 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.

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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 up to 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 along with 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 along with roads and in towns in order to avoid accidents to human life and animal.

All precautions shall be taken during excavation and laying operations to guard against possible damage to any existing structure/pipeline of water, gas, sewage etc. After excavation of trenches pipes shall not be lowered unless the dimensions of trenches and bedding work for pipes at the bottom of the trenches are approved and measured by Engineer.

Pipes and fittings/specials shall be carefully lowered in the trenches. Special arrangements such as cranes, tripods with chain pulley block for lowering the pipes and fittings shall be made by Contractor. In no case pipes and fittings shall be dropped. Slings of canvas or equally non-abrasive material of suitable width or special attachment to fit the ends of pipe and fittings/specials shall be used to lift and lower the coated pipes and fittings/specials. The pipes and fittings/specials shall be inspected for defects and be rung with a light hammer preferably while suspended to detect cracks. If doubt persists, further confirmation shall be done by pouring a little kerosene/dye on the inside of the pipe at the suspected spot. No sign of kerosene/dye should appear on the outside surface. Pipes and fittings damaged during lowering aligning shall be rejected by Engineer and shall be replaced by new one.

All the pipes are to be laid perfectly true both in alignment and to gradient specified. In case of spigot and socket pipe the socket end of the pipe shall face upstream, except when the pipeline runs uphill in which case the socket ends should face the upgrade. The laying of pipes shall always proceed upgrade of a slope. After placing a pipe in the trench, the spigot end shall be centered in the socket and the pipe forced home and aligned to required gradient. The pipes shall be secured in place with approved backfill material tamped under it except at the socket. Pipes and fittings which do not allow a sufficient and uniform space for joints shall be removed and replaced with pipes and fittings/specials of proper dimensions to ensure such uniform space. Precautions shall be taken to prevent dirt from entering the jointing space. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by Engineer. During the period that the plug's on, the Contractor shall take proper precautions against floating of the pipe owing to entry of water into the trench. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or where long radius curves are permitted the deflection allowed at joints shall not exceed 2o for 800 and 1000mm; and 3o for 350 mm diameter pipes. The cutting of pipe for inserting valves, fittings or specials shall be done in a neat and workman like manner by using tools and taking precautions as per manufacturer's recommendations without damage to the pipe so as to leave a smooth end at right angles to the axis of the pipe. For this purpose, pipe cutting machine shall be used.

28.6.4 Thrust Blocks and Anchor Blocks

Thrust blocks and anchor blocks shall be provided as per the design and drawing provided by the Engineer-in-charge.

28.6.5 Back filling

Trenches shall be back filled with approved selected excavated material only after the successful testing of the pipeline as directed by Engineer. Back filling shall be in accordance with requirements and as directed by the Engineer In Charge.

28.6.6 Pipelines Under Existing Roads

Pipelines laid along a road shall be laid in trench. The sewage rising mains shall be continuously ascending and shall not form many vertical kinks.

28.6.7 Reinstatement of Roads

Reinstatement of roads/footpath shall be done as per the requirements of local authorities and requirements specified in sub work 1

28.7 Cleaning of Pipes and Fittings

Pipelines shall be cleaned of all dirt, debris, dust or other deposits before hydraulic test to the satisfaction of engineer. The requirements specified in sub work 1 shall be followed.

28.8 Hydraulic Testing

Pipelines and fittings shall be subjected to hydraulic pressure tests in the presence of the Engineer which shall comply with IS 12288 unless otherwise specified.

Testing shall be carried out in two stages:

- a. Test of sections as construction proceeds.
- a. A test of the whole of the pipeline on completion.

The Contractor shall equip himself with all plant, equipment, fittings and water necessary for the hydraulic tests. The Contractor shall submit to the Engineer, well in advance of the time of tests, details of his proposals, including the supply of water either by tankers or bore holes. No connections from the existing pipelines will be allowed, nor will any connections to the pipeline and pipe work which would involve cutting, tapping or altering the Permanent Works be allowed. Test gauges shall be of approved manufacture having dials at least 200 mm diameter, graduated such that the test pressure is at least 75% of the full scale reading shall be used. If necessary different gauges shall be supplied for different pipeline sections. Two gauges shall be provided for the sole use of the Engineer and shall remain in Engineer's possession for the duration of the Contract. All gauges shall be dead weight tested and calibrated at the commencement of work and at regular intervals as required by the Engineer.

The contractor's arrangements for testing shall include a suitable means of quick installation and removal of the Engineer's gauges during testing.

28.8.1 Testing procedure

The Sectional Hydraulic Test shall be carried out after the pipeline section to be tested has been laid, jointed and back filled to a depth sufficient to prevent float-ation, but leaving the joints exposed which have not been tested. The sections to be tested shall be to the approval of the Engineer and shall not be longer than 2000m or 500m when either the pipeline is laid adjacent to or underneath the car- riage way or when section includes an air valve chamber. The joints between each tested section shall be left exposed until the pipeline has passed the Test on com- pletion.

In addition to the above requirements the Contractor shall perform a hydraulic test on the first 200 m length of pipeline to be laid under the contract. This test shall be undertaken within one month of the Contractor commencing the laying of pipes. Should the pipeline fail the test or the Contractor fails to undertake the test, all laying and welding work shall come to a halt until that section of pipeline passes a hydraulic test.

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. Testing against closed valves will not be permit- ted. Washout valves shall be fitted with blank flanges and these together with in- line valves shall be left open. Air valves already fitted shall be permitted to func- tion during the test.

Proposals for testing where thrusts on structures are involved, even where thrust flanges on the piping are installed, shall be submitted, with the calculations of the forces to be carried, to the Engineer for approval.

The method of filling the pipeline with water shall be approved by the Engineer. The length under test shall be filled making certain that all air is displaced through an air valve installed at the top of the blank flange situated at the high end of the line. The length shall then remain under constant moderate pressure, 10 to 20m head of water, for a period of several hours until the pressure can be maintained without additional pumping.

The pressure shall then be slowly increased at a maximum rate of 1 bar per minute to the full test pressure and pumping discontinued for 3 hours or until the pressure has dropped by 10m, whichever occurs earlier. Thereafter pumping shall be re-

sumed and continued until the test pressure has been restored. The quantity of water pumped restore the pressure shall be the measure of leakage from discontinuation of pumping until its resumption.

The pipe length shall pass the test if the leakage is not more than 1.079 litres per diameter per kilometer per 24 hours for each 100m head of pressure applied and the full test pressure has been sustained for at least eight hours.

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

No pipeline shall be accepted until the leakage on any length is not more than the rate of leakage specified above and all sources of leakage have been rectified.

The Test on Completion shall be carried out after all the pipeline sections have been satisfactorily tested and the joints between each section completed to provide a continuous test length between contract interfaces.

Pipelines shall be tested as above except where the Engineer issues such instructions as are necessary for testing parts of the Works that have been designed for stresses limited by considerations other than those applying to the pipeline systems.

28.8.2 Test Pressures

Test pressures are to be measured in bars at the center of the blank flange situated at the lowest end of the pipeline under test. Unless otherwise specified or shown on the drawings pipeline test pressure shall be in accordance with the following:

DI pipe and fittings 16 bar

For testing of sections of pipeline containing air valve chambers the Contractor should verify from manufacturer that the air valves are capable of operating under and sustaining the test pressure.

28.9 Pipeline Disinfection

Upon completion of a newly laid main shall be cleaned, disinfected using chlorine solution in accordance with procedure specified in IS 12288. Alternative methods may be adopted with the approval of the Engineer. The chlorinated water shall stand in pipeline for a minimum period of 24 hours and all valves in the system shall be operated twice during this period.

The chlorinated water shall be neutralized and disposed off as directed by Engineer.

After final flushing and before the pipeline is placed into service, water samples shall be collected and tested for bacteriological quality and shall not indicate the presence of coliforms. If the initial disinfection fails to produce satisfactory results, disinfection shall be repeated and satisfactory samples are obtained.

The Contractor is expected to carry out the cleaning, disinfecting and dewatering work as a part of laying the pipes and his rates for laying the pipes should include the cost of cleaning and other related works.

28.10 Chamber Markings

Details like valve type, size, cistern number shall be painted on all valve chambers as directed by Engineer. Where valve chambers are flush with the ground, suitable marker posts shall be provided adjacent to the chambers at a suitable location with all details approved by Engineer.

In case of the pipeline laid above ground details such as chainage, invert levels of pipe saddle number culvert number, anchor/thrust block number etc., shall be suitably painted either on the pipeline or the supporting structure in distinct color.

28.11 Measurement and Payment

The measurement for pipes for items specified in Bill of Quantities shall be on running of the net length along the center line of the pipe excluding the length of specials and appurtenances. Payment for pipes shall be made in running meters after production of test certificates specified and directed by Engineer.

Specials shall be paid separately on the basis of each piece used. For the payment purpose, flanges shall be either included in or excluded as described in the Bill of Quantities. However material such as nuts, bolts and washers, etc., shall be included in the respective items.

Valves and Expansion joints shall be paid on number basis after erection and successful testing.

PAYMENT FOR LAYING THE PIPES AND SPECIALS SHALL BE MADE 80% ON SUPPLY, 10% ON LAYING AND 10% ON TESTING

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 thecost of the damaged portion as decided by the Executive 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 testing. 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 withheld till satisfactory hydraulic testing is given.

HDPE Pipes

The specifications for HDPE pipes of various diameters are conforming 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 resin is proposed to be used for manufacturing of the pipes.

General :-

The material used for the manufacture 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.

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 melt flow rating (MFR) shall not exceed 1.10 g/10 minutes - In

addition the material shall also conform to 5.6.2 of IS 7328 : 1992.

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

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.

The resin shall be compounded with carbon black. The carbon black content in the material shall be within 2.5 to 0.5% and dispersion of carbon black shall be satisfactory when tested according to the procedure described in IS 2530 : 1963.

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.

ISI stamping with marking of IS 4984(or IS 14333)

The manufacturer"s name and /trade mark.

Designation of the pipe as per IS 4984 (or 14333)

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

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

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.

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

Hydraulic Testing of HDPE Pipe Line

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.

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.

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.

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.

As per IS code water required to built up allowable drop in pressure during test will be treated as a make up water.

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.

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.

Daily O & M of HDPE pipeline should be done & maintain by contractor for two years free of cost. No extra payment will be done by MJP for this.

The Following code shall be used for:

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 MJP 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 MJP 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

1.5 times the maximum sustained operating pressure.

1.5 times the maximum static pressure in the pipe line.

Sum of maximum sustained operating pressure and maximum surge pressure.

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.

The field test pressure should wherever possible be not less than 2/3rd 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.

10% 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 : 80% 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 Controler Pvt.Ltd, Mumbai 3) M/s WAPCOS Ltd., Gandhi Nagar 10% payment will be made after lowering, laying, jointing of pipes. 10% 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.

GRP PIPE :-

The specification of GRP pipes of various diameter are conforming to IS 12704-1994

Grade of Raw Material :-

Raw material used to manufacture the GRP pipes shall be as follows.

Resin System :- The manufacturer will use highest quality polyester resin in liner and structure of pipe conforming to IS 6746-1994.

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

Fillers / Aggregate :- Silica sand of size range 0.05 mm to 0.8 mm may be used as fillers / aggregates in the laminates.

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 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 (DN 700 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 $\pm 25\text{mm}$. 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 the nominal 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 $+ 50\text{mm}$.

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 C950 for 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 to following 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 test as 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 :80% 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 Controler Pvt.Ltd, Mumbai 3) M/s WAPCOS Ltd., Gandhi Nagar 10% payment will be made after lowering, laying, jointing of pipes. 10% 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.

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.

VALVES/PEN STOCKS/SLUICE GATES

All the valves shall be C.I.D.F. type Valves shall be of approved make by MJP 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” 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” 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.

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.

COLOURWASH

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 a 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

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

The exposed surface of the specified stone flags shall be machine polished to a smooth, even and true plane and the edges machine cut square 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.

The thickness of joints shall not exceed 1.5 mm

Joints shall be grouted with neat cement slurry

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

in the thickness of tiles shall be evened out incushioning mortar to 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 cement paste

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.

Maharashtra Jeevan Pradhikaran

Name of work : **Augmentation to Kulgaon Badlapur water supply scheme**
Tal. Ambernath Dist. Thane

OBLIGATORY REQUIREMENT FOR JACK WELL

The structural design for the Jack well with overhead pump house and Approach bridge shall be done as per standard specifications and code of practice of the IS.

The design shall be carried out in conformity with following latest IS code.

IS:456-2000

IS:875

IS:11682

IS:1893 with inclusion of seismic zones as per latest circular.

IS:1786 for cold worked steel high grade deformed bar (Tor steel of 415 and Mild steel of grade - I shall only be used).

IS:13920-1993 for ductile detailing. BSI Publication S.D. 34 (S & T) 1987.

IS:3370:2009 (Part - I to IV) for water retaining structures.

Trial pit details of work site shall be given. (Open rock is visible nearby bearing capacity shall be taken as 20 MT/Sqm for design purpose only).

Design shall be got approved from VJTI/IIT/VNIT/WCE/Government Engineering College/Reputed Consultants (approved by M.J.P.) at contractor's own cost.

All RCC work on Jackwell and pump house shall be designed in M-250 and water retaining structure as well as structure whichever exposed to sever rain, alternate wetting and drying. According not less than 45 mm concrete cover shall also be provided. The item shall be executed as per IS Code and in M-300

Contractor

No. of correction

Executive Engineer

JACK WELL

JACK WELL:-Construction of Twin RCC Jackwell

1. The arrangements of column and beams shown in the drawing enclosed shall be designed as per requirements.
2. The floor shall be provide with RCC M-300 concrete for which live load shall be 500 Kg/Sqm.
3. The beams supporting pumps on the floor shall be designed for the load of pumps, motors and column assembly. The beams shall be so designed that in one bay five pumps will be installed at equal distance. The space left between the pumps shall be provided with M.S. grating. The beams shall be capable of resisting impact load as per relevant IS for which load of 5 motor, and dynamic load of pump, including column assembly as 1.5MT.
4. There shall be a M.S. ladder from pump house floor to have access upto RL 21.0. M. The M.S. ladder shall have 0.50 m width with railing on both sides. This shall be designed for 300 Kg/Sqm live load.
5. The RCC wall panels on water side shall be designed for the critical loading as specified below.
 - a) Full water load from inside without any soil load from outside. The H.F.L. is 20.70 m which shall be considered for accounting of internal water pressure.
 - b) Saturated earth fill load from outside and having no water pressure from inside.
6. The columns shall be capable to taking load as well as bending moment due to load transfer from wall panels. The internal bracings/beams shall be designed for self weight plus live load of 150 Kg/Rmt.
7. The well structure upto floor RL 22.70 M shall be designed for non- cracking condition.

JACK WELL FLOOR

The floor of Jackwell (bottom slab of well) shall be designed for full uplift.

PUMP HOUSE

8. The two storeyed pump house shall be provided over the Jackwell and it shall cover full area of Jackwell as per drawing. The floor level shall be RL 22.70 M. The clear size of the pump house shall be 33.70m x 19.40 m. The outer column shall be continued upto roof level with internal beams/lintels etc. The total height of pump house

shall be minimum 10.5 M up to top of roof slab as shown in drawings. There shall be continuous corbel beam with a corbel for supporting moving gantry. The capacity of gantry shall be taken 7.50 MT and the corbel beams shall be designed duly considering the impact load due to moving gantry.

2. Two rolling shutter shall be provided for the pump house and the size of rolling shutter 2.0×2.5 m & other size shall be 2.0×2.50 m

3. Aluminium windows with glass shutters of size 2.0×2.0 M shall be provided with M.S. grill.

4. The panelling shall be with B.B. masonry 230 mm thick in cement mortar 1:4 proportion. Inside plaster 1:3 CM with neeru finish shall be provided and out side plaster in CM 1:3 with sand face surface.

Colour wash of approved shade shall be provided from inside in 3 coats and water proof cement paint shall be provided in 3 coats from outside.

ROOF

The RCC slab shall be provided at the top of the pump house resting on beams and columns. There shall be 150 mm projection of roof slab and a normal slope to be given to drain off the rain water.

Maharashtra Jeevan Pradhikaran

Name of work : AUGUMENTATION OF KULGAON BADLAPUR WATER SUPPLY SCHEME

Tal. Ambernath Dist. Thane

OBLIGATORY CONDITION FOR JACK WELL

1.	HEAD WORKS		Twin Jackwells of 14.0m dia. With RCC Pump House above.
	Jack Well		Two nos.14.0 m dia.
a)	Location	:	19° 10'43.60"N 73° 14'42.88"E Jack well LAT LONG on left bank of ulhas river near Valvali- Barvi dam road bridge on Ulhas river
b)	Type of Construction	:	R.C.C. M - 300
c)	Average of bed level of Jackwell	:	13.54 m.
d)	Floor level of jack well	:	22.70 M
e)	Dia of Jackwell	:	14.0 M X 2 Nos.
f)	Depth of Jackwell	:	(Top RL16.0 m, Bottom RL-6.78 m) = Total 22 m
g)	Leveling course	:	PCC M-150
h)	Ladder	:	MS ladder of 0.50 M wide.
i)	Vertical wall	:	0.30 M thick (minimum)
j)	Floor Jackwell	:	RCC M-300.
k)	Floor beam	:	Location of floor beam and foundation block for pumping machinery shall be confirmed from Executive Engineer,Mech.MJP and then assembly design shall be submitted.

Contractor

No. of correction

Executive Engineer

Floor slab of Jackwell should be designed for dynamic loading and vibration load.

II	OVER HEAD PUMP HOUSE.		
a)	Size of pump house	:	double storeyed .
b)	Clear height of P.H.	:	10.5 m for two floor
c)	Construction	:	RCC Framed structure with B.B. Masonry works
d)	Top RL of pump house	:	26.50 m.
e)	Opening at floor level of pump house	:	Opening around the pumps should covered with holding.
f)	Continuous Corbel beam	:	Continuous corbel Beam shall be designed to sustain the load of 7.50 MT gantry crane
g)	Rolling shutter	:	With width 2 x 2.5 M extension
h)	Alluminium windows	:	2 X 2 m ..6..... Nos
j)	Lintel (RCC)	:	Over windows and rolling shutters.
k)	Chajja (RCC)	:	Over rolling shutter and window of size 2.5 M.
l)	Cement plaster	:	20 mm for outside and inside face with neeru finish in CM 1:4
m)	Flooring	:	Polished tender stone flooring
n)	Distemper	:	White wash inside of pump house.
o)	Water proof cement paint	:	Outside of pump house and expose face of Jackwell.

DATA SHEET FOR SUB WORK No.1

Providing and constructing RCC Jack Well, & Overhead Pump House.

All above obligatory levels and sizes of said components of the complete structure may change as per instruction of engineer-in-charge without any extra compensation above the respective notes quoted against the various items under Schedule 'B' of the Tender Documents.

All foundation level and strata shall be inspected by Engineer-in-charge and only after approval of foundation strata further casting of respective footing should be conduit.

All necessary soil testing should be carried out as per instructed by Engineer-in-charge at own cost of agency.

Contractor

No. of correction

Executive Engineer

Maharashtra Jeevan Pradhikaran

**Name of work : AUGUMENTATION OF KULGAON BADLAPUR WATER SUPPLY SCHEME
Tal. Ambernath Dist. Thane**

DETAILED SPECIFICATION FOR WTP

WATER TREATMENT PLANT OF CAPACITY 60 MLD

General

These specifications as laid down hereinafter are in amplification of the requirement already specified in preceding of this tender and further fully complementary to it. The elaborate specifications for electrical works are given separately in addition to the following. Additional specification for mechanical work and civil work are separately given.

DS-1 ITEM NO. 1 AERATION FOUNTAIN (RCC).R L OF LIP-65.50 M

Accessories

1m wide walkway and 25 mm dia double row G.I. pipe railing at the outer periphery of aeration fountain. It is necessary to provide RCC stair for inlet chamber. Ceramic tiles in white cement shall be provided to cascade and collecting launder.

Mechanical Equipment

The central inlet to the chamber shall be of CI pipe of required thickness and dia with bell mouth at its top, increased to suitable diameter covered with dome shaped MS cage. From the duck foot bend, M.S. pipe line extending upto 15.00 m distance measured from center to duck foot bend shall be provided by the Contractor with required specials as per site conditions.

DS-2 Measuring Flume, Flow Measuring Equipment etc..

Design

The flume shall be designed as an open channel type for required flow with free board or not less than 30 cm. The measuring flume shall have a baffle wall or appropriate arrangement for recirculation jambs and side chamber for float. The item shall include construction of entire length of channel starting from the inlet chamber to the receiving point at flash mixer. Ref. ISS:6059 and IS:9117 of latest edition shall be followed.

Accessories

On one side walkway of 1.20 m width with 25 mm dia G.I. pipe railing in double row at the outer edge and as per specifications for mechanical engineering works shall be provided.

Mechanical Equipment

Simple flow meter with dial type indicator shall be provided and installed near the flume. The measuring device shall have a capacity of measuring minimum flow of 100 cum/hour and maximum flow of 3000 cum/hour correct up to a rate of 5 cum/hour as per ISS:6756, 6236 and 2032 of latest edition.

In order to reduce head loss, the measuring device shall be on Partial flume principle. It shall have, however, to be assured that the channel does not head up due to churning of water in the flash mixer. There should be clear overfall from channel to further unit. The channel and inlet chamber channel shall be provided with a drain pipe with valve for purpose of washing. At this time, channel shall be provided with penstock gate in M.S. to separate out from flash mixer.

DS-3 Flash Mixer**Design and Construction**

A flash mixer of required capacity shall be constructed in RCC finished with cement plaster 1:3 mix at the water face. The unit shall be provided with RCC slab partly covering the tank for locating the driving unit of the agitator and for approach to the same. The maximum detention time for flash mixer shall be 60 seconds with side water depth of maximum 3.5 m. It should have arrangement to receive the measured and chlorinated raw water, dose aluminum sulphate solution immediately and violently dispensed the solution throughout the bulk of water in a flash mixer chamber. The hydraulic design should be such that the accuracy of the flume is not affected by the hydraulic behaviour of the section. The design should provide flash mixing chamber with submerged mixers, shaft driven from overhead motors and gear box each designed to impart turbulent energy into water at an anticipated rating of 2.25 kW (minimum). Aluminum sulphate shall be dosed immediately adjacent to the flash mixing device.

Accessories

The walkway of 1.20 m width shall be provided with 25 mm dia G.I. pipe railing in the double row as specified in general mechanical engineering works specification attached.

Electrical and Mechanical Equipments

This will be consists of the following

- Frame agitators with stainless steel blades and stainless steel vertical shaft mounted on bearing of sufficient strength to prevent vibrations.
- Electrical motor of suitable horse power, starter and reduction gear (not less than 3 HP) Torque rating of gear box shall be designed and submitted for approval.
- Suitable size outlets with proper controlling arrangements of flow. Water tight penstock on the inlet.
- Protective covers of M.S. sheets duly painted for motor with tray to prevent failing of lubricant into water.
- C.I. pipe lines between flash mixer and clariflocculators shall be provided with control valves and suitable chambers.
- Flash mixer draining arrangements shall be provided with a suitable sluice valve and chamber.

DS-4 Clariflocculators

Designing

The item include designing and construction of RCC radial flow clariflocculators with central flocculation chamber of 30 minutes detention period and outer annular clarifier of 2.5 hours (minimum) detention period overflow rate not exceeding 30 Cum/Sqmt/day excluding sufficient capacity for sludge storage shall be provided, however, capacity below SWD shall not be considered. Peripheral launder to clariflocculators shall be provided to take clarified water to the launder with suitable bevel shaped weir be provided on wall. The shape, depth and size of inlet and outlet of clariflocculators shall be so designed that the gentle overturning motion given to the water in the flocculating zone shall bring about complete agglomeration of floc to the maximum possible extent so as to achieve quick settlement in the clarifier zone with a view to lower the turbidity below 10 ppm preferably, when there is maximum raw water turbidity. In short (a) turbidity not more than 10 ppm, (b) suspended solids not more than 20 mg/lit,

Total Al. Not more than 0.30 mg/lit for water leaving the clariflocculators shall be achieved, wherever pre-chlorination unit is provided a residual chlorine of 0.2 mg/lit for water leaving the clariflocculators shall be maintained.

Construction

The outer clariflocculators wall shall be in RCC of thickness not less than 18 cm. The bottom slab shall be in RCC of minimum thickness of 15 cm. It shall have a slope of 1 in 15 from outer periphery towards the center. The flocculator wall shall be 12 cm thick in RCC with cement plaster on both the sides as it is not retaining any water. The central inlet to the flocculator chamber shall be RCC shaft of adequate diameter with suitable slot opening at the top. This includes providing, laying, lowering and jointing C.I. pipes of suitable diameter from flash mixer outlet to central inlet shaft of the flocculation chamber. The portion of C.I. pipe below the floor of the clariflocculators will be encased in CC M-300 with adequate cover of 20 cm from all sides. The flocculator wall shall rest on RCC ring beam and column of suitable section and height so that water from flocculator will pass on the clarifier readily, below the flocculator wall.

The sludge pipe from the central sludge pocket upto chamber of nearest drainage system shall be of CI pipe of B class, S & S type. The pipes will be encased in CC M-300 upto cover 20 cm on all sides for length below the floor of the clariflocculators. The diameter shall not be less than 300 mm. It should be possible to remove the entire sludge accumulated at the centre of the pit of the clariflocculators by gravity alone to the last drop when it is to be emptied for repairs or so. It also includes sluice valve of equal dia to that of pipe line with extended spindle and wheel. A telescopic bleed device shall be provided separately and drained in the sludge chamber.

There shall be RCC circular launder outside the edge of vertical wall and extending over to the whole periphery around the weir. The launder should have bevel shape RCC weir having. The launder shall be connected at suitable points to inlet chamber or pipe of the filter unit. The launder shall be designed to take full flow in clariflocculator and size should be such that minimum clear free fall 10 cm in the launder shall be maintained. From launder of clarifier, clarified water channel of required mld capacity will lead to filter inlet.

Accessories

The clarifier will have 1.20 M wide peripheral walkway all round with G.I. pipe railing 25 mm dia in two row at the inner/outer circumference as per general specifications for mechanical engineering works.

Mechanical and Electrical Equipments

This includes providing and erecting standard mechanical equipment with required electrical wiring, switches etc. complete. In flocculation chamber, flocculator paddles made of S.S.-304 section of suitable size and S.S.-304 flats (8 mm thickness) fixed to central stainless steel shaft of suitable dia (not less than 50 mm and as per IS:7208:1974) should be provided. The stainless steel central shaft shall be provided with guide bearings to the bottom suitable for underwater use. Even in the case of Dor Oliver type flocculator mechanism offered by the tenderer, the paddle shall be of P.P. + FRP and guide shaft, if used, shall be in stainless steel. The paddles area of flocculator shall be 10 to 35% of tank sectional area in the plane of shaft and the paddle tip velocity should be 0.30 to 0.40 m/sec the distance between the paddle tips should be of maximum one meter. The flocculator driving mechanism shall comprise of 400/400 Volts, 3 phase, A.C. motor of suitable mechanism section HP (minimum 3 HP) with approved make starter connected by worm reduction gear of suitable ratio through pinion and bevel wheel drive. Bevel shaft shall be connected to flocculator shaft through rigid couplings. The planetary gears box shall be suitable for 24 hours continuous operation. The design calculations justifying the selection of gears, material of construction, lubrications torque requirements verses torque suitability of gear box, etc shall be submitted for approval. The equipment for clarifier shall consist of a lattice girder bridge. The bridge will be of entire diametric length of flocculator and half the diameter of clarifier and with trolley rails resting on the clarifier wall and the central bearing or central shaft it should not be supported by flocculator wall. The bridge path shall consists of a 1.2 m wide walkway made of welded and bolted R.S. sections of suitable size and fitted with 6 mm thick chequered plates. Two Nos. of scraper arms with scraper blades of neoprene rubber suitable size covering the entire diameter of the clarifier being suspended shall consist of 400/440 V A.C. motor of suitable HP (not less than 3 HP) with starter of approve make jointed through coupling to planetary gear box transmitted by suitable drive imparting slow motor to the driving mild steel wheel moving on rails. The bearings shall be housed in high grade C.I housing with G.M. bush for rigidity. Special current collector for transmission of electric power from outside to the different units of bridge shall be provided. The clarifier bridge mechanical equipment should be given two coats of anticorrosive epoxy paint. The panel shall be suitable for outdoor installation and switch fuse units of approved make shall only be assembled. The drawing should be got approved prior to fabrication and brought to the site only after inspection by the Engineer-in-Charge.

Minimum performance

Effluent turbidity not greater than 10 ppm

S.S. not greater than 10 mg/lit
 Total Al. Not greater than 0.5 mg/lit.
 Outlet turbidity - 2 NTU

DS-5 Filter House and Rapid Gravity Constant Rate Sand Filters

Design

The filter beds shall be located in filter house with roof slab with control bay in a filter house with roof. The location of filter house shall not be on pure water sump. There shall be minimum 2 Nos. of filter beds which can be operated independently. The ratio of length and breadth of each filter bed (there are two beds in each unit) shall not more than 1.66. Filter shall be designed for the filtration design of 4800 lit/Sqm/hr. at normal flow and maximum 6000 lit/Sqm/hr with overloading during backwash/maintenance of a bed for ex. changing filter media etc.

It is proposed to backwash the filter with air wash at the rate of 35 to 45 Cum/Sqmt/hr of filter bed after 0.35 Kg/Sqcm pressure at the under drains and followed by wash water at the rate of 600 lit/Sqmt/minute of the filter bed area for a duration of 12 min.. It shall be ensured that the lip level of wash water trough is kept minimum 60 cm above the surface of sand to accommodate expansion of sand bed.

1.20 m wide walkway all round the filter beds with double row of G.I. pipe railing of 25 mm dia as specified in the general specifications for mechanical engineering works.

Space for housing air blowers and panel board in a separate filter annex room with adequate working space.

An office room.

Pressure reducing arrangement to reduce pressure of water supplied from wash water tank for back washing the filter beds if necessary.

Each unit shall be complete in all respect with inlet valves, wash water inlet valve, wash water outlet valves etc. Velocities permissible in different conduits and valves of filter house shall be as below.

a)	At inlet to filter	1.00 m/sec.
b)	At inlet to wash water	2.40 to 3.0 m/sec
c)	At outlet of wash water	2.0 m/sec
d)	At outlet of filtered water	1.0 m/sec
e)	Air inlet	25 m/sec.

Filter inlet and outlet channels shall be designed for 20% overloading with free board of minimum 50 cm.

Filter Media

This shall consist of properly washed quartz sand of effective size between 0.45 mm to 0.70 mm with a uniformity coefficient between 1.3 to 1.7. The gravel media shall be as per standard specifications of rapid gravity filters. The filter bed shall consist of 0.60 to 0.70 m of sand supported on 0.45 m gravel. The filter sand shall be granular, hard, durable, well-washed and screened. It shall be free from clay, dust, shale, loam, organic impurities, vegetation and other impurities and shall not contain more than 10% miraculous matter. The sand crushed and powdered and immersed in concentrated hydrochloric acid shall not loose more than 1.5% of weight calculated as CaCO_3 and not more 2% weight shall be lost in case of sand crushed/powdered after burning. The frailty weight cost after milling for 15 minutes (750 strokes) shall be less than 10% and for 30 minutes (1500 strokes) shall be less than 20%. The gravel shall be hard, durable and shall not disintegrate under the action of water. The smallest and largest size shall be 3 mm and 50 mm respectively. The Contractor shall specify the size and thickness of each layer of filter media (gravel and sand). The filter media shall be so selected to achieve filtration rate or 6000 liter/Sqmt/hour and turbidity not 1 NTU or less

Construction

The filter house and filter annex building shall be of RCC framed structure. Filter house will comprise of closed control bay and filter beds. Ground floor filter annex shall be double storeyed comprising of inter-annex hall with porch at main control door, air blower room, panel board installation, general administrative block, 1.00 m wide staircase from annex room to operating floor of filter house shall be provided.

Two Nos. RCC stair case 1.0 m wide shall be provided for going from filter operating platform to inspection gallery. These staircases shall be provided with G.I. pipe hand railing as per specifications mentioned for mechanical engineering work. The steps of staircase shall be provided with CC chequered tiles.

Dimensions of the brick walls, external and internal, should be appropriate for the function of wall to serve and shall not be less than 23 cm. For brick masonry there shall be sponge finished cement plaster in CM 1:3 mix from outside and inside face of the wall shall be plastered in CM 1:3 mix and smooth finished with neeru. The thickness of plaster shall be 12 mm for

brick masonry.

The inside face of inspection chamber and filter water outlet channel connecting portion shall be provided with 6 mm thick first class quality white glazed tiles, with ceramic glazed corner etc. set in white cement. Simple flow meter with dial type indicator shall be provided to measure rate of filtration of each filter. Also rectangular notch shall be provided in the inspection chamber made of stainless steel. The chamber shall be provided with suitable bulkhead fittings for illumination. Inspection chambers shall be provided with aluminum angles framed both side with protected transparent cover. The inspection box and filtered water outlet channel shall be in RCC. The cover of channel shall be in RCC slab finished with marble mosaic tiles, of approved colour, shade and size. There should be four openings of 90 x 60 cm for getting into the channel and these will be fitted with 90 x 60 cm heavy duty C.I. manhole frame and cover, the width of the passage (walkway) around and in between the two adjacent filter beds shall be 1.20 m minimum. Walkway around and filters units shall be provided with 25 mm dia double row G.I. pipe and railing as specified in the general specifications for mechanical engineering works. Railing shall also be provided along the pipe gallery. The clear height shall 4 m minimum above filter operating platform level to roof slab bottom. The roof and the ceiling etc. shall be finished as specified in the general specifications for civil engineering works. The minimum difference in the operating floor and the walkway level on top of P.W. channel shall be 2.7 m to be decided as per hydraulics.

The position of inspection box, RCC staircase, location of air blower etc. should be so chosen as to offer very neat and tidy appearance to the filter house.

The ground floor of the filter annex should accommodate air blowers, entrance hall with entrance counter, ten chairs etc. A decorative partly glazed and partly paneled large size door should be provided.

Mechanical Equipments

Piping

Under this arrangement inlet piping, with regulating arrangement of approved type, outlet pipe with central valves, filter back wash piping waste water discharging piping with valves and air pipe from the blower upto the under-drainage system with suitable control valves and air releases with necessary piping, extended spindle penstock and operating C.I. hand wheel, etc. as required shall be provided. All valves should be capable of being operated from operating floor.

Note:- All the sluice valves used shall be of Kirloskar/IVC/IVI and DVPL make only.

All pipes shall be of CI B-class pipes with flanged joint upto 300 mm dia. Above 300 mm dia M.S. flanged pipes of minimum 6 mm thickness may be provided. This also includes the required number of specials to negotiate bends and inter connections, etc. The complete piping for backwash of water shall be provided suitable to wash two filter bed at a time.

Under drainage system

This shall be provided with Central manifold of D I K9 pipe with plain ended D I tees to be laid over RCC flooring and laterals of OPVC 10 Kg.Sqcm with perforations at bottom. The under drainage system shall be designed for the washing rate which shall not exceed 600 lit/Sqmt/min. The under drainage system shall consists of manifolds and laterals as per design of the Contractor to satisfy the obligatory requirement.

The ratio of the area of the manifold to the total area of laterals drawing into the manifold shall be 1.5 to 2. Wash water gutter (laterals and main) shall be properly designed so that while functioning, it facilitates complete bed washing. There is no loss in filter material. Wash water travel shall not exceed 1.20 m transversely. Height of lip of the gutter shall be designed taking into consideration the bed expansion during backwash. Duration of wash should not exceed 10 minutes in any case. The quantity of back wash water used shall not exceed on an average 2% of total quantity of filtered water as counted on the average of year's working. The piping shall be sufficiently fixed to RCC floor to prevent its getting detached from the floor. The under drain system shall be capable of taking an overload of 20%.

The under drain system should be capable of taking an overload of 20% as stipulated above. So also the filter outlet control system should also be capable of taking an occasional overload of 20% of the rated capacity hydraulically.

Complete system of waste water draw off for collecting and disposing off waste water during cleaning of filter beds shall be provided as to above requirements.

Flow Control System for Constant Rate Filtration with Influent Flow System

The filter shall work on constant rate filtration by influent flow splitting. In the case of influent flow splitting, the entire flow of influent (clarified water conveyed to filters) shall be split equally at the inlet of each filter unit of 2 beds by means of simple weirs. The rectangular weirs with equal dimensions are located at the same elevation in the concrete weir boxes. The location of weir should be such that it should be possible to measure head on the weir and regulate the discharge by providing isolation gate for every weir. The spindle of this gate should not reduce the walkway width. The influent channel shall be connected to the inlet of weir boxes by means of isolating gates. Filter boxes should have to be designed in such a way that the depth of standing water on the bed should be about 3.5 to 4 m supported by due design. The influent channel should be designed for the velocity of 0.6m/sec.

The sizing of the box and that of inlet port should be large enough so that they do not cause any turbulence over the weir. The design and arrangement of constant rate filtration process shall be as directed by the Engineer-in-Charge and as specified in Para 7.6.8.1. of CPHEEO manual.

General Layout and Carpet Area

Full details should be indicated in general layout plan.

DS-6 Bypass Arrangement

Design and Construction

Bypass arrangement shall be provided as per detail mentioned in Schedule-B. The arrangement shall be designed for a required flow plus 20% overload. It shall also include construction of RCC chamber of suitable size wherever necessary.

It should be possible to bypass.

Flash mixer and clariflocculators.

Filters totally and/or partially

Flash mixer and clariflocculators and filters

Clariflocculators shall be designed to take water to the chlorination point of pure water channel in the filter house proper.

Note: For bypass arrangement SS Knisf gate valves to be used instead of gates.

The period of bypass will be minimum possible required for various units and repairs, whether panel or otherwise. During this period the hydraulic capability of various units will be utilized to the maximum but in any case no unit shall be over flooded nor the quality of pure water be deteriorated beyond acceptable limits. The Contractor shall give trial of such hydraulic bypass and limits of end quality achieved.

Piping

Pipes and specials shall be of D I K7 Class.

The DI sluice shall be provided instead of sluice valves/sluice gates, i.e. Clariflocculator drain, inlet channel, inlet valve of filter beds, outlet valves of filter beds, backwash pumps, blowers, etc. The CIDF sluice valves & Actuators , etc. shall be as per approved list of mechanical equipments of MJP.

DS-7 Wash Water Tank

Design and Construction

The tank shall be of RCC with required capacity. The capacity of wash water tank should be sufficient for cleaning one filter bed with two sections even though only one section is to be washed at a time at the rate of 600 lit/sqmt/min. for 12 minutes duration and shall be provided at a suitable location. In case total beds are more than 4, then capacity should be sufficient for washing 2 beds instead of 1 bed. The tank shall be at such an elevation as would give an effective net head of 12 m at the under drain of the filter beds. In addition to above 10 cum extra capacity be provided for other utility.

Allied Items

Water level indicator

One water level indicator shall be installed in the filter house

RCC spiral staircases for access to the top of the tank and M.S ladder inside the tank.

2 Nos of C.I. heavy-duty manhole covers with frames of size 0.9 x 0.6 m with locking arrangements.

Lightening conductor

One No. as per relevant IS specifications.

Piping and Valves

C.I. pipe line with specials, valves etc. shall be provided from wash

water tank filling pump in pump house to wash water tank and wash water tank to filter for back wash and the required sizes of G.I. pipes for chemical tank and sanitary block shall be provided from wash water tank.

DS-8 Chemical House and Store Chemical Feeding Equipment

Design

The building shall be constructed in two floors as indicated. It shall be a RCC framed structure in columns and beams with brick paneling of minimum 23 cm thickness. It should not be located on pure water sump.

Area and Location

The chemical house shall be so located that the chemical could be conveniently and easily fed and controlled between the inlet chamber and flash mixer and fed by gravity. The minimum carpet area for chemical house (in two stories) and chemical store in single or two story shall be as below.

Chemical House	Chemical store total minimum
..... Sqmt.	10 Sqmt min. separately required

Above area is the total area, which can be split in two floors.

Above areas excludes 150 sqmt. area of filter house as shown at OR-10 (V- g)

Minimum ceiling/roof height	4 m on ground floor
	4.5 m on first floor

The entire construction shall be a RCC structure in columns and beams as specified with panel of 23 cm thick brick walls for external walling subjected for exposure to rains.

Construction

Ground floor

The ground floor shall accommodate alum store for 90 days lime for

30 days and TCL powder for 7 days requirement and other misc. store. Platform type alum weighing machine of 1.00 MT capacity, the average height of the plinth of chemical house shall be 0.6 m

First floor

The first floor shall accommodate minimum 3 RCC solution tanks. Similarly it shall also accommodate laboratory, test room and TCL solution tanks for pre-chlorination and post-chlorination and lime tank. The chemical tanks shall be designed and provided as below.

Alum Tank.

Minimum three tanks (one for preparation, second for dosing and third for stand by) each tank capable of giving un-interrupted dose of 2.5 mg/l for 8 hours capacity, minimum free board 0.30 m trays for dissolving, level indicator, mechanical agitation devices, solution feed and drain lines, solution feed device. The inner surface of tank and dissolving tray shall be coated with FRP. The strength of solution shall be upto 10% only conforming to IS:9222 part-I-1979.

Lime solution tank

Minimum three number so lime solution tank each of 8 hours capacity to dose upto 2.5 ppm at 10% solution strength to deal with the design flow. The inner surface of tank and dissolving tray shall be coated with FRP

TCL Tank for Post-chlorination

Minimum 3 Nos. each of capacity not less than 3 hours (1 Kg of RCL in 40 lit of water) for a dose of 3 ppm of chlorine to deal with the design flow The inner surface of tank and dissolving tray shall be coated with FRP

TCL tanks for Pre-chlorination

These shall be as per post-chlorination requirement

Mechanical and Other Equipment

A dissolving tray of RCC trough with holes or slots shall be provided on each tank for placing the alum cakes. The alum solution tank shall be fed with pure water by means of PVC 6 Kg.Sqcm. piping and valves of adequate size from wash water tank. Each solution tank shall be provided with brass gauge plate level indicator. The top of the solution tank shall be covered

with 50 mm thick wooden planks properly fixed with rounded edge and painted in three coats of oil paint. The alum mixing paddles shall be of stainless steel of enough section and size. Individual drive arrangement shall be provided. Necessary wash out arrangements shall be provided. An RCC operating platform at suitable level and of 1.20 m width and length covering all the tanks shall be provided. All the tanks shall have independent outlets, feeding the dosing tank. In addition there shall also be adequate capacity lime solution and TCL solution tank with allied equipment to work in emergency situation.

For lime solution tank mixing paddle shall be of mild steel with individual driving arrangement. Constant head device with manual dose adjustment arrangement shall be provided for all chemical solution tanks i.e. without arrangement of automatic dose arrangement. 100% stand by shall be given i.e. one more constant head device at every tank be provided in spare.

All valves, pipes and fittings for dosing and washout shall be non-corrodible materials and should be of adequate size. Monorail operated chain pulley block of 1.0 MT capacity with geared trolley shall be provided for handling the chemical in storage area. This can be manually operated. In addition to the above one MT capacity simple chain pulley block fixed to a hook of first floor shall be provided to lift the chemicals to top from chemical store. The chain pulley block should be of Morris/Elephanta make

An opening of suitable size floor for lifting alum bags from ground floor to first floor shall be provided. The opening of the floor shall be provided with 25 mm dia G.I pipe railing in double row and 0.85 m high. The operating platform of solution tank shall be provided with G.I. pipe railing. The tank shall be provided with 1.20 m wide access staircase with 15 cm wide M.S. plate stringers of 10 posts and two rows of 25 mm dia (internal) G.I. pipe (medium duty) on both sides. Precaution shall be taken to ensure continuity of feeding, alum solution by gravity and prevention of gas hazards, corrosion. Accuracy of the dosing equipment shall be an essential requirement. Constant head device with manual closing arrangement shall be provided.

The chemical house, platform, staircase shall have flooring of corrosion proof tiles.

DS-9 Wash Water Pump Sets

Design and Specifications

Two Nos. of wash water pump sets as described under the statement of obligatory requirement shall be provided. One will work and another pump sets as standby. Hence, total 2 Nos. of pumps shall be provided with 100% standby for wash water pumping and capacity to fill up the wash water tank in 1 hours. The pump characteristics shall be suitable for satisfactory operation for head range qualified. The pump speed shall not exceed 1000 rpm (Syn.). The efficiency shall not be less than 75% at duty point.

Construction Features

The pumps shall be vertical turbine and if positive suction possible then vertical inline or horizontal splitcase. But the pump shall run without cavitations. The impeller shall be balanced both statically and dynamically. The interior surface and passages shall be smooth finished. The shaft shall be of solid type and manufactured from high tensile steel. The shaft sleeves shall be of bronze and shall be securely keyed to the shaft. The bearing shall be heavy duty, anti-friction ball bearings. The stuffing boxes shall be of such design as to enable re-packing without removal of any part except gland lantern ring. The stuffing boxes shall be provided with a drain hole for connecting drain pipe to drained leaked water through gland. Arrangement shall be provided for collection of gland leakages and discharging with G.I. piping near outlet wall into small channel provided under civil works contract.

The pumps shall be provided with a common base plate of fabricated steel or cast iron for mounting of pump and motor. In case of fabricated base plate it shall be designed for adequate rigidity and vibration free operation. The contractor shall submit the fabricated drawing for approval prior to fabrication. The pumps and motor shall be installed on suitable girders of size not less than ISMB 200 x 100.

The coupling between pump and motor shall be steel pin and rubber bush type flexible coupling shall be of adequate size. The coupling shall be dynamically balanced after being keyed to the shaft. The suction and delivery connections shall be integrally cast with the casing the flanges being flat faced and drilled to IS:1537. It shall be fixed on suction side of the pump as per direction given by the Engineer-in-charge, including jointing material and hard-ware etc complete.

Both suction and delivery ends of the casing shall be provided with a 12 mm (1/2") tapping for mounting of pressure gauges. The tappings shall be provided with bronze collared plugs. Each pump shall be provided with 150 mm dia delivery pressure gauge with isolating cock and suitably calibrated to indicate pressure from 0 to 100 m. 150 mm dia combination vacuum pressure gauges suitable to read suction lift upto 3 m and suction head upto 5 m. The gauges shall be provided with syphon tube and isolating cocks of standard make with pulsation dampener.

Material of Construction

Pump casing	:	Cast iron, conforming to IS: 210, Gr.20
Impeller	:	Bronze
Shaft	:	Higher tensile steel (EN-8 or superior)
Shaft sleeves	:	Bronze
Flexible coupling	:	Forged steel conforming to IS:3445.
Wearing rings	:	Bronze

The pumps shall be tested at manufacturer's work in the presence of representative of Department.

The scope of inspection is given below.

Review of raw materials test certificate and quality control procedures.

Hydrostatic test on casing.

Performance test.

Strip inspection after performance test for one random pump to check,

Rubbing if any,

Wearing ring clearances

Dynamic balancing of impellers.

Note : If only positive suction possible then only go for HSC pumps or else agency shall consider VT pumps

VACUUM PUMP WITH MOTORS

- a) The bidder shall design priming arrangement with 2 Nos, dv 30, 3 HP vacuum pumps. The arrangement shall be available for manual operation and shall be complete with isolation valves with all allied electrical equipments and mechanical components complete.

The pump shall be capable of creating vacuum of not less than 600 mm of mercury evacuating air at normal temperature and pressure at the rate of not less than 150 Cum/hr. The pump unit shall be set type, operating on principle of formation pump of liquid ring due to rotation of motor, complete to curing or operating on equally good principle. The casing shall be designed to withstand vacuum. It shall be complete with foot for mountings and suction and delivery nozzles. The motor and its fittings shall be designed to withstand high temperature and stresses. The motor shaft and shaft sleeves shall be heavy duty and designed for minimum wear. Stuffing box shall be adequately deep to prevent entry of outer air. Liquid deflection shall be provided to prevent entry of gland leakage to bearings. The bearing shall be grease lubricated with arrangement for repacking and refilling of grease.

i)	Casing	:	C.I. (IS:210 PG-180)
ii)	Rotor, rotor shaft	:	Steel (EN-8)
iii)	Sleeves	:	Cr. Steel/leaded in bronze

The unit shall be mounted on M.S. base plate common to vacuum pump and motor. The motor shall be directly coupled to the pump and shall have minimum 20% excess margin of power over and above power requirement. It shall be rated for continuous duty. The motor shall be TEFC squirrel cage type suitable for operation 415 V, 3 phase, 50 Hz. electric supply. Accessories as under shall be provided on vacuum pump.

Vacuum gauge of suitable size duly calibrated.
 Drain lock
 Adjustable relief valves

G.I. piping for vacuum pump

This item includes G.I. pipe 40 mm dia B class for piping and gun metal valves 4 Nos for piping.

Unions, bends, tee, etc. required for erection of vacuum pump are included in this item.

Contractor shall provide pressure gauge 100 mm dia, capacity range 0 to 70 M and of pressure gauge complete with tube, isolating cock, suitable to 12 mm dia G.I. pipe. It shall be installed at end delivery side of casing, provided with 12 mm tapping. These tappings shall be provided with bronze collared plugs.

Location of pumps

Wash water pumps shall be located near pure water channel by constructing separate sump of required capacity as directed by Engineer-in-Charge.

d) Allied Items Piping and valves

The piping shall be provided consisting of suction and delivery upto wash water tank inlet. It shall be of C.I. A-class of suitable dia. All piping shall be double flanged pipes and specials.

Each pump set shall be provided with strainer C.I. foot valve and 1 No. of CIDF sluice valve, one reflux valve etc. on delivery side.

The test of the pumping machinery shall be given for a period of 100 hours non-stop. Performance of machinery will also be observed in the entire performance period.

A panel board of suitable capacity shall be provided with all fixtures thereon, suitable for these pumping sets, including circuit breaker of suitable type, switch fuse units, capacitors and starters all as necessary for complete job.

DS-10 CHLORINE ROOM AND CHLORINATORS

DESIGN

Two numbers of vacuum type chlorinators having capacity to treat required flow at a dose 20 Kg/hour should be provided, for post chlorination (1 working + 1 standby)

The required size of chlorine storage and chlorine room of 18 Sqmt minimum shall be provided.

CONSTRUCTION

Disinfection will be achieved through chlorine gas for this purpose. Not less than 2 numbers of vacuum type chlorinators of reputed make like Pennwalt, Meito with due approval from the Chief Engineer (K.R.), Maharashtra Jeevan Pradhikaran with all accessories shall be provided and erected as per makers specifications. Dosing capacity of each shall be upto 20 Kg/hour.

Chlorinators shall be housed in chlorine room. The chlorine cylinder room shall be located and designed for facility of removing and bringing in large chlorine cylinders. There should be provision of weighing machine of adequate capacity to weight and keep the cylinder on top of cradles during use. The chlorination room shall be provided with additional ventilators at

floor level also. Exhaust fans, at least 6 numbers should be designed to accommodate at least 3 numbers of toners at a time all on cradles. The arrangement of storing shall be conforming to provisions of bylaws prepared for gas storage by the Central Government 1981. The piping conveying gas to chlorination room shall be concealed below detachable false flooring. For movement of cylinders from truck to cradles and in between cradles shall be done with 2.5 MT capacity gantry. The offer of the contractor shall include cost of tested full chlorine filled cylinder, 8 numbers minimum (Toners of 900 Kg) to be installed before commissioning.

PIPING

This shall be provided from the chlorinators upto the point of application and shall be of PVC with suitable specials, piping shall also be provided for supply of pure water to the chlorinator from a suitable tapping point.

The safety equipment for chlorine gas cylinder handling such as gas mask with artificial inhaling arrangement of a reputed Company in 3 sets to be provided. Chlorine leak detention and control equipment shall also be provided in 3 sets. Water tank of required size shall be provided for supply water to chlorinator..

DS-11 EMERGENCY DISINFECTION ARRANGEMENT DESIGN

This arrangement is proposed for disinfection of water by TCL. The capacity of each TCL solution tank shall not be less than 3 hours capacity (1 Kg TCL in 40 liters of water). There will be 3 number of tanks.

CONSTRUCTION

The emergency disinfection TCL tank shall be located suitably in the chlorination room. The chlorination room should have a separate entrance. Tank walls shall be lined from inside with bitumen rubber paint or any other suitable anticorrosive materials. Additional ventilators shall be provided at floor level.

ACCESSORIES

Approach ladder and walking platform 1.20 M wide with G.I. pipe railing as specified in the General Specifications for Mechanical Engineering Works shall be provided if the tank top is more than 1 M above the floor.

PIPING

This includes alkathene piping encased in A.C. pipes for solution outlet and drawn up to the point of discharge and G.I. piping with valves for feeding pure water to tanks, right from tapping point.

MECHANICAL EQUIPMENTS

The tanks shall be provided with electrically operated suitable stainless steel shaft fixed with stainless mixing paddles with suitable motor cover. A dosing arrangement consisting of constant head dosing box with stainless steel ball valve and polythene float and stainless orifice with stainless steel tappet shall be provided to administer appropriate dose of chlorine at each place. A solution level indicator shall be provided to each tank.

DS-12 ELECTRIFICATION

The main distribution panel board should be connected to panels for flash mixer, clariflocculator, clarifier, chemical agitators, lighting purpose, etc. This item includes all power/control wiring, external, internal electrification, illuminaries, fixtures, switch fuse unit, circuit breakers, etc. This units shall be as per site requirement and test and trial shall be given upto the satisfaction of Engineer-in-charge.

The contractor shall submit single line diagram, running load and connected load calculation. Design fault level for 440 V system shall be 35 kA. The contractor should also submit design calculation showing size, Amp. Rating of PVC armoured 1.1 kV grade aluminum cables with voltage drop calculation. Electrical illumination shall be provided at 150 lux for internal works and 10 lux for outdoor premises. The outdoor lighting shall comprise of street pole, wall bracket of suitable size. Lighting system shall be designed accordingly. Earthing as per IE Rules and relevant IS Standards shall be provided. Internal illumination shall be with LED and external shall be with LED lamp.

The contractor should design HP rating of the equipment with safety margin of the 30% upto 30 HP and 20% margin for 31 to 150 HP prime movers/motor.

Note:- Agency shall supply 5 Nos of 12.5m high most with 120W luminaries in WTP premises

Types of starter will be as below.

Upto 7.5 HP	DOL Starter
7.5 HP to 30 HP	Fully automatic star-delta starter in standard confirmation.
30 HP & Above	ATS Starter

A ventilation equipment such as exhaust fans shall be provided to achieve 10 air changes/hr. Air circulator with pedestal shall be provided.

The source of electric supply for the electrification of WTP works shall be

made available on the main control panel of the proposed raw and pure machinery through separate contractors at the pump house.

The contractor will have to provide the main supply cable from the control panel in the pump house up to main control panel of the WTP equipments of 1.1 kV grade PVC armoured 3.5 core of suitable size and ampere rating of required length under ground or above ground as per site situation.

The Clariflocculator Bridge shall be provided with 1.1 KV grade, 16 sq.mm, 4 core XLPE copper cable double run for supply to Bridge motors with minimum 28 no. of brushes of slip ring. Also the 1.1 KV grade, 2.5 sq.mm, 30 core XLPE copper cable shall be provided for control supply for automation system. The cable shall be laid from Main LT Panel in WTP to slip ring rotor provided in the central shaft of Clariflocculator Bridge.(with 100% standby cable.)

The motor, cable, switch gear, circuit breaker, panel board, capacitor. All allied equipments shall be suitable for these design without any overloading at any operational point. All electrical work shall be carried out as per relevant specifications, IE rules and PWD standard specifications.

Separate panel Board for actuators shall be provided for operations of actuators.

A separate room of 10 x 5 mtr. Size shall be provided for housing PLC panel and Actuator Panel near to Main LT Panel of WTP and away from chlorine & alum dosing arrangement/ stores.

DS-13 LABORATORY EQUIPMENT

The laboratory shall be suitably accommodated on the ground floor of chemical house. The contractor shall provide the laboratory equipment to the latest and up to-date design and shall consist of,...

Jar test apparatus to decide optimum alum dose including chemical/electrically operated stirrer.

One turbidity rod for measuring the turbidity of raw water.

a) A latest type optical turbidity meter for measuring the clarity turbidity of filtered and settled water.

A turbidity meter specially to measure turbidity of pure water with digital display alongwith 2 Nos of spare kits.

One electrically operated pH meter (Aquascope) with full range of compactor discs with necessary reagent.

Two chloroscopes for measurement of chlorine with necessary reagent.

One wash basin of large size for laboratory use with inlet pipe connections from main and washout pipe arrangements upto manhole.

Plastic (white/transparent) buckets of 15 liters capacity - 2 Nos.

One analytical chemical balance with glass case, one of weighing capacity upto 200 gms and sensitivity upto 0.1 milligram alongwith a weight boxes. One mechanical balance of 1 Kg capacity with dial display shall be provided with sensitivity one gram.

ix)	Stainless steel tongs of 200 mm size	2 Nos
a)	Crucible with silica and lid	2 Nos
b)	Test tubes 15 and 20 cm size	12 Nos
c)	Volumetric pipettes range varying from 1 cc to 100 cc.	6 Nos
d)	Measuring flask various range	4 Nos
e)	Beakers	4 Nos
f)	Weighing bottles	2 Nos
g)	Bottles 1000 cc	2 Nos
h)	Burette 25 cc	6 Nos
i)	Reagent bottles of different capacity	4 Nos
j)	Chemical flask 250 cc	4 Nos
k)	Porcelain crucible 25 cc	4 Nos
l)	Measuring cylinders 100 cc to 500 cc	4 Nos
m)	Distillation flask 1000 cc	1 Nos
n)	Pipette stand for 12 pipettes	3 Nos
o)	Test tube stand	2 Nos

One electrically operated „Beaker“ laboratory flocculator for stirring solution.

One water works model of minimum plan size as per actual execution, in a glass case mounted on a T.W. table to be located in the office room of filter house.

SAMPLING TABLE

This shall be provided for collecting samples of raw water, settled water, filtered water and chlorinated water with necessary pumps if required, clarity bowls, glazed sink, piping and teak wood French polish table size not less than 1 x 2 m with glass cover and aluminum top for supporting the same, on which the bowls are mounted. All fittings for the table shall be chromium plated.

Individual supply lines of the sampling table shall be marked (preferably on the push rod of the cocks) with distinctive letters such as raw, settled, filtered, etc. The whole assembly shall in form of pleasing features with arrangement in the background for clear vision. The equipment shall also include drain connecting the manhole outside the filter house.

Two sets of instruction manual for operation of flash mixer, clariflocculator, filters, venturiflume and the flow recording equipment and the chlorinator shall be provided at no extra cost.

The contractor shall identify and provide all necessary reagents and chemicals so as to enable the chemist and his assistance can satisfactorily test the samples and analysis then for a period of 3 months.

The contractor shall provide 1 No. of Godrej medium size almaries and Godrej book case and 1 No. of large Godrej table 6 Nos of chairs along with 3 Nos of cushioned stools.

A quartz type battery operated 30 cm dia wall clocks.

DS-14 INTERNAL ROADS

The item shall include designing the works to an attractive layout, leveling of the works site and construction of internal WBM roads of 3.5 M total width with asphalt topping 40 mm thick of 3 M width approachable to each unit of the plant with side gutters. Which shall be as per standard practice.

DS-15 PURE WATER SUMP.OBLIGATORY LEVEL OF SUMP BOTTOM-103.0 M DESIGN AND CONSTRUCTION

Capacity of sump shall be minimum 1 hours storage. The construction shall be in RCC.

ALLIED REQUIREMENTS

The water level indicators 1 No. mechanical and 1 No. of electronic digital display shall be provided to each compartment. Mechanical and 1 No. electronic shall be fitted in wash water pump house and 1 No. of display in the office.

Suitable decorative RCC ventilators shall be provided.

4 Nos 1.2 m x 0.9 m C.I. heavy duty manhole frame and cover with

suitable locking arrangements shall be provided and fixed.

Sufficient No. of access ladders/steps shall be provided.

Overflow from pure water sump is necessary upto 15 m length from sump.

In addition to sump, 30 minutes capacity chlorine contact tank (CCT) shall be provided.

DS-16 PURE WATER PUMP HOUSE

Pure water pump house with double floor arrangement having pump floor area $m \times \dots m$ & panel floor area $\dots \times \dots m$ shall be located on pure water sump and shall have adequate area to accommodate pumps. Height of pump house shall be 9 M minimum. Ventilation shall be minimum 20%. The construction should be in RCC frame structure and brick panels of minimum thickness of 23 cm. Top slab thickness should be 12 cm minimum. Doors shall be in CCTW and steel windows fully glazed shall be provided. Floor shall be provided of 50 mm thick shahabad stone with M-100 bedding. The arrangement of cable tray/trench, location of panel board, etc. shall be got approved from Maharashtra Jeevan Pradhikaran. The pump house columns shall be designed with corbels for 3 tonnes gantry. The scope does not include the providing of gantry. The required size of common suction pit of 1.0 M depths through out the sump length shall be provided in the sump. For design of pump house floor, the impact factor should consider as under. Weight of pumps Bowl assembly 3 times + two times of motor weight and + discharge head base frame, sole plate, column assembly weight + weight of water etc..

DS-17 CONVEYANCE OF WASTE WATER AND SLUDGE DRAIN ARRANGEMENT DESIGN

The arrangements is to be provided for collecting and carrying the water and sludge from the intake chamber, venturiflume, flash mixer, clariflocculators, filter house, chemical house, overflow of wash water sump and pure water sump, etc. through a system of pipes and manholes upto point of discharge i.e. point as shown in the drawing of last manhole near to the boundary of plot. The pipe shall run 2/3 full. The maximum velocity at 1/3 flow shall be less than 1 M/sec. The conveyance system to drain effluent of septic tank shall be provided separately upto soak pit. (The size of drainage pipe shall be decided as per design requirement). To drain out sludge from each unit C.I. -B Class or D.I. pipes shall be used and to convey sludge from manhole to manhole RCC pipe shall be used.

CONSTRUCTION

The pipelines shall be of RCC, NP2 class jointed with CM 1:2, the minimum cover over the sewer shall be 0.8 M. The pipe below 200 mm dia shall not be used in the system. The system shall include all valves, specials, etc. as per requirements at site and as directed by the Engineer-in-charge.

MANHOLE

These manholes shall be in B.B. masonry and shall be in rectangular shape of 0.9 x 0.45 M opening minor as directed by Engineer-in-Charge.

The diameters of manhole shall be as stated below.

1) Depth upto 1.0 M	1.0 M dia
2) Depth from 1.0 to 2.0 M	1.2 M dia
3) Depth from 2.0 to 3.0 M	2.0 M dia
4) Depth more than 3.0 M	2.5 M dia

The B.B. masonry shall be 23 cm thick for manhole upto 1.0 m depth, 35 cm thick for manholes between 1 m to 2 m depth and 45 cm thick for manholes more than 2 M depth. The bottom of each manhole shall be of 30 cm, M-100 (1:3:6) C.C. with a benching of M-150 (C.C. 1:2:4). The bottom and inside and outside surfaces of the chambers shall be finished smooth with cement plaster in CM 1:3. Manhole shall be provided with heavy-duty C.I. manhole frame and cover (500 mm dia as per ISI:1726-1967) C.I. steps shall be provided for manholes more than 1.0 M deep.

DS-18 SANITARY BLOCK

DESIGN AND CONSTRUCTION

There should be one unit and accommodated suitably in filter house and chemical house. It shall be completely closed structure, constructed in brick masonry with RCC roof slab. The area of the block shall be as per standard requirements of ISS and Factory Act Provisions.

This block shall consist of,...

i) 600 mm size water closets (Indian type)	1 No.
ii) Urinals separated by Kadappa partition, 525 mm size coloured.	2 Nos
iii) Wash hand basin with mirror	1 No.
iv) Bathroom with showers, towel rod 3 Sqm mirror, shelf etc.	1 No.

All the provision in the sanitary block shall be of standard quality. The area

of the sanitary block shall be 15 Sqm. The floor of the entire block shall be provided with approved glazed tiles. Dado in glazed tiles shall be provided for all units, for a height of 2.0 M. Adequate ventilation with exhaust fans shall be provided.

ALLIED ITEMS

Water feeding connection : G.I. pipelines of required size and lengths with specials, valves, etc. shall be provided for all the units.

Flushing tanks : Flushing tank of 14 liters capacity shall be provided for each water closet and urinal respectively.

Sewage effluent connection : All units shall be provided with suitable size and length of outlet connections to septic tank.

There should be one unit of instant geisure in bathroom.

DS-19 TRIAL RUN

The period of trial run shall start from the satisfactory commissioning of the plant by the contractor as mentioned in program under General Conditions.

After satisfactory completion, the plant is to be run for a period of 3 months under this item. During this period bulk water, electricity shall be supplied by the Maharashtra Jeevan Pradhikaran, free of cost. The contractor shall supervise and offer training guidance, consultation, etc. to the staff during this period for smooth running of the plant. Required operation maintenance manual, catalogues, etc. be supplied in 6 sets along with all forms, registers, charts, etc. by the contractor during this trial run maintenance period.

Similarly, 3 sets of colour photographs of major stages of construction shall be taken and furnished to the Maharashtra Jeevan Pradhikaran for record.

The plant will be taken over the Maharashtra Jeevan Pradhikaran after expiry of successful trial run period. If the contractor is required to run the plant beyond the trial run period, establishment charges shall be payable to the contractor. Contractor should get the requirement of staff in various categories and rate of monthly payment to them approved by Maharashtra Jeevan Pradhikaran, before the expiry of trial run period. Contractor shall get the payment of establishment, to the extent of activity engaged him for this purpose.

After successful commissioning of the scheme, plant shall be operated and maintained by agency for a period of three months. He operation an maintenance refers to up-keeping the civil, mechanical and electrical components of the plant through normal repairs so that they are able to function to designed capacity and parameter and locally and daily operation

plants equipment values, machinery etc.

Staff to be deployed for operation and maintenance as per Annxure. Complete record of bacteriological and chemical analysis from source to consumer tap should be maintained. Monthly samples shall be taken and atleast 5 samples of consumer tap shall be taken. Register shall be maintained for all such records.

APPENDIX - II

Sr.No.	Description of Item	Civil cost Rs.	Mechanical cost Rs.
1.	Hydraulic and process design approval	1%	1%
2.	Structural design approval	3%	--
3.	Inlet works consisting of inlet chamber, venturi flume flow meter flash mixer with agitator.	4%	8%
4.	Clariflocculators	22%	24%
5.	Rapid sand filter and filter house	22%	19%
6.	Chemical house, administrative block, Chemical tank, chlorine room, chlorinator, lab equipment, sanitary Block, air blowers, access roads, compound wall, recirculation sump, landscaping and Staff Quarters.	14%	18%
7.	Wash water tank, wash water pumps, pipe assembly valves etc.	6%	11%
8.	Bypass arrangement	2%	4%
9.	Pure water sump and pump house	2%	--
10.	Drainage arrangement	13%	6%
11.	Electrification	2%	7%
12.	Hydraulic testing	7%	--
13.	Trial run and site cleaning	2%	2%
	Total	100%	100%

Item wise payment schedule of payment for conventional type WTP.
(Tentative)

3a) Inlet works - Civil

Inlet chamber, venturi flume, flash mixer
With agitation

i)	Excavation	:	4%
ii)	PCC and foundation	:	4%
iii)	Superstructure consisting columns, base slab,	:	82%
iv)	Misc. items as per A/T such as plastering,	:	10%

	railing, painting, glazed tiles, etc.		
	Total	:	100%

3b) Inlet works - Mechanical

i)	On supply of equipment as per A/T such as agitator for flash mixer, motor, switch gear, panel, „V" notch, flow meter and pipe assembly for inlet chamber.	:	80%
ii)	On erection and testing of the above equipment on complete erection, testing and commissioning including three months trial run)	:	20%
	Total	:	100%

4a) Clariflocculators - Civil

i)	Excavation	:	10%
ii)	PCC	:	12%
iii)	Bottom slab	:	28%
iv)	Vertical wall of clarifier	:	28%
v)	Launder wall, slab and flocculator wall	:	16%
vi)	Misc. works as per A/T such as plaster, tailing, ainting, precast steps on walk way, etc.	:	6%
	Total	:	100%

4b) Clariflocculators - Mechanical

i)	On supply of equipment as per A/T such as clarifier, bridge rails, gear boxes, motor, switch gear, panel, inlet pipe and sludge pipe with valves and constant bleeding equipment.	:	80%
ii)	On erection and testing of the above equipment	:	20%
	Total	:	100%

5a) Rapid sand filters and filter house - Civil

i)	Excavation	:	7%
ii)	PCC	:	7%

iii)	Base slab	:	16%
iv)	Filter house upto roof slab	:	30%
v)	Filter box upto and including walk way	:	20%
vi)	B.B. masonry walling, doors and windows	:	10%
vii)	Plastering and flooring	:	5%
viii)	Misc. works as per A/T such as railing, painting, cover on rate control chamber, M.H. frame cove on pure water channel.	:	5%
	Total	:	100%

5b) Rapid sand filter beds and filter house - Mechanical

i)	On supply of pipes, valves and gates as per A/T	:	40%
ii)	On supply of under drain pipe and tees as per A/T	:	10%
iii)	On supply of filter media as per A/T	:	20%
iv)	On supply of gauges and loss of head and rate of flow meter as per A/T.	:	10%
v)	On erection and testing of the above equipment	:	20%
	Total	:	100%

6a) Chemical house, chemical tank, administrative block, chlorine room, chlorinator and sanitary block etc. - civil

i)	Excavation	:	5%
ii)	PCC footing and column upto GL	:	12%
iii)	Columns, beam upto and including roof slab of ground floor.	:	20%
iv)	Columns, beam upto and including roof slab of first floor.	:	20%
v)	Chemical tanks	:	5%
vi)	B.B. masonry, doors and windows	:	20%
vii)	Plastering and flooring	:	10%
viii)	Stair case	:	2%
ix)	Poarch	:	1%
x)	Misc. works as per A/T such a painting.	:	5%
	Total	:	100%

6b) Chemical house - Mechanical

i)	On supply equipment for chemical tank with pipes and valves as per A/T.	:	10%
ii)	On supply of chlorinator with pipes and valves as per A/T	:	20%
iii)	On supply of air blower, motor, switch gear, panel pipes and valves, etc.	:	40%
iv)	On supply of sanitary and WS equipment as per A/T	:	5%
v)	On supply of lab equipment and furniture as per A/T	:	5%
vi)	On erection and testing of above equipment	:	20%
	Total	:	100%

7a) Wash water tank - Civil

i)	Container excluding roof slab	:	60%
ii)	Roof slab, internal column and beams	:	25%
iii)	Plastering, ladder, lighting conductor, water level indicator, railing.	:	10%
iv)	Misc. works as per A/T such as painting, etc.	:	5%
	Total	:	100%

7b) Wash water tank - Mechanical

i)	On supply of vertical pipe assembly with inlet, outlet, overflow valves and specials as per A/T	:	40%
ii)	On supply of wash water pumps, motors, switch gear and panel boards as per A/T	:	40%
iii)	On erection and testing of the above equipment	:	20%
	Total	:	100%

8a) Bypass arrangements - Civil

i)	Bypass channel and bypass piping	:	75%
ii)	Bypass chamber	:	15%
iii)	Other misc. works as per A/T	:	10%
	Total	:	100%

8b) Bypass arrangement - Mechanical

i)	On supply of gates as per A/T	:	80%
ii)	On erection and testing of gates	:	20%
	Total	:	100%

Pure water sump and pump house

i)	Excavation	:	10%
ii)	PCC and foundation slab	:	15%
iii)	Vertical Wall	:	15%
iv)	Column, beam and roof slab of sump house	:	10%
v)	Column beam and roof slab of pump house	:	20%
vi)	B.B.Masonry, doors and windows	:	10%
vii)	Plastering and flooring	:	15%
viii)	Other misc, works as per A/T such as painting, M.S. ladder, M.H.frame and cover etc.	:	5%
	Total	:	100%

10a) Drainage arrangement - Civil

i)	Excavation of drainage pipeline and construction of chambers as per A/T	:	100%

10b) Drainage arrangement - Mechanical

i)	On supply of drainage pipes	:	80%
ii)	On lowering, laying, jointing of pipes	:	20%
	Total	:	100%

Electrification - Mechanical

i)	Internal and external electrification to entire plant as per A/T including main panel board switch gear as per A/T	:	100%

Hydraulic testing - Civil

i)	Inlet Work	:	6%
ii)	Clariflocculators	:	22%
iii)	Filter Beds	:	30%
iv)	Wash Tanker Tank	:	12%

v)	Bypass channel	:	5%
vi)	Sump	:	20%
vii)	Drainage arrangement	:	5%
	Total	:	100%

13)	Trial run and site cleaning	:	100%

NOTE

As separate provision is made for hydraulic testing and testing of mechanical equipment in the break up schedule no further deduction through R.A. Bills on account of hydraulic testing is necessary.

Daily record of raw water pumped, pure water pumped from WTP, water pumped to ESR, Alum doses, Alum consumed, turbidity, pH, chloride dose, residual chlorine at consumer end etc. shall be maintained. Calibration chart for turbidity and chlorine dose shall be prepared.

Daily record of filters washed

Contractor

No. of correction

Executive Engineer

Maharashtra Jeevan Pradhikaran

Name of work : AUGUMENTATION OF KULGAON BADLAPUR WATER SUPPLY
SCHEME Tal. AMBERNATH Dist. THANE

STATEMENT OF BASIC DATA VIZ. OBLIGATORY REQUIREMENTS OF THE WORK

The water treatment plant shall be in RCC and designed by the Contractor at his own cost with the following obligatory data.

OR-1 Rated Capacity

The capacity of the plant as a whole, for individual units as per Schedule-B and specifications. The plant shall be , ...60..... MLD Capacity.

OR-2 Layout of Plant

As per Contractor's design, within the boundaries of the enclosed contour plan, the layout shall be such as would give the whole plant an aesthetic appearance. It shall not, however, affect beauty of the architectural treatment given to the face of the central filter house building. The MJP reserves the right to modify the layout, if considered necessary. The layout of plant shall indicate internal roads. The layout of the plant shall be as compact as possible. The Contractor shall have to construct the treatment plant for capacity 60 MLD and in accordance with the detailed specifications. .The contractor shall perform working survey of the land allotted for WTP. The levels given in the Tender document are approximate and contractor shall confirm by himself. Department is not responsible for any difference in the levels

OR-3 Scope of Work

The scope of work shall be as per contract limit marked on layout and as mentioned below -

The work shall start 15 m ahead of raw water inlet chamber as specified in the specifications and end at the last manhole of drainage system. In case of distribution from pure water sump distribution outlet piping should be limited to 15 m excluding control valve. The length of horizontal MS/CI pipe from the face of vertical inlet pipe to inlet chamber shall be 15 m without any sluice valve. The design of Contractor must include all units of Water Treatment Plant as per Schedule-B.

OR-4 Levels

The lip of aeration fountain and F.S.L. of main pure water sump shall be as per data sheet, which are obligatory. The Contractor should ascertain the actual strata met with though the trial pit results given.

OR-5 Foundation

The structure should be founded on hard strata and minimum depth of excavation in hard strata shall be not less than 1.00 m.

Contractor

No. of correction

Executive Engineer

The Contractor has to verify the bearing the same during execution and base the foundation suitably.

The offer of the Contractor shall include excavation for all the units of the plant as per Schedule-B in all types of soft and hard strata by any or all means, including all leads and lifts involved in the work as per actual requirement at the site. It shall also include bailing or pumping out water, right from

commencement of work till its completion in all respects for the entire plant units as per Schedule-B. All machineries, T&P, manpower, etc. required for this job shall have to be provided by the Contractor at his own cost.

All the structures should be checked for seismic zone III action for safety and stability.

All the structure of the units as per Schedule-B shall be design for necessary uplift pressure for entire area of the plant layout, if so insisted by the Engineer-in-Charge.

OR-6 Type of Construction

Reinforced Cement Concrete : Cast in-situ.

To be based on following ISI Specifications.

IS:456 (latest edition), Water retaining structure/water container shall be constructed in M-300 and remaining structures shall be constructed in M-250

IS:3370:1965 Part-I, Part-II and Part-IV.

IS:1893:1975 (Latest edition)

IS:875:1964

National Building Code of Practice, Government of India Latest edition, Publication of ISI.

Any other IS Specification, not mentioned above but relevant in the design, construction, etc. shall be made applicable. For such application no extra claim shall be payable to the Contractor.

IS:13920 for Seismic Zone - III.

OR-7 Construction

The Construction shall be carried out as per (a) Relevant latest ISS; (b) Abstract of specification given in Annexure-I incorporated as per Standard Specification Book, 1972 edition, Government of Maharashtra Publication (c) National Building Code of Practice; (d) Relevant Chapter of PWD Hand book.

In case where alternatives are mentioned in publication for design as well as construction purpose, the approval of the accepting authority of the tender shall have to be obtained for the particular alternative proposal to be used by the Contractor. If MJP does not agree to that alternative, the Contractor shall have to adopt the alternative as suggested by the MJP without extra cost.

OR-8 General Requirements to be provided for in all the Structures Besides Those Enumerated in Schedule-B and Specifications.

For Civil work For all civil works the requirements as laid down in Appendix-A General Specifications, of these tender document shall have to be scrupulously followed.

For Mechanical work The requirements as laid down in Appendix-B of these tender document shall be essentially govern the offer of the Contractor.

For Electrical Works The specification laid down in Appendix-C of these tender documents shall be binding on the Contractor wherever relevant.

For Architectural work The offer should include architectural treatment to the entire plant structure to give an elegant look to the complete premises. The Contractor shall workout details so as to offer elegant look.

OR-9 Use of Steel for RCC Members as Reinforcement CRS

round bar grade-I Fe.500 (IS:432) shall be used.

Tor steel of 415 grade and Mild Steel Grade-I shall only be used as per design. The Contractor shall have to procure the steel from open marked. The steel procured by contractor shall be tested 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 samples from steel brought at site by him in laboratory at his cost and result should be submitted to the Maharashtra Jeevan Pradhikaran. Defective steel brought by the Contractor shall be rejected and will not be allowed to be used. Test certificate starting the chemical composition and characteristics of the product should also be produced.

At least 3 samples of each diameter should be tested from every 5 MT or part thereof. Tests lots only be permitted to be used.

OR-10 Specific Requirement to be provided for in the Design of hydraulic and building structures.

All members of the structures in contact with water shall be in RCC grade (M-30). In case of vertical walls or water retaining structures the portions of walls above FSL and slab covering or incubating water shall also be of the same grade as that of the portion below it. The minimum thickness of such member shall not be less than 15 cm or design requirements. This is not applicable for small channel walls, roofs, and flocculator wall of clariflocculator, which should satisfy the design requirements.

Wherever partition walls are provided in water retaining structures, these shall be designed for the conditions with one compartment as full while adjacent as empty, wherever such condition is applicable.

The sidewalls of water retaining structures shall be designed for the worst condition such as

Tank full conditions without earth filling from outside.

Tank empty conditions with submerged earth pressure from out side.

There shall be no counter-force coming inside the structures.

Aeration Fountain (Cascade Type) Obligatory Level : 65.50m

Aeration Fountain (Cascade Type)

a)	Capacity	As per data sheet
b)	Area to be provided (excluding area of Central inlet shaft)	At the rate of 0.625 m ² /mld
c)	Minimum number of Cascades	4 Nos
d)	Minimum drop	0.8 to 1.0 M
	Minimum rise of step	20 cm
e)	Collecting channel	Peripheral to the aeration fountain (free fall from last step to channel Shall be 20 cm.)
f)	Free Board	Not less than 30 cms.
g)	Velocity	1 M/Sec. to 1.25 M/Sec (Maximum)
h)	Inlet of fountain	C I
i)	R.L. of lip of Aeration Fountain	As per data sheet
j)	Peripheral walkway	1.20 M wide (Minimum) connected to other component
k)	Structure	RCC
	Parshall Flume	
a)	Capacity	As per data sheet
b)	Velocity in channel	Not more than 0.6 M/Sec.
c)	Loss of head	0.75 M. (Maximum)
d)	Free Board	0.3 M. (Minimum)
e)	Access	0.2 M. wide (Minimum) gallery connected to other components.
f)	Structure	RCC
g)	Measuring Device	Simple flow meter with dial type indicator for measuring the flow of raw water for minimum 100 cum/ hour and maximum 500 cum/ hour accurate in reading upto 20 cum/hour shall be provided and fixed. Float chamber to have a drain

valve and draining
arrangement

Distribution Chamber

A distribution chamber shall be provided before or after flash mixer for the treatment plants of capacity 25 MLD or more for distributing flow equally to both clariflocculators.

IV) Flash Mixer

a)	Type	R.C.C. Circular
b)	Detention period	Not less than 60 seconds
c)	Outlets in separate R.C.C. chambers with Proper discharge regulating discharge	one for each clariflocculator designed as to carry required MLD Discharge with maximum Velocity of 1.8 M/Sec. for normal flow, the velocity should be minimum 0.8 M/Sec.
d)	R.P.M. of blade	not more than 150 and should be suitable for achieving required G
e)	Free Board	0.50 M. for normal flow
f)	Value of G to be achieved	$G = 300 \text{ sec.}^{-1}$
g)	Prime mover	Not less than 3.00 B.H.P. Design calculation of flash mixer To be submitted for approval.
h)	Loss of head	0.4 M (maximum)
i)	Side water depth	3.5 M. (maximum)
j)	Shaft and Blade	Stainless Steel
k)	Access	1.2 M. wide (minimum) peripheral walkway connected with other components.
l)	M.S. Covers for motors	6 mm thick M.S. sheet cover for motors

Clariflocculator

a)	No. of units and type	1 No. radial flow
b) i)	Rated flow	As per data sheet
	Detention Period	
i)	Flocculator	30 minutes

- ii) Clarifier 2.5 hours detention time minimum excluding sludge storage capacity upto side water depth.

Note : Capacity below clear side water depth of the clariflocculator shall not be considered.

- c) Side water depth 3.50 M. maximum
Free board Not less than 0.50 M
- d) Floor slope 1:12 slope shall be towards central sludge pocket only.
- e) Inlet shaft RCC of adequate capacity, with velocity between 0.8 M to 1.8 M range.
- f) Surface loading 30 Cum/Sqm/day
i.e. with overloading.
- g) Weir loading 200 to 300 Cum/M/day
i.e. with overloading.
- h) Type of weir Peripheral launder and 6mm thick M.S. right angle V-notches to give clear overfall in the launder painted with ciba. Gaygi epoxy paint
- i) Velocity at the weir Not more than 0.3 M/Sec.
Prime mover :
- i) For blades Not less than 2 BHP
- ii) For bridge Not less than 3 BHP

The detailed design calculation of prime mover, i.e. torque, duty etc. shall be furnished for approval.

- K Launder RCC outside the tank
- l) Velocity of flow in 0.8 M to 1.8 M per sec.
flocculator inlet pipe
- m) Range of velocity 10 to 75 sec -1
Gradient „G”
Agitator assembly 4 Nos. of Paddle agitator for each Flocculator.
- n) Velocity in launder Not more than 1 M/Sec.
Maximum. (Even when considered 20%)

overloading). Difference in clarifier F.S.L. and launder F.S.L. should be minimum 10 cms.

- o) Type of clarifier bridge Full diameter of flocculator and half diameter of clarifier.
- p) Diameter of C.I. drain pipe 300 mm dia.
- q) Sludge Removal Mechanized unit with continuous removal of sludge under pressure.

Bleeding pipe with telescopic valve arrangement shall be provided in a separate RCC Chamber.

- s) Access 1.2 M. wide (minimum) peripheral walkway connected to other components.
- t) Sludge Scraper Mechanical sludge scraper conforming to I.S. no. 10313/1982

The unit of clariflocculator should be such located that it will be able to take the settled water from this clarilocculaor to the inlet of raw water channel of filters of required Mld capacity. The separating wall between clarifier and flocculator should be in RCC only. Brick wall will not be accepted.

VI) Filters

- a) No. of units 6 beds each with 2 section
Each bed to have central gullet.
- b) Design flow As per data sheet
- c) Type Rapid gravity
- d) Depth of filter sand 0.6 to 0.75 M.
- e) Minimum depth of gravel 0.45 M.
- f) Rate of filtration 6.000 Liters/Sq.m/hour.
- g) Overloading to be guaranteed 20% of above rate
- h) Area of filter house Not less than 150 Sqm
excluding filter beds which are open to sky and
excluding control bay With closed roof for administrative officer with sanitation block, lap,

	blowers, wash water pump, MCC and entrance
lobby	
Free board	Not less than 0.50 M.
Rate of back wash of water	liters/Sqm/minute.
Duration of back wash	Minutes
Minimum free fall from outlet weir to pure water channel	20 cm.
Velocity in the pure water channel with overloading Capacity	1 to 1.5 M/sec. with 20% overloading.
Under drain system	Conventional, A.C. pipe of designed Dia. Class 15 with C.I. header tees.
Lateral travel of wash water upto the edge of wash water gutter	Maximum 1.2 M.
Water level above sand surface	Minimum 1.30 M.
Uniformity coefficient of sand	1.3 to 1.7
Effective size of sand	0.55 mm to 0.65 mm.
Specific gravity	2.5 to 2.65
Inlet sluice gate for each filter bed	As per design, but 100 mm dia (Min.)
All outlet sluice valvedia for each filter bed	As per design, but 100 mm dia (Min.)
Drain valve of each filter bed	As per design, but 100 mm dia (Min.)
Minimum control valves for each filter bed when	Filter inlet - 1 No. per bed Filtered water outlet - 1 No. per

Sec.

sectional wash is adopted

Wash water outlet - 1 No. per bed

Air inlet - 1 No per Sec

Wash water inlet - 1 No per Sec

Maximum 1.8 to 2.0 M.

w) Loss of head

x) Designe of washing

Piping of wash water lines, air lines and air blowers should be design for washing 1 section of bed at a time. The dia. of valves should be same as that of respective pipe line. However sectional wash is not compulsory and contractor is free to choose washing or one filter bed with two sections at a time and in that case W.W. pipe line air line, air blower have to be design accordingly pipe respective.

VII) Air blowers

a) No. of units

2 Nos. minimum

b) Rate of air supply

35 to 45 Cum/Sqm/Hr.

c) Duration of supply

5 minute minimum.

d) Working pressure

0.35 Kg/cm²

e) Dia. of piping

Minimum 80 mm. dia C.I. pipes

f) Capacity

Each units is having 2 beds & only one bed is to be washed at a time.

Note : Design calcutions for blower prime mover to be submitted by the Contractor but not less than 10 H.P.

VIII) Chemical house and Chemical store

a) Structure

R.C.C. framed with brick panels in two storeys.

b) i) Carpet area of Chemical house

As per DS-8 detailed specification

ii) Carpet area of Chemical store

As per DS-8 detailed specification

c) Alum solution

As per DS-8 detailed specification

d) T.C.L. solution tank

As per DS-8 detailed specification

e) Lime Solution tank

As per DS-8 detailed specification

f) Laboratory and Rest Room

As per obligatory requirements under OR-ii (VI-h)

Note : Total area should be as per schedule „B”

IX) Wash Water Tank

a) Construction

R.C.C.

b) Capacity

Capacity should be decided at 600

- c) Location Lit/Sqm/ Min + 10 Cum. Vide detailed specification under DS-7 Chemical House/filter house/ independent structure .

Wash Water Pumps For Water Tank

- a) Type Electrically driven, Centrifugal
- b) B.H.P. As per design but minimum 3 BHP
- c) Discharge To fill the tank in one hour
- d) Total head As per design
- e) No of pumps 2 Nos. (one working and 1 standby)
- f) Pipe works and valves To be designed at 2 M./sec velocity minimum size 100 mm.
- g) Location & priming upto 8 MLD on pure water sump with priming arrangement. Above 8 MLD near pure water channel with positive suction

XI) Chlorinators

- a) No. of units 2 Nos.
- b) Dose Pre-chlorination 3 PPM
- c) Rated discharge As per data sheet
- d) Type Vacuum feed type
- e) Injector Booster pumps, suitable for working and standby

XII) TCL Dosing Installation (Emergency Disinfection)

The arrangement shall include tanks, controlling valves, piping, etc. complete.

- a) No of Units 3 Nos. to suit 3 PPM dosing
- b) Total rated capacity As per data sheet
- c) Capacity of tank To suit 3 PPM dosing
- d) Drive for mixing By electric power

XIII) Bypassing Arrangements

As per Schedule „B” and as per detailed specifications.

XIV) Drainage Arrangements

As per Schedule „B” and as per detailed specifications.

XV) Electric Installations

As per detailed specifications.

XVI) Laboratory Equipments
As per detailed specifications.

XVII) Sanitary Blocks
As per detailed specifications.

XIX) Pure Water Sump
a) Capacity 1 hour
b) Type R.C.C.

Pure Water Pump House
a) Floor area Minimum 10 to 20 Sqm. Per pumpset
b) Location By the side of sump/on sump
c) Height 6 M. (minimum)

XXI) Internal Roads
As per detailed specifications.

XIX The design and layout of mechanical equipments and electrical installations required for flash mixer, gear box motor, clarifier bridge and motor, gear box, wash water pumps, air blowers, chlorinators, alum mixing pumps shall be got approved by Executive Engineer (Mech.).

The design, drawings and layouts shall be submitted to Executive Engineer for approval prior to execution of work.

XXI) All the flooring in water treatment plant shall be provided with vitrified tiles. The flooring of chemical house and store shall have 50 mm thick Shahabad stone flooring. And the stair case and all the steps shall have 50 mm thick polished Kadappa stone. All the skirting shall be with vitrified tiles in all inside faces of the walls of the building, except alum store. All the windows shall have marble stone framing.

XXII) All exterior doors, windows, ventilators shall be provided with RCC lintels and chajjas in a box type or any other suitable architectural form. Entrance shall have at least 3.00 m porch in RCC with architectural view.

XXIII) Water proof cement painting and distempering.

All the internal plastered and finished faces of all the walls, columns etc. shall be given three coats of oil bound distemper of approved quality and shade. The ceiling shall be given two coats of water proof cement paint.

All external plastered and finished faces of walls in RCC masonry, columns etc. shall be given tree coats of water proof cement paint of approved shade. The finish of exterior faces shall give aesthetic appearance to the building.

The colour scheme shall got approved from the Executive Engineer in- Charge.

**Maharashtra Jeevan Pradhikaran
WATER SUPPLY DEPARTMENT**

SPECIFICATION FOR ELECTRICAL INSTALLATION

GENERAL

All the electrical installations, both internal & external shall be carried out as per Indian Electricity Rules, 1956 and subsequent amendments from time to time.

The work shall be carried out through a licensed electrical contractor registered with Government of Maharashtra.

The damages caused to the civil structures etc. during electrical installation shall be made good by bringing such locations to their normal condition i.e. original finish at no extra cost.

All the materials used for electrical installations shall be of standard type and of reputed make specified at relevant places hereafter. All the materials shall be got approved from the Engineer-in-Charge prior to the supply.

All safety measures shall be adopted for all the installations as per Indian Electricity Rules i.e. providing adequate earthing, proper installation, etc.

The general layout of the internal and external electrification of entire plant shall be got approved from the Engineer-in-Charge, well in advance. Necessary modifications shall have to be carried out as per instructions of the Department at no extra cost. The tender drawing, if provided is indicative, however, the contractor shall justify his layout tender specifications.

All the external and internal electrical installations shall be properly fixed to

poles and walls respectively to withstand storm, rains etc.

The electrical installations, internal and external shall be adequate and should have decorative finish, keeping in view architectural beauty of the civil structure.

The entire electrical installations, both internal and external shall be commissioned to the satisfaction of the Engineer-in-Charge without any extra cost and shall be covered with guarantee for 12 calendar months for its performance, design equipment's and workmanship, from the date of commissioning.

SCOPE OF WORK

The job involved consists of providing, erecting and commissioning of electrification with necessary allied equipments and its accessories for entire plant structures as per Annexure attached to the tender both external and internal including yard premises of the treatment plant. The agency has to make his own arrangement for electric supply per construction purpose. Department will make available electric supply for commissioning and operation of plant, however, agency shall liaison with power supply authority for releasing the electric supply at water treatment plant. The Contractor shall have to install his panel board in a separate room in the filter house to be constructed by him. Adequate illumination shall be provided both for internal and external areas. Sufficient Nos. of plug points shall be provided on board. External electrification will be done by laying underground cables and internal wiring shall be carried out in PVC conduit as per Indian Standard Rules. The scope also includes the essential items of work and material required but not specified anywhere in specification.

The makes of all mechanical/ electrical components shall be as per the visited only. Equivalent makes are not acceptable.

ITEMWISE REQUIREMENTS

Motor

All the prime movers required for mechanical equipment's of water treatment plant would be of suitable HP, squirrel cage induction motors, working on 440 Volts, 3 Ph.50 Hz., minimum. class of insulation for motors shall be 'B' and construction as per IS:325. The motors for outdoor installation shall be of degree of protection IP 54/55 or superior and continuous duty.

Recommended Makes : As per approved list of MJP.

Starters

Direct online starters for motors upto 5 HP shall be provided. Above 5 HP and upto 30 HP, star delta shall be provided, for motor above 30 HP auto transformer starter shall be provided, these starters shall be of fully automatic.

Recommended Makes : As per approved list of MJP.

Panel Board

Main Distribution Board

A cubical sheet metal enclosed panel comprising 415 V switch gear and control gear shall be suitably designed for functions as under.

Reception of power from pump house by providing and laying adequate size 3.5 core aluminium armoured cable.

Distribution of power to filter house, chemical houses and lightening purpose etc.

This switch gears and controls gears components shall be

The design and components of this panel shall be for approved prior to its fabrication.

One No. adequate Capacity MCCB for reception of power shall be front operated and shunt release type.

Outgoing feeder for (a) air blower, (b) wash water pumps (c) electrical circuits for flash mixer, clarifier, bridge chemical dosing arrangement external illumination and internal illumination etc. (separate feeder for each of the above with adequate spare feeders)

Panel Construction

The 415 Volts control gears shall be housed in totally enclosed sheet metal clad vermin and dustproof cubicles suitable for floor mounting. The panel shall incorporate the following.

415 Volts suitable sized bus-bars with neutral housed in enclosed compartment horizontal/vertical formation.

Inter panel barriers in the bus bar chamber shall be of epoxy painted. The panel shall be fabricated from MS sheets 2 mm thick. Hinged doors shall be provided at the front and rear with car type handles. Mechanical interlock shall be provided to prevent opening of the front door or alternative arrangement shall be provided to trip supply in event of opening of the front door. Suitable stopper shall be provided to restrict opening of the door and scratching of paint with adjoining panel structure. Cable entries and exists shall be from bottom. The indicating and operating devices shall be preferably at uniform levels and shall not be above 1600 mm from floor levels.

The drawing, of the panel shall be submitted and got approved from the competent authority before fabrication. The same shall be tested in the factory before brought to site.

The panel frame work shall have minimum ISMC 75 base channel.

Capacitor

Adequate capacity power factor improving capacitors for blowers, wash water pump and bridge and flash mixer motor shall be provided and commissioned.

Earthing

Ground bus of section not less than 50 x 4 mm G.I. flat and shall be bolted to the frame work at minimum 2 places. Earthing arrangement shall be provided inside each cubical to ensure tank is earthed in all positions of the tank.

Painting

The panel shall be painted as under

	Prime coat	:	One coat of red oxide

	Intermediate Coat	:	Enamel paint of shade approved by the Engineer
	Final Coat	:	As above

Labels and danger mark

Scheme of labeling shall be as under

Each compartment door shall have title label. The component / control on each compartment shall have function label.

Each internal component and fuse shall have identification label with fuse current capacity where applicable.

All external labels shall be clear painted black in English. All internal labels shall be multi-layered plastic. All labels shall be affixed with chrome plated nuts and bolts. Size of labels shall be 50 x 25 mm minimum with height of letters as 5 mm.

Compartment not interlocked to an insulator shall have an external danger mark as under.

‘Danger Live Terminal’ with flash mark and volts in red letter on white background

Mat

Electrical grade rubber mat 6 mm thick extending full length of each panel shall be provided. The requirement shall be applicable for all L.T. panels and starter panel.

Specification of Components

MCCB shall be of (i) LT /EE, Telemechanie/Siemense/C&S only

Digital Ammeter with 96 Sqmm size with CT having suitable ratio

0 - 500 Volts digital Voltmeter of size 96 Sq.mm.

Switch and Fuse Unit

The switch and fuse units shall conform to IS:4047 and IS:4237. They shall be double break, quick break type designed to break under full load condition. All switches shall have ON and OFF indication. Mechanical interlock shall be provided to prevent inadvertent opening when ON.

All fuses shall be HRC and or link type. Indication for state of fuse shall conform to IS:2208.

Indicating Lamps

All indicating lamps shall be of low voltage with series resistance. The lens shall be polycarbonate, oil and dust proof, unbreakable and of suitable colour. The arrangement shall permit removal of lenses and bulbs from front. All lamps shall be protected with individual fused circuit. However LED indicating lamps are preferable.

Meters

The ammeters and voltmeters shall be dust and water tight with plastic windows and of accuracy Class-I as per IS:1248. They shall be flush mounted on panel. Size of the meter shall be 96 Sqmm. Combined digital meter for current voltage and frequency shall be acceptable.

Inspection

The panel shall be offered for inspection and tests to the Engineer-in-Charge at manufacturers works as under.

Complete panel after assembling.

HV test on power and control circuits.

Simulation test of check functioning of control.

Documents

Final dimensional, schematic and wiring drawing or panel board and test reports shall be submitted to the Engineer-in-Charge in 5 copies.

Constructional, schematic and wiring drawings and operation and maintenance for MCCB shall be submitted to the Engineer-in-Charge in 3 copies.

Panel Board for Blowers

The panel shall be cubical type. The panel board designed for the blowers shall have bus bar chambers, phase indicator lamps with switches, ammeter, voltmeter of suitable range with rotary switch and suitable starter with single phase preventor unit and MCB of adequate capacity .

Panel Board for Clariflocculator

The panel shall be double door cubical type. This panel board shall be installed on the bridge of clariflocculator and should be waterproof and weatherproof. It shall consists of MCB of adequate capacity, direct online starter or star delta starters as the case may be etc, including the MCB for fluorescent lights on bridge. The canopy shall be fitted to panel box.

Panel Board for Flash Mixer

The panel shall be of double door cubical type. The panel board for flash mixer shall consist of MCB of adequate capacitys, star delta starter and single phase presenter. The panel board should be water proof and weather proof. The capapy shall be fitted to panel box.

Panel Board for Alum Mixing Mechanism.

The panel shall be cubical type. The panel board shall also include MCB of adequate capacity , starter and single phase preventer. The canopy shall be fitted to panel box.

Note: *The location of all above panel board shall be placed considering convenience and shall be properly installed as per directions of the Engineer-in-Charge. Suitable starters, DOL, Star Delta or auto transformer starter as the case may be shall be suitably installed in Panel board.*

Cables

The base of 3.5 core up to panel and further from panel to motor, cable of 3 core aluminum armored cable of adequate capacity with regard to starting current of motor shall be provided and shall be of reputed makes conforming to IS 1554:1964 and laid as per standard practice in a channel as per Indian Electricity Rules. All cables shall be sized considering duct rating and shall have minimum 10% current margin above duct rating. The voltage drop should be restricted to 10 Volts. The cables schedule should be submitted to the MJP and got approved before procurement and starting the cable work. A stand- by cable from adequate place to panel to panel shall be provided and

laid for clarifier bridge panel.

Recommended Makes: As per approved list of MJP.

Wiring

Internal

Point wiring 1-1.5 Sq mm PVC sheathed FRIS glade wire shall be provided in a PVC conduit of 20 mm dia. With continuous GI earth wire of 14 SWG complete with shock proof accessories erected on Formica topped TW block PV conduit pipe and all necessary conduits specials e.g. bends, tees and cross, elbows, inspection and distribution covers, cutout etc. shall be provided. Generally as specified in PWD electrical red book under specifications EG PW/SW

PVC sheathed wires : Multistrand copper conductor 660/440 Volts
grade

PVC conduit pipe ISI mark

External

All the external wiring will be done by using cable of suitable size 2 core, aluminum armored cable suitably laid in ground below 60 cm with necessary screened sand columns of 15 x 15 cm and cable placed exactly at center of the sand column an bricks placed on both sides and top of the sand column as per Indian Electricity Rules, suitable cable and cable boxes, glands shall be provided. Adequate size loop shall be provided at terminal points. The cable shall be paid as per specification No. CB-LT/AL and PWD Electric Red book.

Recommended Makes: As per approved list of MJP.

Poles

Poles for street light shall be of G.I heavy duty swage welded ones end of 100 x 74 x 50 mm dia. 6 m long with suitable bend at top as per standard practice. The erection of pole shall include excavation with 0.6 m x 0.6 m x 1.5 m deep and embedded in cement concrete foundation in 1:3:6 with 40 cm plinth. The poles shall be spaced at a distance not more than 20 m center to center along the road and in area requiring lighting. The installation shall be made as specified in PWD red book specification No. OH-PL/ GIP.

All necessary fixtures with G.I. light post, clamps, nuts and bolts screws

insulators with kit-kat fuse unit of suitable capacity shall be provided. Suitable earthing shall be provided to the poles.

Painting : All the poles shall be nicely painted with one coat of red oxide and 2 coats of superior quality anticorrosive Silver paint.

For illumination on bridge of clariflocculator 1.5 Sq mm, 2 core aluminum armored cable shall be used with all necessary fixtures e.g. glands, clamps etc.

Illumination

Internal

The minimum illumination level shall be made as specified. The fixtures used for internal illumination shall preferably be stove enameled box/powder coated box type florescent. Fitting with 36/40 W tube light and electronic ballast as per specification No. FG-IDF/BFF for toilet CFL bulbs are to be provided. The fixture shall be mounted with two ball suspension and flush with ceiling with all its accessories i.e. ceiling rose etc. places as directed. It shall be mounted in zig-zag pattern on walls, where suspension type is not possible but exclusive as per direction of Engineer-in-Charge. The rate of illumination shall be as specified in Annexure.

External

The level illumination mentioned in Annexure is minimum level of illumination. The agency has to design the required fixtures and the design shall be got approved from competent authority. The fixture consider for illumination shall be energy efficient.

Automatic Emergency Lighting

5 Nos of automatic emergency light units comprising twin 20 W florescent. Tubes (complete fitting) chargeable batteries, auto battery charges et. Complete

The unit shall be provided with automatic ON-OFF arrangement during breakdown of electricity supply with flexible cord and 3 pin plug. The system shall be got approved before supply. The automatic emergency light are generally be supplied at the time of completion.

FANS

Ceiling Fans : Minimum 8 Nos.

Ceiling fans of approved type with condenser, AC 50 Hz., 230 Volts and 1200 sweep complete with all fixtures e.g. fan clamps, MS flat, nuts and bolts and with regulator canopy and down rod of required length. The down rod shall be long enough so that a clear distance between the floor and fan blades shall not exceed 2.6 m. The ceiling fans shall be provided as specified in PWD specification FG-FN/CF with electronic step regulator and fixed. Ceiling fans shall generally provided for all the building of the plant stores and the portion of filter house. All ceiling fans should be at one make only.

External Fans : Minimum 12 Nos.

Exhaust fans below mentioned size with condenser unit and complete with all its accessories and necessary fixtures shall be provided and erected. The location of the exhaust fans shall be as per the direction of the Engineer-in-Charge. Metal sheet cowl for exhaust fans recess 375 mm dia fabricated from suitable frames of 25 x 25 x 3 mm angle, covered with 22 gauge GI sheet and opening covered by expanded metal, mechanism shall be provided. The cowl to be fixed to wall with grouted bolts of 9 mm diameter and 12 cm long and nuts.

• Chlorine room	4Nos.(375 mm to 900 rpm)
• Filter gallery and above filter water	2 Nos. (375 mm 900 rpm)
• Filter house	2 Nos (150 mm 400 rpm)
• Laboratory	1 No. (225 mm 1400 rpm)
• Sanitary block	2 Nos (225 mm 1400 rpm)

Exhaust fan shall generally be as per specification No. FG-FN/EXE 100 Sr. 1 to 3

Earthing

Earthing for electrical installation both internal and external, including panel boards and motors with adequate capacity of aluminium wire of suitable gauge shall be provided at all places and all earthing stations shall be interconnected so as to ensure maximum safety and GI plate, charcoal, salt etc. shall be used as per Indian Electricity Rules and as per IS:3043:1966, the earthing wires will run along conduits upto plug points and as per the directions of the Engineer-in- Charge.

Switch Boards with Switches for Building Wiring

Plate type switches and 3 pin plugs shall be provided and properly fixed TW

block of suitable size with sun mica top. Sufficient number of such switch boards for operating convenience shall be provided with indication of fan lights, etc. complete

Power Point

Power wiring with 6 No. of plug points and switches of 15 amp 6 pin 230 V suitable for operation of electric power drilling machine and grinder shall be provided as per directives of Engineer-in-Charge. The points generally be provided in wash water pump house and blower rooms, labaratory 2 Nos in each.

This shall be in addition to the general plug points provided.

The point wiring shall be provided with FRLS glade multi-standard copper wire.

Earthing

Earthing to all panels, motors, poles shall be provided with suitable type earthing. A separate earthing shall be provided for internal electrification and power points.

Fire Extinguisher

Agency has to provide and supply four Nos. of DCP type fire extinguisher 5 Kg capacity cartridge type with gun metal cap 150 gm Co₂ gas cartridge, powder and brackets conforming to ISL2171:1985 and complete erected with necessary clamp made from 50 x 6 mm Nos flat with nuts and bolts grouted in wall complete as directed by Engineer-in-Charge.

Painting

All structural work shall be painted with one coat of primer paint and two coats of epoxy/enamelled paint prior to commissioning of plant.

ANNEXURE

Values of illumination at WTP

1.	Aeration fountain	70 lux
2.	Flash mixer	50 lux
3.	Clarifier and bridge	50 lux
4.	Filter and Filter house	200 lux
5.	Filter gallery	150 lux
6.	Chemical store	70 lux
7.	Alum mixer	100 lux
8.	Staircase/passage	50 lux
9.	Laboratory	200 lux
10	Officer/Supervisor room	200 lux
11	Blower room	150 lux
12	Chlorinator room	150 lux
13	Tonner platform/room	100 lux
14	Wash water pump room	100 lux
15	External/Street lighting	50 lux

Contractor

No. of correction

Executive Engineer

Maharashtra Jeevan Pradhikaran
WATER SUPPLY 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 MJP 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. ESR & MBR:-

SR.NO.	ESR/MBR	Capacity in ML.	GL in m	LSL in m	FSL in m	S.B.C.
1	Proposed Joveli gaon ESR	1.50	35.94	57.94	62.44	10 MT
2	Proposed ESR 1 Boudhwasti	1.50	31.78	53.78	58.28	10 MT
3	Proposed ESR 2 Thakurwadi	1.50	38.04	60.04	64.54	10 MT
4	Proposed ESR at Eranzad	2.00	31.08	53.08	57.58	10 MT
5	Proposed ESR at Anjalinagar	2.10	19.50	41.50	46.50	10 MT
6	Proposed ESR at Gandhi chowk	1.00	38.81	60.81	65.31	10 MT
7	Proposed ESR at Vadavali	1.00	57.75	79.75	84.25	10 MT
8	Proposed ESR at Belavali ESR 1	1.50	57.00	79.00	83.50	10 MT
9	Proposed ESR at Belavali ESR 2	1.50	58.00	70.00	74.50	10 MT
10	Proposed MBR at Belivali	2.50	61.92	76.92	81.42	10 MT
11	Proposed MBR at Belivali	2.50	61.92	76.92	81.42	10 MT

Note: No change in these levels will be permitted & RCC design will not be accepted by MJP if changes are made.

Contractor

No. of correction

Executive Engineer

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 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

The reservoir will be a covered RCC container supported on RCC column footing and termed ate braces, etc as per drawing.

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 MJP.

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 MJP 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

Sand, Metal & Bricks

River sand/artificial sand, metal & bricks of best quality will be insisted. Samples of these will have to be got approved prior to use on work.

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.

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 **Corrosion Resistance 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 MJP. 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.

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 MJP supervisor 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.

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 MJP. 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.

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.

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 x65 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.

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.

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 MJP the various manufacturers of the ladder.

Centering Work

Before starting the work of ESR, the Contractor should submit design of centering and its detailed drawing for approval by MJP. 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

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

- Capacity
- Shape and type
- Staging height of tank indicating various levels
- 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.

Maximum and minimum subsoil water level.

Site plan showing location of ESR.

Line diagram showing dimensional and sectional elevation with important levels.

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:

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.

The design shall be carried out in conformity with following IS code.

IS 456:2000

IS 3370 -Part I and IV

IS 875: 1987 Part I to Part IV

IS 11682:1985 for RCC staging of overhead tanks.

IS 1893:1984 with inclusion of seismic zones as per latest circular.

IS 1786 for cold worked steel high grade deformed bars

(Tor steel of Fe-415 grade & mild steel grade-I shall only be used.)

IS 13920:1993 -for ductile detailing, applicable for ESRs under seismic

zone III, IV and V. (Recent editions of IS shall be referred.)

B.S.I. publication S.P. 34 (S and T) 1987 IS:13928: Ductile detailing of RCC structure.

Foundation for ESR

The foundation should have the required safe bearing capacity. Minimum depth of foundation shall satisfy the following criteria.

Depth in soft rock shall not be less than 1M or depth in hard rock shall not be less than 0.5 M.

The total depth in all strata put together shall not be less than 1.50M.

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.

The free board shall be included in the depth of water for design purposes.

Minimum free board shall be 300 mm; measured below bottom of roof beam.

Maximum actual water depth shall not exceed 5.0 M.

Clear cover for reinforcement shall be provided as below :

Footing/Raft 50 mm. at bottom and sides & 40 mm. at top

Columns 40 mm.

Braces, beams, slab (Bottom and roof), 40 mm vertical wall, gallery.

Minimum thickness of container members shall be as below.

Bottom slab and vertical wall 200 mm.

Roof slab 120 mm.

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

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.

The staging shall be designed for ductile detailing as per IS 13920/1993, wherever applicable.

The width of braces shall be maximum of the following in case of Earth Quake Zone (as applicable) and above.

250 mm.

There shall be a minimum distance of 75 mm between two adjacent reinforcement bars provided in the braces as well as beams.

Minimum width of brace - 300 mm.

Width to depth ratio in case of braces shall preferably be more than 0.30

Increase in permissible stresses in braces, for Earth Quake/ Wind force design, will not be allowed.

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.

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 coincide with column/raft beam centre.

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.

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.)

The shape of container may be square or circular. Similarly the column shape may also be square or circular.

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 15 Tones/m² only raft foundation should be provided.

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.

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

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.

i) The inlet, outlet, overflow and bypass piping shall be of cast iron D/F. pipes only.

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.

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.

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.

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.

Lightening conductor, water level indicator, central ventilator and M.S. ladders/RCC staircase shall be provided as per department specification.

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.

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.

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.

Height of staging shall be the vertical difference between lowest supply level and the average ground level and the site of tank.

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

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(Pat-I to IV)\

IS:1893-Criteria for earth quake resistant design of structures.

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:
 tank full
 tank empty

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)

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 confirm 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 confirm Cl.25.5.1.1&25.5.1.2 of IS: 456:2000.

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 EC shall be taken as 5700 ECK where EC is the characteristic cube strength of concrete in N/mm² as per Cl.5.23.1 of IS:456.

Age Factor

- 7.1 Age Factor for increasing strength shall not be considered for the design.

Units

Design should be in Metric units only.

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:456 2000.

- 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%
Vertical wall full height	7%
Roof slab	6%
On completion of spiral staircase / M.S ladder	4%
On completion of plastering and finishing	1%
On erection of pipes valves and constructions of chambers	3%
Hydraulic testing	10%
Other Miscellaneous items as per A/T including snowcem, painting water level indicator, lighting Conductor, M.S. ladder and nameplate 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**

On approval of design	2%
Excavation and PCC	2%
On completion of Bed concrete & Footing	10%
Vertical wall half height	18%
Vertical wall Remaining height	20%
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:

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.

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

The reservoir will be a covered RCC container supported on RCC column with footing and intermediate braces, etc. as per drawing.

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.

DETAILED TECHNICAL SPECIFICATIONS (MECHANICAL)**IDS No.1- SUBMERSIBLE Non-Clog Pumpset****PART 1 GENERAL****1. DESCRIPTION**

1. Pumps shall be submersible pump(s) with watertight and totally encapsulated electrical 3-phase motor prepared for operation at a supply voltage of 415 volts in 50 Hz. complete with adequate length of submersible rubber cable (EPDM-based)
2. The cable shall be sized to match the electrical consumption of the motor running at full load and dimensioned according the latest IEC 60335-1 standard.
3. Pump/s, motor/s and drive/s shall be rated for continuous duty and shall be capable of pumping the flow range specified.
4. The pump/s shall meet the maximum allowable shut-off head and not overload the motor/s at any point on the maximum pump speed performance characteristic curve and the pump/s operating range, within the limits of stable pump/s operation, as recommended by the manufacturer, to prevent surging, cavitation and vibration.

1.02 SCOPE

1. The pump/s shall be designed, manufactured, selected and equipped with accessories suitable for the purpose, the duty and operation of the entire system.
2. The pump/s shall be tested and commissioned for the purpose the product is intended.

1.03 REFERENCE STANDARDS

The following standards are referred to in this Clause

For 50 Hz pumps

1. Machinery Directive (2006/42/EC). Standard used: EN 809: 1998 + A1: 2009.
2. Low Voltage Directive (2014/35/EU). Standard used: EN 60204-1: 2006 + A1: 2009.

3. EMC Directive (2014/30/EU)
4. ATEX Directive (2014/34/EU)
5. Standard of enclosure class (IP) (IEC 60529).
6. Referenced vibration standards: ISO5199:2002 and ISO10816
7. DIN flange standard (EN-1092-2): Pressure stage PN 10

PART 2 PRODUCT

1. DESIGN & PERFORMANCE CONDITION
 1. The pumps shall be designed and constructed to operate in a media temperature of maximum 40°C (104°F) and in the operating conditions they are designed for.
 2. The pumps shall be designed for a life of 100,000 operating hours given the recommended service intervals stated by the pump manufacturer.
 3. Pumps vibration levels shall refer to the principals stated in the ISO 5199:2002 and ISO 10816-7:2009 ANSI
 4. The submersible pump when establish on a discharge connection and operated in the system shall be free of leakage in the discharge connection. The pump/s shall be installed according to pump supplier recommendations for respect distances between intake and ground floor, sidewalls and minimum water levels to ensure cavitation caused by either surface or submerged vortices is eliminated over the full area of operation.
 5. The construction should be designed so dismantling, service and re-installation can be accomplished easily.
 6. The controls and starting/drive equipment to be suitable for use with the pump/s motor/s, taking into account all requirements including start torque and starting currents and number of starts per hour.
 7. For the performance curve of the selected pump impeller, the head shall continuously rise as flow decreases throughout the entire curve from run out to maximum allowable shutoff head.
 8. Pumps shall be with an uncompromised free spherical passage through the pump hydraulics. The minimum free spherical passage through the pump shall be minimum 100-mm in diameter.

9. The pump(s) shall be tested in test facilities standardized according to ISO 9906:2012 Grade 3B / ANSI/HI 11.6:2012 grade 3B [use one] with regularly calibrated instruments. Based upon selected test grades according to above standards, the manufacturer shall guarantee the following parameters:
10. Flow rate = 850 Cum/hr
11. Total head = 74 mWC
12. Maximum Rated Power = 250 kW

1. SYSTEM OVERVIEW

Pump system shall be fabricated in accordance with the following requirements:

1. For pumps installed on auto-coupling system: Pumps shall utilize a double guide rail system with dock foot bend to permit easy removal and reinstallation without dewatering of the pump sump.
2. Discharge connections to be established automatically with a simple downward motion when the pump is lowered into operating position by the guide rail system. The pump(s) shall be capable to be removed without disconnecting any fasteners.
3. An appropriate length of chain or lifting system shall be connected to the lifting device of the pump to permit raising and lowering of the pump.
4. Pump/s should be selected with impellers according to the required application and shall be fabricated according to the rated motor size as follows:
5. For pumps fitted with channel impeller
6. The pump shall be equipped with two-channel enclosed type impeller without guiding vane coupled directly to the motor shaft. The design of the channel impeller shall be smooth leaving no obstructions or dead zones while being capable of handling a dry solids content up to 3% and 100mm particle size
7. Pumps must be equipped with a method of restoring impeller to casing clearance in the axial direction, to restore the pump efficiency, at site, without the need for dismantling of pump and machining for replacement of wear rings of the pump. Impeller clearance adjustment shall not be done unless approved by the Engineer
8. To reduce vibrations and the load on the shaft seal faces, shaft and bearings to a minimum, the impeller must be impellers shall be dynamically balanced to ensure that the impeller is in total balance when being submerged in the media. The balancing requirements of impellers shall be in accordance with ISO 1940.

9. Discharge Connection and Guide Rails shall be fabricated as follows:
10. The guide claw mounted on the discharge flange of the pump shall connect to the duck foot being at the bottom of the pit without use of any tools.
11. The guide rails shall not support any portion of the weight of the pump.
12. Double guide rails required for the auto coupling arrangement.
13. The final connection between the pump discharge flange and the dock foot bend elbow shall ensure zero leakage by means of a replaceable NBR rubber seal fixed onto the pump discharge flange, thereby avoiding a metal-to-metal contact.

Performance curves:

1. For the pump(s) in question, the pump manufacturer shall supply a complete performance curve document in a readable size.
2. All performance curves shall be according to ISO 9906:2012 Grade 3B and the curves shall be documented in a test report delivered with the pump/s in question.
3. Performance - and system curves of the pumps shall be supplied with a readable large scale, which shall show the capacity of the pumps under single and multi-pump operation at the duty point/s
4. When tested at the manufacturer's facility, pump(s) can be tested based on system specific duty points (on request).

1. PUMP/S

1. Castings, fabrications, machined parts and drives shall conform to the industry standards for strength and durability and shall be rated for continuous duty over the entire operating range with selected materials according to waste-water specifications.
2. Pumps shall be manufactured of the following materials as a minimum
3. Pump castings shall be Ductile iron grade not less than EN 1563 EN-GJS-500-7.
4. Impeller/s shall be CF8M not less than Stainless steel impeller, DIN W.-Nr. 1.4408
5. Bends shall be Cast iron not less than EN-GJL 250.

6. Motor casing shall be Cast iron not less than EN 1561 EN-GJL-250 A48 30
7. Shaft should be High tensile Steel SS4140.
8. Fasteners shall be as per pump manufacturer.
9. Shaft seal shall be double mechanical seal of the
The seal faces of the primary shaft seal shall be silicon carbide/silicon carbide (SiC/SiC) and the seal faces of the secondary shaft seal shall be SIC / Carbon.
10. The pumps shall be fitted with flanges according to EN 1092-2 / ASTM/ANSI B16 125 lb

The lifting system shall be manufactured of the following materials:

1. The guide rails system shall be stainless steel grade no less than EN 1.4408 (SS 316).
2. Lifting chains shall be certified and executed in stainless steel EN 1.4408 (SS316).
3. Painting and surface preparation as per Manufacturer standard.

1. ELECTRIC MOTORS

1. All motors shall be suitable for operating at a power supply of $415 \pm 10\%$ Volts, 50 Hz. , 3 phase, AC supply. Motors shall be capable of giving rated output without reduction in the expected life span when operated continuously under the following supply conditions.

- I. Variation of supply voltage from the rated motor voltage ± 10

The motors shall not be overloaded at any point of the performance curves.
The pump/s shall have service factor of 1.10 (+10%) in 50 Hz.

2. All motors shall be capable for start & stop not less than 10 times per hour.
3. Motor/s shall be capable of starting up and operate in the event of a completely flooded pumping station. Motors shall be selected to meet the maximum power required for the selected impeller at all operating conditions.
4. The pump/s motor/s shall be suitable for soft starter.
5. Motor/s shall be capable of starting and accelerating the load with the applicable method of starting without exceeding the acceptable winding

temperatures, when the supply voltage is in the range of 10% above of the rated motor voltage.

6. Motor/s shall be designed to withstand 120% of the rated speed for two minutes without any mechanical damage in either direction of rotation.
7. The insulation class of motor winding shall conform to class - F (155°C/311°F) and temperature rise F class.
8. Pump motor/s shall be water tight totally encapsulated type, protected to IP68. (IEC 60529).
9. Motor/s cooling must be achieved by a cooling jacket, using the pumped media to cool the motor/s. The pump impeller must be equipped with a system to ensure a pumped flow of liquid through the cooling jacket designed to prevent the liquid channels from blocking with hair and foreign material.
10. The motor windings shall be protected with a waterproof material and shall incorporate a thermal sensor in each phase to safeguard against high winding temperatures. The thermal sensor shall be connected into the control circuit of the starter and signals taken for continuous monitoring of winding temperature.
11. The motor shall incorporate a cut-out device to detect the presence of any liquid in the motor enclosure, in the form of non-resetting moisture switch to ensure that the cause of leakage is detected and repaired.
12. The terminal connections for the power and protective circuits shall be housed in a completely sealed and waterproof junction box, complete with all external corrosion resistant cable glands.
13. The pump unit/s shall be provided with power and protection circuit cables of sufficient length to reach from the motor junction box to the local isolator, located at the access level.
14. The power cable shall be 400V/ 3.3 /6.6kV grade flexible stranded copper wire, insulated and overall sheathed with under-water grade compound flexible insulation. The cable shall be rated to take the full motor current under the prevailing liquid and ambient temperature conditions. Cable length should be 30m

Pump Monitoring Unit (PMU) Specifications

1. Each submersible pump should be provided with individual PMU.
2. Pump monitoring unit shall have provision to connect the following sensors for each pump:
 - a) Winding Temperature Protection
 - b) Vibration Sensor
 - c) Temperature sensor
 - d) WIO Sensor
 - e) PTC Sensor

- f) Moisture Sensor
3. Visual indication for above faults shall be available on PMU.
 4. The PMU shall have onboard Analog output terminal for Water in oil, stator winding temperature
 5. The PMU shall have onboard Digital input terminal Feedback from motor contactor and auto reset alarm.
 6. The PMU shall have onboard Digital output terminal for Alarm high stator temperature, Alarm moisture in the motor, Alarm insulation fault and General warning output.
 7. The PMU shall have 250VAC potential free contact terminal for alarm.
 8. Voltage of the system shall be 24VAC+/- 10% 50 to 60Hz or 24VDC+/-10%
 9. The PMU is IP20 and shall be used indoor installation
 10. The PMU shall have a communication option of Modbus RS485 for communicating with BMS/SCADA systems for enhanced operating and monitoring purposes.
 11. The PMU shall have indicator lights for sensor status measurement, stator insulation resistance, leakage, vibration in pump, motor temperature, motor running, service of moisture etc.
 12. The PMU shall be configured through Potentiometers and DIP Switch, where Pot can be used to adjust the warning limit of insulation resistance and DIP Switch can be used to configure for the connected pump.

IDS No.2- V.T. PUMP SET

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 impeller.
- ◆ 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.

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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.

Details of Pumping Machinery

Location	Proposed Jackwell	Existing Jackwell	Existing Jackwell	Existing Jackwell	60MLD WTP Sump	18 MLD WTP Sump	15 MLD WTP Sump	24 MLD WTP Sump
Type of Pump	VT	VT	VT	VT	VT	VT	VT	VT
Discharge (m ³ /hr)	850	950	1320	700	1207.8	348	273.6	568.6
Head (m)	74	36	20	38	30	50	58	72
VSS Motor HP	335	180	150	150	250	100	100	250
No of Pump sets	3+0	2+2	1+1	1W	2+1	1+1	1+1	2+1
Speed (RPM)	1440	960	960	1440	960	1440		
Column Diameter (mm)	350 mm	400 mm	400 mm	350 mm	400 mm	250 mm	250 mm	300 mm
Suspension Length (m)	21 m	21 m	21 m	21 m	6 m	6 m	6 m	6 m
Efficiency		81% Minimum As per ISO-9906-Gr 2B						
Type of Lubrication		Self-Water Lubricated						
Operation		Continuous						
Impeller/Wear Ring/ Bowl Bearings		CF8M/Bronze						
Suction Bell		Cast Iron						
Column Pipe and Sole Plate		MS						
Discharge Head		MS/ CI						
Line Shaft /Bearing		SS 410 / Cutless Rubber Bearing						

Contractor

No. of correction

Executive Engineer

Details of VT Pump

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 20Mtr. 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 plates 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 with stand 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 led to sump
 - c) Drain valve led 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 Superintending Engineer (M) or his representative and third-party inspection agency approved by MJP

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) Shut off 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)

3) Finish of water passage in impeller and diffuser.

4) 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 MJP

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 liberalized tolerances.

XHv	+0.006
XQv	+ 0.09

- 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 dully 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: KBL, Flow more, Wilo, WPIL

IDS No.3- Submersible Monoblock Pumpset

Providing erecting, Testing and Commissioning of submersible Monoblock pump set on supply well with discharge of pump set 158500 LPH, 27 meter head with 30 HP motor as per specification as follows

The pump sets shall be of sturdy construction for the unfavorable and not the ideal site conditions as regards to storage, handling, running, maintenance and repairs to pump sets. It should be possible to repair the pump sets in Departmental workshop with each and minimum coats. They should, therefore be fitted with replaceable spare parts. Feature of ease rewind ability and of economy in repairs are of over riding consideration after meeting the basic hydraulic electrical and mechanical performance. In general it should conform to I.S. 9283-1979.

MOTOR

The motor should be designed for 415 plus 10% minus 15% Volts 3 Phase 50 cycles/sec. With 0.85 power factor at full load A.C. Supply and shall have a speed of around 2900 RPM depending on motor rating corresponding to synchronous speed of 3000 RPM. It should be totally enclosed squirrel cage, induction type of motor, water cooled and water lubricated, sealed against, pollution from outside water vending pumped. The windings shall be wet type water lubricated and provided with metal tilting thrust pads, designed to take up to all downward thrust at most, unfavorable running conditions. The thrust pads should be made of proper materials to ensure proper lubrication with water and smooth transmission of thrust. Besides the swiveling thrust pad on hard ends stainless steel ball the bearing properties with water lubrication and corrosive resistance. The thrust plate resting on the pads should have appropriate surface to ensure proper lubrication with water and smooth transmission of thrust. Besides the swiveling thrust pad on hardened stainless steel balls the bearing assembly itself should be able to swivel on stainless steel ball / swivel arrangement. The thrust bearing housing shall be provided with a drain plug to empty water filled into the thrust bearing. The bearing housing shall be fitted with a rubber diaphragm or other

compensation device to take care of expansion and contraction of water with rise and fall of temperature.

Adequate heavy duty sealing arrangement and also a sand guard should be provided in the motor / inlet body to prevent tube well from earthing motor bearing.

Both stator and rotor should be impregnated with a superior quality of varnish having Class "B" thermal insulation under vacuum and not by manual or gravity flow to avoid air pockets so that these are properly filled by varnish. Subsequently, rotor bodies should be baked repeatedly under controlled conditions to ensure long life of the varnish and to give a hard finish to the rotor surface. The rotor shaft should be provided with suitable stainless steel sleeves of AISI : 410 or of Cr.13 stainless steel as per IS : 1570-1972 in the bearing portion. The rotor shaft shall be of EN:9 steel, and should be dynamically balanced.

It should be possible to rewind the stator with readymade tested coils. These coils should be submerged in water for at least 24 hours and then subjected to high tension test at 3.3 KV. After stator winding it would again be subjected to high tension test as prescribed above stator body should be rigidly welded on the stamping assembly. Adequate arrangement should be provided for stopping or rotation or shifting of stamping axially as well as circumferentially preferably by providing machining grooves in the stamping assembly and the stator body. Metal rings having rounded edges should be provided on both ends of the stampings to avoid damages to winding wires due to sharp end of the stampings.

The winding wires to be used in winding of motors should confirm to ISI:8783-1978. They shall be if ICC/ Finolex or of equivalent reputed make. Make of winding wires should be mentioned in the tender. The temperature rise should confirm to IS: 325-1970.

The motor H.P. rating shall include 10% reserve H.P. over and above maximum power required at any of the point in the duty range. The motor shall not get over loaded in the range of the specified pump head.

The motor shall confirm to IS: 8034-1976 and IS: 9283-1979. The motor should be suitable for starting with Star-Delta / DOL. The motor shall have the name plate giving the following information's.

- a) Name of the Manufacturer.
- b) Motor Make / Model
- c) Manufacture's Number and Frame reference
- d) Type of duty
- e) Frequency in Cycles / Second
- f) Number of Phases
- g) Rated output in KW / HP and current in Amp. At rated output.
- h) Rated voltage and winding connections.
- i) Voltage range
- j) R.P.M. at rated point
- k) Power Factor at rated point
- l) Year of manufacture.

The motor and pump shall have the same serial number.

FLAT FLEXIBLE

Motor should be provided with joint less flexible flat cable of copper conductor with water proof PVC or rubber sheathing and of standard Amp. Reputed, make as per IS:694-1977 or equivalent International BSS / DIN standard, as far as applicable for

submersible motors the length of cable provided for connection to starter shall be as mentioned separately. For Indian manufactures, cable should be either of Indian Cable Co. Ltd., or Finolex cables Ltd. Make of cable should mentioned in the tender. Cable packing ring should be provided to ensure non entry of sand into the motor.

The size of 3 core flat cable shall 3 x 2.5Sq.mm copper submersible cable.

Cable guard and cable clips should be provided along with the pump to prevent damage to cable, when lowering the pump or when handing it.

PUMP ELEMENT

The pump element shall confirm to IS:8034-1976 and as amended vide amendment No.1 of Oct.1980 the pump should be able to give discharge 158500 LPH at 27 M duty point and also operate overloading in range from 21 to 30 mtr head. The non-return valve shall be provided above the pump discharge case and pump set shall be suitable for 150 mm dia G.I. pipe fittings.

IMPELLER

The impeller should be closed type ensuring required performance, free of cavitations. The material or impeller should be confirming to IS:318

PUMP SHAFT

The pump shaft shall be guided with bearing bushes. Pump shaft shall be of 12% chrome steel conforming IS:1570 (Part-V) 1972 or of stainless steel as per A.I.S.I. 410. The surface finish of pump shaft as well as protection sleeves shall be 0.75 micron remix.

SUCTION CASE WITH STRAINER

The material for the suction case shall be closed grained cast iron as per grade EG-200 of I.S. 210-1978. The opening of suction case for the entrance of water should be proper size and shape to avoid formulation of eddy currents. It shall be fitted with a strainer of suitable length made out of perforated brass sheet of not less than 2 mm thickness.

BEARING MATERIAL

The material of bearing shall be lead bronze confirming to suitable grade of I.S.318.

CASING WEARING RING

The material for the casting wearing ring shall be reader bronze as per I.S.318. The wearing rings shall be provided on the bowl/ casing.

COUPLING

A suitable coupling of stainless steel AI SI 410 or of equivalent type be provided.

NON RETURN VALVE

Non return valve will be provided with the pump discharge casing. The N.R.V. designing shall be for instant closing of N.R.V. No back pressure should develop which may affect the pumped.

PAINTING

The complete pump set including motor should be painted with two coat of epoxy rubberized paint.

ERRECTION

The pump is to be installed in the sump in vertical position. Also the structural steel frame of size 1 x 0.5 m fabricated from 75 x 40 x 40 mm channel should be provided for each pump sets separately with no extra cost. Complete Painting to installation i.e. valves / C.I. Specials /G.I. Delivery above from the Girder level of well should be done with acrylic synthetic paint.

The pumps shall be guaranteed by the manufactures against defect in material and workmanship under normal use, and service, or 18 months from the date of supply at site. The efficiency of submersible pump shall be guaranteed for range of head between minus 25% and plus 10% of the specified head there should not be steep rise and fall in head verses discharge curve and discharge verses the buyer to judge the performance of pump set.

- a. Discharge V/s head curve
- b. Discharge V/s efficiency of pump and overall efficiency or pump set.
- c. Discharge V/s power input at pump shaft curve.
- d. Submersible more characteristic data.
- e. General arrangement drawing for both motor and pump showing clearance at bearings. Wearing and run out.

TESTING AND INSPECTION

Manufacturer test certificate with test results shall be furnished along with supply pump sets.

FIELD TEST

After installation, commissioning trial running and thirty days minimum operation field of or 200 hours running whichever is earlier, the contractor shall arrange field test of pumps. During field test only discharge will be measured with available means and accuracy at duty point. If in field test, necessary correction in installation or equipment is needed, the same shall be done by contractor to the satisfaction of Engineer-in-charge at no extra cost, Arrangement for fixing the pressure gauge on delivery before delivery valve shall be made by the contractor with no extra cost to each pump. - 3

Nos. pump set

IDS No 04: - VERTICAL SOLID SHAFT MOTOR

The scope of the work includes providing approved make,

a) Providing, erecting and giving test and trial of vertical Solid shaft motor 1500RPM, squirrel cage induction motor, conforming to IS 12615, class IE4 IP55 premium, having continuous rating suitable for operation at 415Volts $\pm$ 10%, 3 Phase, 50Hz $\pm$ 5% with "F" class insulation temperature rise limited to class "B" insulation. with TPI.

b) Providing, erecting and giving test and trial of vertical Solid shaft motor 1000RPM, squirrel cage induction motor, conforming to IS 12615, class IE4 IP55 premium, having continuous rating suitable for operation at 415Volts $\pm$ 10%, 3 Phase, 50Hz $\pm$ 5% with "F" class insulation temperature rise limited to class "B" insulation. with TPI.

The motor should be TEFC 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 $\pm$ 10% voltage variation, $\pm$ 5% frequency variation and $\pm$ 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, whichever 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 Superintending Engineer (M) or his representative and third-party inspection agency approved by MJP.

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.

IDS No 05: - PRESSURE GAUGE

This job covers providing and fixing 150 mm 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 this 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- 10 Kg/ sq. cm. should be of approved make only.

IDS No 06: - RMU

- a) Supplying, installing, testing and commissioning SF 6 Insulated 22kV, 630A, 16kA/3sec, 4 way outdoor, extensible motorised SCADA compatible RMU, internal arc tested as per electric supply company specification consisting of 2 nos. feeder with 2 LBS and 2 nos. feeder with 2 VCB compliant to IEC 62271 - 100, 200 and 102, as per specification no. SW-HTS/RMU SCADA with Supplying, erecting foundation structure for RMU for cable entry etc.. and Providing and erecting Sillicon Coated Touchproof Indoor Termination Joint Kit 22 kV (E) XLPE HT cable 3x95/300 sq. mm. with necessary material
- b) Supplying, installing, testing and commissioning SF 6 Insulated 22kV, 630A, 16kA/3sec, 3 way outdoor, extensible motorised SCADA compatible RMU, internal arc tested as per electric supply company specification 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 SCADA with Supplying, erecting foundation structure for RMU for cable entry etc.. and Providing and erecting Sillicon Coated Touchproof Indoor Termination Joint Kit 22 kV (E) XLPE HT cable 3x95/300 sq. mm. with necessary material

IDS No.7–FCMA/Soft STARTER

Providing erecting and giving test and trial of FCMA/Soft fully Automatic, Electronic Soft Starter with Semi Conductor Fuses, VAF meter, PLC and HMI, push buttons and indications, and its control circuitry etc. complete. Make :- ABB, Schneider only

IDS No 8: - SLUICE VALVE WITH ACTUATOR**SLUICE VALVES**

Providing, erecting and commissioning of various dia of PN 1.6 Rating Sluice Valves without bypass shall be of approved by the Executive Engineer (M) and shall be provided in the delivery pipe of each pump. The sluice valves of cast iron body suitable for the PN 1.6 rating shall be provided and shall confirm to relevant IS14846. 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	Ductile 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

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 gearbox and handwheel for emergency manual operation which will automatically disengage on restoration of power to motor and with 10 watt single phase space heater and continuous local mechanical position indicator and individual 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 ,torques witch dial and with TEFC squirrel cage induction motor working on 440 Volts+/-10%,3phase,50Hz 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% overload margin. The torque rating of reduction gearbox shall be at least 1.5 times max. torque required for opening and closing of valve with integral starter for ON & OFF operation & current position transmitter with 4-20 mA analog output for interfacing with PLC including Third Party Inspection.

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.

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 50.00 % extra margin with IS 12615: 2011

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 to fit on valve spindle.

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.

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.

Testing

The valve and actuator should be tested by the Third-Party inspection agency with
MJP representative

The scope of third-party inspection by the agency approved by MJP 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.

For Valve Actuator:

1. Review of raw material test certificate and quality control procedure.
2. High voltage test
3. Insulation resistance test
4. Checking wiring diagram and circuit.

Acceptable makes: As per Mechanical approved make of MJP enclosed.

IDS No 09: - REFLUX VALVE

Various 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 16 Kg/Sq cm and body test pressure of 24 Kg/Sq cm construction materials shall be as per relevant standard. However, rubber faces shall not be offered. Various 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 various 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 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

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 + Graph oil 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, PN 1.6	

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 MJP

The scope of third-party inspection by the agency approved by MJP is as under

Contractor

No. of correction

Executive Engineer

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 MJP

IDS No 10: - M.S.D.F. / CIDF PIPE 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 various dia manifold @ Pure 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	min 12 mm thick
ii)	Dished end	min 12 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.

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 16 Kg / Sq.cm. in presence of Engineer-in-charge.

IDS No 11:- - CABLES with CABLE TRMINATION KIT

1.1kV GRADE POWER CABLES

1.1 kV grade power cable shall be aluminum conductor XLPE insulated armored cable earthed and of MJP approved make only. The cable shall be of size & rated to carry full load current at 0.90 P.F. continuously or to withstand short circuit current of 15 KA for 1 second duration but shall not be less than the size specified in subsequent clause.

1.1 kV Power Cable

Power cable used in 415 V system shall be of MJP approved make and shall be 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.

Cable Schedule

The cable lengths stated in the schedule are estimated quantity and shall form the base for comparison of the tender other 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 offer. The tenderer may offer alternative sizes and quote for such size separately the prices for which shall however not be considered for comparison and evaluation of tender offer. The Engineer-in-Charge reserves the right to accept or reject such alternative size / sizes.

Cabling 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 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 underground 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 of 1.1 kV and 1.1 kV grade cable shall be as per manufacturer's 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 arise.

Cable Duct:

Following cables shall be laid in cable ducts -

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 heights 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.

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 center. 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.

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 cores 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.

Termination Method:

Termination method on pole structure, VCB, Vacuum contractor, motor for 1.1 kV and 1.1 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 1.1 kV cable shall be laid in suitable vertical G.I. Pipe with clamp while jointing to DP structure.

Tests

The scope of third-party inspection by the agenda approved by MJP to as under;

- a) Review of raw materials test certificate and quality control procedure,
- b) Routine test,
- c) Overload test,
- d) Insulation Resistance test.

For conditions other than (a) and (b) manufactured test certificate for routine test shall be furnished.

HT Cable

- a) Supplying , erecting & terminating XLPE insulated, galvanised steel formed wire armoured (strip) cable 22 kV(E), 3 x 300 sq. mm. aluminium conductor laid in provided trench / pipe as per specification no. CB-HT

1. SCOPE:

The specification covers design, manufacture, shop testing, packing and delivery of 11, 22 & 33 kV, multi core, cross linked polyethylene insulated power cables by road/rail to the designated Store Centers in the State of Maharashtra. These cables shall be suitable for the 3 phase AC-50 Hz system with the nominal voltage of 11/22/33 kV which may reach maximum of 12/24/36 kV respectively. These cables shall primarily be designed for effectively earthed neutral system.

The cable shall be manufactured strictly conforming to IS:7098 (Part 2) - 1985 amended up to date and shall bear ISI mark.

2. SERVICE CONDITIONS:

Material to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

2.1.1	Maximum ambient temperature in open air (°C):	50
2.1.2	Maximum ambient temperature in shade (°C)	45
2.1.3	Minimum temperature in shade(°C):	3.5
2.1.4	Relative humidity (%)	10 to 100
2.1.5	Maximum annual rainfall (mm)	1450
2.1.6	Maximum wind pressure (Kg/Sqmtr.)	150
2.1.7	Maximum altitude above mean sea level (Mtrs)	1000
2.1.8	Isoceraunic level (days/year)	50
2.1.9	Seismic level (Horizontal acceleration)	0.3 g.
2.1.10	General nature of climate :	Moderately hot and humid tropical climate, conducive to rust and fungus growth.

1. STANDARDS:

Unless otherwise specified elsewhere in this specification, the rating as well as performance and testing of the HT TR XLPE power cables shall conform to the latest revisions available at the time of placement of order of all the relevant standards as listed bellow, but not limited to the said list. All cables made with TR-XLPE insulation shall be tested and/or certified to meet the performance parameters as per Annexure- I attached.

Sr. No.	Standard No.	Title
1	IS:8130 - 1984	Conductors for insulated electric cables and flexible cords.
2	IS:7098 (Part 2)/ 1985	Cross linked Polyethylene (XLPE) Insulated PVC sheathed cable for working voltages from 3.3 kV up to and including 33kV
3	IS:5831 - 1984	PVC insulation and sheath of electric cables.
4	IS:3975 - 1988	Mild steel wires, Formed wires and Tapes for armouring of cables.

Contractor

No. of correction

Executive Engineer

5	IS:0462 (Part I)/1983	Fictitious calculation method for determination of dimensions of protective coverings of cables
6	IEC 60502-2	Cables for rated voltages from 6 kV ($U_m = 7,2$ kV) up to 30 kV ($U_m = 36$ kV)
7	ANSI/ICEA S-94 649:2004	Standard for concentric neutral cables rated 5 through 46KV

3. GENERAL TECHNICAL REQUIREMENTS:

6.35/11 kV, 12.7/22 kV, 19/33 kV earthed, multi core power cables shall normally be with stranded compacted H2/H4 grade aluminum conductor as per IS: 8130 - 1984 with latest amendments, provided with conductor screening (of extruded semi-conducting cross link material) and shall be insulated with water tree retardant (TR) XLPE of natural colour. The insulation screening shall be provided consisting of extruded semi-conducting cross link material in combination with a metallic layer of copper tapes. Three such screened cores shall be laid up together with fillers and/or binder tapes where necessary and provided with extruded inner sheathing of heat resistant PVC conforming to type ST-2 of IS: 5831 - 1984.

Maximum continuous operating temperature shall be 90°C under normal operation and 250°C under short circuit condition

CABLE DESIGN & CONSTRUCTION:

Conductor :

Electrolytic grade aluminum conductor shall be of H2/H4 grade as per clause 3.1 of IS 8130/1984 and shall have flexibility class-2 in accordance with clause 5.3 of IS 8130-1984. The shape of conductor shall be compacted, stranded, and circular.

Conductor screen/Shield:

The conductor screen shall be an extruded layer of black, semi-conducting compound. The allowable operating temperatures of the conductor shield shall be equal to or greater than those of the insulation. The conductor screen shall be extruded in the same operation as the insulation. The semi-conducting screens should be effectively cross linked to achieve 90°C cable rating. The interface between the extruded conductor screen and insulation shall be free of any voids. The volume resistivity of the screen material shall not exceed 1000 Ω m at 90°C.

Insulation :

The insulating material shall be Cross Linked Polyethylene (XLPE) cured by dry curing process and applied by extrusion process as per IS-7098 and its latest amendments. The insulation shall be an extrusion of dry cured thermosetting cross linked poly ethylene water tree retardant material rated for 90°C continuous operation.

The insulating material shall have excellent electrical properties with regard to resistivity, dielectric constant and loss factor and shall have high tensile strength and resistance to abrasion. This shall not deteriorate at elevated temperatures or when immersed in water. The insulation shall be preferably fire resistant and resistant to chemicals like acid, alkalis, oils and ozone.

The insulation properties shall be stable under thermal conditions arising out of continuous operation at conductor temperature of 90°C rising momentarily to 250°C under short circuit conditions. It shall be free from any foreign material or porosity visible to the unaided eye. The insulation shall be so applied that it fits closely on the conductor and it shall be possible to remove it without damaging the conductor.

The extruded water tree retardant (TR) XLPE insulation shall be of very high degree of purity. The manufacturer should provide the certification that the TR-XLPE compound used has proven track record. The tree retardant cross linked polyethylene insulation should be such as to retard the development and growth of water trees in the compound. The insulation compound shall be clean with low levels of contamination. The quality of insulation should be good and insulation should not be deteriorated when exposed to the climatic conditions.

The average thickness of insulation shall not be less than the nominal value as specified in IS: 7098 (Part II) with latest amendments. No tolerance on the negative side shall be acceptable.

Insulation Screen/ Shield:

Extruded Semi-conducting screening and metallic screening of copper tape shall be generally as per IS: 7098 (Part-II) with latest amendments. The semi conducting compound shall be suitable for the operating temperature of the cable and compatible with the insulating material.

The insulation screen shall be an extruded layer of black semi-conducting compound and continuously covers the whole area of the insulation. The semi-conducting screens should be effectively cross linked to achieve 90°C cable rating. The contact surface between insulation and insulation screen shall be smooth and free from protrusion and irregularities.

The interface between the insulation and insulation screen shall be free of any voids. Insulation screen shall be strippable type.

The metallic screen shall consist of a layer of copper tape applied in helical form

Core Identification:

Individual core of multi-core cables shall be colour coded and/or numbered for proper identification in accordance with clause 13.1 of IS: 7098 (Part - II).

Laying up of cores:

In three core cables, the cores shall be laid together with a suitable right hand lay. The interstices shall be filled with non-hygroscopic material. Further, the compounds used with fillers shall be such as to have no deleterious effect on other components of the cable and to be stable at cable temperatures.

Inner Sheath:

The laid up cores shall be provided with inner sheath applied by extrusion process. It shall be ensured that the shape is as circular as possible. It shall be applied to fit closely on to the laid up cores and shall be possible to remove easily without causing any damage to the underlying insulated cores and screens.

The thickness of the inner sheath shall be as per IS: 7098 (Part - II). No tolerance on the negative side shall be acceptable.

Armoring:

The armouring shall be of galvanized round steel wires for multi core cables. The armouring shall be applied as closely as practical. The galvanized steel wires shall comply with the requirements of IS: 3975-1988 with latest amendments. In case of Single core cable armouring shall be of Non-magnetic material conforming to IS: 3975 - 1988 (amended upto date)

The dimensions of the galvanized steel wire shall be as per IS: 7098 (Part-II). No tolerance on the negative side shall be acceptable.

Outer Jacket:

The outer jacket shall consist of extruded tough outer sheath of PVC compound insulation over the armouring. Inner conductor shielding, TR XLPE insulation and outer shielding shall be extruded in one operation by special process to ensure that the insulation is free from contaminations and volTEM and perfect bonding of inner & outer shielding with insulation is achieved. The PVC compound for the outer sheath shall conform to type ST-2 of IS: 5831 - 1984 (amended up to date). The colour of the outer sheath shall be black. The cable must meet all the requirements of the IS: 7098 (Part 2) - 1985 amended up to date and shall bear ISI mark.

DISCHARGE FREE CONSTRUCTION:

The inner conductor shield, TR-XLPE insulation, and outer insulation shield shall be extruded with a true triple extruder head using a dry cure process. The conductor screen, Insulation and Insulation screen shall all be extruded in single point at one time process to ensure homogeneity and reduction of volTEM, in the insulation and the screening system of the cable. The bidders are requested to elaborate the manufacturing technique adopted by their manufacturers to achieve this motive.

The Company will order the verification of true triple extrusion dry cure process at manufacturer's works as a pre qualification if it is technically accepting the bid. During verification if it is found that the firm is not manufacturing the cable with true triple extrusion dry cure process the offer shall be rejected.

4. 4 CONTINUOUS A.C. CURRENT CAPACITY:

Continuous a.c. current capacity shall be as per Table given below.

Conductor sizes in sq. mm.	Continuous A.C. current capacity in Amps. at maximum conductor temp. of 90°C		
	When laid direct in the ground 30°C		When laid in air_40°C
	11 kV	22/33 kV	11/22/33 kV
70 sq.mm	160	155	165
95 sq mm	190	175	200
120 sq mm	215	195	230
150 sq mm	240	225	265

185 sq mm	270	255	310
240 sq mm	315	290	345
300 sq mm	355	325	396
400 sq mm	405	385	460
500 sq mm	450	450	590

4.5 SHORT CIRCUIT CURRENT:

Short circuit current of 11, 22 & 33kV XLPE cable shall be as per Table given below.

Duration of Short Circuit in sec	Area of Al. Conductor	Short circuit current in kA
T	A	$I=0.094 \times A/\text{sq.rt (t)}$
1	70 sq.mm	6.58
1	95 sq.mm	8.93
1	120 sq.mm	11.28
1	150 sq.mm	14.1
1	185 sq.mm.	17.39
1	240 sq.mm.	22.56
1	300 sq.mm.	28.2
1	400 sq.mm.	37.6
1	500 sq.mm	47
1	630 sq.mm	59.2

4. TESTS AND TESTING FACILITIES :

ROUTINE TESTS:

All the Routine tests as per IS: 7098 (Part 2) - 1985 amended up to date shall be carried out on each and every delivery length of cable. The result should be given in test report. Partial discharge test must be carried out in a fully screened test cell. It is, therefore, absolutely essential that the manufacturer should have the appropriate type of facility to conduct this test which is routine test.

The details of facility available in the manufacturer's works in this connection should be given in the bid.

ACCEPTANCE TEST:

All Acceptance tests as per IS:7098 (Part 2) - 1985 as modified up to date including the optional test as per clause no 18.4 and Flammability Test shall be carried out on sample taken from the delivery lot.

SHORT CIRCUIT TEST:

The contractor shall also undertake to arrange for the short circuit test as a type test on any one size of each voltage grade i.e on one size of 11 kV, one size of 22 kV and one size of 33 kV earthed grade shielded TR-XLPE cables ordered at a recognized testing center such as Central Power Research Institute at

Bangalore/ Bhopal at the cost of supplier. If facilities for carrying out short circuit tests are available at the works of the supplier, and provided the certification procedure is approved by the Purchaser, testing at the supplier's works will be acceptable. Short Circuit test shall be witnessed by the purchaser's representative.

The short circuit test shall be preceded and followed by the following tests so as to ensure that the characteristics of the cable remain within the permissible limits even after it is subjected to the required short circuit rating.

- a) Partial Discharge Test.
- b) Conductor Resistance Test.
- c) High Voltage Test.

The manufactured cable will be acceptable only after such a sample test is successfully carried out at CPRI or at suppliers works and approved by the Purchaser.

TESTING FACILITIES :

The supplier / tenderer shall clearly state as to what testing facilities are available in the works of manufacturer and whether the facilities are adequate to carry out type, routine and acceptance tests mentioned in specified IS. The facilities shall be provided by the bidder to purchaser's representative for witnessing the tests in the manufacturer's works. If any test cannot be carried out at manufacturer's works reason should be clearly stated in the tender.

When requested, a certified test report shall be supplied for production runs of cable. The report is to include all actual production test values required by the referenced specifications. The manufacturer should provide the traceability information from cable till the materials used in the manufacturing.

5. PACKING AND MARKING:

IDENTIFICATION MARKS ON CABLE:

The following particulars shall be properly legible embossed on the cable sheath at the intervals of not exceeding one meter through out the length of the cable. The cables with poor and illegible embossing shall be liable for rejection.

Manufactures name and/or Trade name.

Voltage grade TR-XLPE Cable.

Year of manufacture.

Successive Length.

ize of cable

ISI mark

The cable shall be supplied in continuous standard length of 250 running meters with plus minus 5% tolerance wound on non returnable wooden drum of good quality and non-standard lengths not less than 100 meters upto 5% of the ordered quantity shall be accepted. Alternately cable can be supplied wound on non-returnable steel drum without any extra cost to the purchaser. Packing and

marking shall be as per clause No. 21 of IS:7098 (Part 2) - 1985 amended up to date.

Supplier should provide statistical data regarding cables of all sizes viz. -

- 1) Weight of one meter of finished product of cable of various sizes and ratings.
- 2) Weight of one meter of bare conductor used for cables of various sizes and ratings.

5. QUALITY ASSURANCE PLAN:

A detailed list of bought out items which got into the manufacture of cables should be furnished indicating the name of the firms from whom these items are procured. The bidder shall enclose the quality assurance plan invariably along with offer followed by him in respect of the bought out items, items manufactured by him & raw materials in process as well as final inspection, packing & marking. The Company may at its option order the verification of these plans at manufacturer's works as a pre qualification for technically accepting the bid.

During verification if it is found that the firm is not meeting with the quality assurance plan submitted by the firm, the offer shall be liable for rejection.

8. GUARENTEE:

Supplier shall stand guarantee towards design, materials, workmanship & quality of process/manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract.

In the event any defect is found by the Company (MSEDCL) up to a period of 12 months from the date of commissioning or 18 months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges(@ 20% of expenses incurred), from the supplier.

Supplier shall further be responsible for 'free replacement' for another period of FOUR years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Company.

9. SCHEDULES:

- a. The tenderer shall fill in the following schedule which form part of the offer. Schedule 'C' - Tenderer's Experience.
- b. The tenderer shall submit the list of orders for similar type of equipments, executed or under execution during the last three years, with full details in the schedule of Tenderer's experience (Schedule 'C') to enable the purchaser to evaluate the tender.

ANNEXURE -I

All cables made with TR-XLPE Insulation should be tested and/or certified to meet the following performance parameters as per ANSI /ICEA S-94-649

Property	Units	Requirements Values
Min. Avg. Electrical Breakdown Strength (Qualification test)	Kv/mm	> 25
Impulse Strength	Kv/mm	> 83
Water Tree Length	mm	0.25
Max. Bowtie Tree Density	(Number per 16.4 cu. cm)	Maximum 15 (0.12-0.25 mm range)

Manufacturing processes to produce high-quality cables with the following characteristics:

- i. Cure consistency with hot set/creep less than 100%
- ii. No volTEM larger than 75 microns per 16.4 cubic cm
- iii. No ambers larger than 250 microns per 16.4 cubic cm No contaminants larger than 125 microns and less than 5 between 50-125 microns per cubic 16.4 cubic cm tested.
- iv. Partial discharge less than 5 pico coulombs at 52 kV
- v. Neutral indent on cable is less than 375 microns
- vi. Cable insulation concentricity greater than 90% tested
- vii. No protrusions greater than 75 microns at the conductor shield and 125 microns at the insulation shield

FACTORY TEST :- The 11 KV XLPE cable shall be tested at Manufacturers works in presence of representative of MSEDCL, Third party agency approved by MJP and Executive Engineer (Mech.) or his representative as per scope of Inspection as given below

- 1) Quality control procedure
- 2) Routine test as per IS
- 3) Short circuit test
- 4) Partial discharge test
- 5) Conductor resistance test
- 6) High Voltage Test

b) Providing and erecting Heat shrinkable outdoor termination kit for 11 kV (UE)/ 22 kV (E) XLPE HT cable 3x300/95 sq. mm. with necessary material as per specification no. CB-JT/HT

c) Providing and erecting Silicon Coated Touchproof Indoor Termination Joint Kit 22 kV (E) XLPE HT cable 3x300/95 sq. mm. with necessary material.

d) Providing and erecting Heat shrinkable indoor termination kit for 11 kV (UE)/22 kV (E) XLPE HT cable 3x up to 300/95 sq. mm. with necessary material as per specification no. CB-JT/HT

e) Providing and erecting Heat shrinkable straight through joint kit for 11 kV (UE)/22 kV (E) XLPE HT cable 3x up to 300 sq. mm. with necessary material as per specification no. CB-JT/HT

POWER AND CONTROL CABLES

Design criteria

- a. Power and control cable shall be suitable for installation in a tropical monsoon area having a hot humid climate. The reference ambient temperature to be considered for the purpose of this specification is 50 Deg C.
- b. The de-rating factor for various conditions of installation including the following shall be considered while choosing the conductor size and calculations shall be submitted for Owner's approval:
 - i. Maximum ambient air temperature.
 - ii. Maximum ground temperature
 - iii. Depth of laying wherever applicable
 - iv. Grouping of cables
- c. The maximum continuous conductor temperature and the maximum allowable conductor temperature during short circuit are to be taken as 70 deg C and 160 deg C respectively in case of PVC insulated cables and 90 deg C and 250 deg C respectively in case of XLPE insulated cables.
- d. The cables shall be capable of continuous satisfactory operation under a power supply system frequency variation of ($\pm$) 5%, voltage variation of ($\pm$) 10% and combined frequency and voltage variation of 10% (absolute sum).
- e. The cables shall in general comply with the requirements of the latest revision of IS-1554 (Part - I) for the LT PVC power and control cables or the relevant IEC International Standard unless otherwise specified in this specification. The design, manufacture, installation, testing and performance of the cables, shall comply with the latest revisions of IS/ IEC/ NEMA/ ASTM Standard and the most stringent conditions specified in these specification shall be applicable.

General technical requirements

- a. Type of cable:-

The cable shall be multi-core/ single core (XLPE), PVC and any polymeric/

elastomeric insulation type as specified.

b. Conductor:-

The cable conductor shall be made from standard copper to form compact conductor having a resistance within the limits specified. All the cables of size (.....) sqmm and above shall have sector shape conductors. The minimum no. of strands in conductor shall be 7 (seven) except as otherwise specified. Power cables shall be of stranded Copper conductor with size (.....) sqmm minimum and the control cables shall be stranded copper (electrolytic) conductor with a minimum size of 1.5 mm.

c. Conductor Shield

The conductor having a semi-conducting screen shall ensure perfectly smooth profile and avoid stress concentration. The conductor screen shall be extruded in the same operation as the insulation, the semi-conducting polymer shall be cross linked for XLPE cables.

d. Insulation

The insulation of the cable shall be extruded type and shall be designed and manufactured for the specified system voltage. The manufacturing process shall ensure that insulation shall be free from voids. The insulation shall withstand mechanical and thermal stresses under steady state and transient operating conditions. The extrusion method should give a very smooth interface between semi conducting screen and insulation. The insulation of the cables shall be of high standard quality. The minimum volume resistivity of the PVC insulation of all the PVC insulated cables shall be 1×10^{14} ohm-cm at 27 deg C and 1×10^{11} ohm-cm at 70 deg C.

e. Insulation shield

In XLPE cables, to confine electrical field to the insulation, a non-magnetic semi conducting shield shall be put over the insulation. The insulation shield shall be extruded in the same operation as the conductor shield and the insulation by triple extrusion/process. The XLPE cable insulation shield shall be strippable. Metallic screening for all type of power, control and special cables shall be provided.

f. Inner Sheath

The sheath shall be suitable to withstand the site conditions and the desired temperature. It shall be of adequate thickness and applied by a continuous process to produce a sheath of consistent quality free from all defects. PVC sheath shall be extruded.

g. Armour

Hard drawn Aluminium wire armouring / galvanized steel tape/ wire armouring shall be used for single core and multi-core cable respectively. The hard drawn aluminium wire for armour shall be of H4 grade, as per IS-8130 (having tensile strength above 150 N/mm) The diameter of the aluminium wire shall be as per the table for the dimensions of the galvanized steel wire armour given in the relevant standard.

h. Serving/ outer sheath

Extruded PVC serving as per IS: 5831 or as specified otherwise shall be applied over the armouring with suitable additives to prevent attack by rodent and termites. All serving must be given anti-termite treatment.

Codes and standards

All cables to be supplied shall conform to the latest revisions of IS or any other international standards acceptable to Owner. Some of the Indian Standards/ IEC considered relevant to the cables are given below:

Sr. No	Standard	Description
1	IS:1554 (Part-I)	PVC insulated (heavy duty) electric cables for working voltage up to and including 1100 V.
2	IS:1554 (Part-II)	PVC insulated (heavy duty) electric cables for working voltage from 3.3kV up to and including 11kV.
3	IS:3961	Recommended current ratings for cables.
4	IS:8130	Conductors for insulated electric cables and flexible cords.
5	IS:5831	PVC insulation and sheath of electric cables.
6	IS:2982	Copper conductor in insulated cables and cords.
7	IS:3975	Mild steel wires, strips and tapes for armouring cables
8	IS:5609	Specification for low frequency wires and cables with PVC insulation and PVC Sheath.
9	IS:6380	Spec. of elastomeric insulation of sheath of electric cables.

10	IS:434(I and II)	Specification for rubber insulation cables
11	IEC:540	The methods for insulations and sheaths of electric cables and cords (elastomeric and thermoplastic compounds).
12	IEC:230	Impulse tests on cables and their accessories.
13	IEC:60	High voltage test techniques.
14	IEC:287	Calculations of the continuous current rating of cables (100% load factor).
15	IEC:288	Nominal cross-sectional area and composition of conductor of insulated cables.
16	IEC:502	Extruded solid dielectric insulated power cables for rated voltages from 1.00 kV upto 30 kV.
17	NEMA-WC-5	Thermoplastic insulated wires and cables for transmission and distribution of electrical energy.
19	IEC: 332-1	Test on electric cables under fire conditions.
20	ASTM-D-2843	Standard test method for density of smoke from
21	ASTM-D-2863	Test for determination of Oxygen Index.
22	IEC-754-I	Test method for acid gas generation.
23	IEC-331	Fire resisting characteristics of electric cables.

Constructional requirements

Cable shall have suitable fillers laid up with the conductors to provide a substantially circular cross section before the sheath is applied. Fillers shall be suitable for the operating temperature of the cable and compatible with the insulating material. All materials shall be new, unused and of finest quality. Workmanship shall be neat, clean and of highest grade.

- a. 415V system power cables - The cable shall be 1.1kV, grade, heavy duty, stranded aluminium conductor, PVC Type-A Insulated galvanized steel wire/strip armoured, flame retardant low smoke (FRLS) extruded PVC type ST1 outer sheathed.
- b. Control cables - The cable shall be 1.1kV grade, heavy duty, stranded copper

conductor, PVC Type-A insulated, galvanized steel wire / strip armoured, flame retardant low smoke (FRLS) extruded PVC of Type-ST1 outer sheathed.

Identification of cores

The insulated cores of LT power cables shall be identified by color code. The control cables shall have identification by means of printing of numbers of its cores at intervals not more than 75 mm. At least 20% cores shall be kept as spares in the multi-core control cables.

Arrangement of cables

As far as feasible, separate cables shall be provided for circuits of different plant and auxiliaries, for circuits of different voltages, and for circuit used separately. Power, control and instrumentation circuit shall invariably be taken through different routes, which shall not be laid together on the same cable trays.

Drums lengths

Drum lengths of the cables shall be so chosen that straight through joints are eliminated. However, the drum lengths shall not be less than the following lengths:

- i) 415 Volt, 1.1kV grade power cables 500 M
- ii) 1.1kV grade control and instrumentation cables 1000M

Installation of cables and earthing system

The GI/Al cable trays, and accessories, supports, conduits, cable glands, lugs, ferrules, tags, clamps and other accessories for installation of cables in cable trays, trenches etc. earthing system network/earth mat including interconnections at necessary area of plant shall be provided.

Design and Constructional Features

a) Inter Plant Cabling:

Interplant cabling for main routes shall be laid along overhead trestles /duct banks. However, from tap-offs, same can be through shallow trenches. In case of Duct banks, pull-pits shall be filled with sand and provided with a RCC covering. Directly buried cables, if essential, shall not have concentration of more than 4 cables in one route.

b) Cable entry: Shall be decided during detail engineering

- c) Trenches: PCC flooring of built up trenches shall be sloped for effective drainage with sump pits and sump pumps.

Cable trays, fittings and accessories

- a. GI Cable trays shall be ladder/ perforated type as specified complete with matching fittings (like brackets, elbows, bends, reducers, tees, crosses, etc.) accessories (like side coupler plates, etc. and hardware (like bolts, nuts, washers, GI strap, hook etc.) as required. Cable tray shall be ladder type for power and control cables and perforated for instrumentation cables.
- b. Cable trays, fittings and accessories shall be fabricated out of rolled mild steel sheets free from flaws such as laminations, rolling marks, pitting etc. These (including hardware) shall be hot dip galvanized as per relevant IS.
- c. Cable trays shall have standard width of 80mm, 200 mm, 300 mm and 600 mm and standard lengths of 2.5 metre. Minimum thickness of mild steel sheets used for fabrication of cable trays and fittings shall be 2 mm. The thickness of side coupler plates shall be minimum 3 mm.
- d. Cable troughs shall be required for branching out few cables from main cable route. These shall be U-shaped, fabricated of mild steel sheets of minimum thickness 2 mm and shall be hot dip galvanized as per relevant IS. Troughs shall be standard width of 50 mm and 75 mm with depth of 25 mm.
- e. The size of the cable tray (80mm to 600mm width) depends on the size of the cables and routing of the trays. Bidder has to decide based on site visit. The tray loading should not be more than 70% of tray capacity , none of cable will be laid over the cable. The cable cost includes cost of tray and no separate payment will be made for cable tray.

Support system for cable trays

- d) Cable tray support system shall be pre-fabricated.
- e) Support system for cable trays shall essentially comprise of the two components i.e. main support channel and cantilever arms. The main support channel shall be of two types:
 - Having provision of supporting cable trays on one side and
 - Having provision of supporting cable trays on both sides.

In general, the support system shall be as follows :

- i. Cable supporting steel work for cable racks / cables shall comprise of various

channel sections, cantilever arms, various brackets, clamps, floor plates, all hard wares such as lock washers, hexagon nuts, hexagon head bolt, support hooks, stud nuts, hexagon head screw, channel nut, channel nut with springs, fixing studs, etc.

- ii. The system shall be designed such that it allows easy assembly at site by using bolting. All cable supporting steel work, hard wares fittings and accessories shall be prefabricated factory galvanized.
- iii. The main support and cantilever arms shall be fixed at site using necessary brackets, clamps, fittings, bolts, nuts and other hardware etc. to form various arrangements required to support the cable trays. Welding of the components shall not be allowed. However, welding of the bracket (to which the main support channel is bolted) to the overhead beams, structural steel, insert plates or reinforcement bars will be permitted. Any cutting or welding of the galvanized surface shall be brushed and red lead primer, oil primer and aluminium paint shall be applied.
- iv. All steel components, accessories, fittings and hardware shall be hot dip galvanized after completing welding, cutting, drilling and other machining operation.
- v. The main support channel and cantilever arms shall be fabricated out of minimum 2.5 thick rolled steel sheet conforming to IS.
- vi. Cantilever arms of 300 mm, 600 mm and 750 mm in length are required. The arm portion shall be suitable for assembling the complete arm assembly on to component constructed of standard channel section. The back plate shall allow sufficient clearance for fixing bolt to be tightened with tray in position.

Junction boxes

- f) Junction Boxes with IP:55 degree of protection, shall comprise of a case with hinged door constructed from cold rolled sheet steel of minimum thickness 2 mm. Top of the boxes shall be arranged to slope towards rear of the box. Gland plate shall be 3 mm thick sheet steel with neoprene/synthetic rubber gaskets. All junction boxes shall be of adequate strength and rigidity, hot dip galvanized as per relevant IS, and suitable for mounting on wall, columns, structures etc. The boxes shall include brackets, bolts, nuts, screws M8 earthing stud etc. required for installation
- g) Terminal blocks shall be 650 volts grade, rated for 10 Amps and in one piece

moulding. It shall be complete with insulating barriers, Clip-on type terminals and identification strips. Marking on terminal strip shall correspond to the terminal numbering on wiring diagrams. It shall be Elmex type CSLT-1 with insulating material of Melamine conforming to ESI Standard 12.1 or equivalent. Terminal block shall be suitable for terminating 2 wires of 2.5mm on both sides arranged to facilitate easy termination

Terminations and straight through joints

1.1 kV grade straight through joints shall be of proven design. A necessary care has to be taken during joint and termination.

Cable glands

Cable shall be terminated using double compression type cable glands. Cable glands shall conform to BS:6121 and be of robust construction capable of clamping cable and cable armour (for armoured cables) firmly without injury to insulation. Cable glands shall be made of heavy duty brass machine finished and nickel chrome plated. Thickness of plating shall not be less than 10 micron. All washers and hardware shall also be made of brass with nickel chrome plating Rubber components shall be of neoprene and of tested quality. Necessary cable dimensions shall be furnished to the successful Contractor.

Cable lugs/ ferrules

Cable lugs for power cables shall be Aluminium solder less crimping type conforming to IS:8309 suitable for aluminium compacted conductor cables. Cable lugs and ferrules for control cables shall be tinned copper conforming to IS:8309. The cable lugs for control cables shall be provided with insulating sleeve and shall suit the type of terminals provided on the equipments.

Cable clamps and straps

The cable clamps required to clamp multi core cables on vertical run shall be made up of Aluminium strip of 25x3 mm size. For clamping the multi core cables, self-locking, de-interlocking type nylon clamps/ straps shall be used. The clamps/ straps shall have sufficient strength and shall not get affected by direct exposure to sun rays and outdoor environment

Installation

Cable tray and support system installation

- a) Cables shall run in cable trays mounted horizontally or vertically on cable tray support system which in turn shall be supported from floor, ceiling, overhead structures, trestles, pipe racks, trenches or other building structures. All cable trays shall be in vertical configuration in boiler and ESP areas.
- b) Horizontally running cable trays shall be clamped by bolting to cantilever arms and vertically running cable trays shall be bolted to main support channel by suitable bracket/ clamps on both top and bottom side rails at an interval of 2000 mm. For vertical cable risers/shafts cable trays shall be supported at an interval of 1000mm. Fixing of cable trays to cantilever arms or main support channel by welding shall not be accepted.
- c) The cantilever arms shall be positioned on the main support channel with a minimum vertical spacing of 300 mm unless otherwise indicated in the relevant tray layout drawings
- d) All cable way sections shall have identification, designations as per cable way layout drawings and painted/ stencilled at each end of cable way and where there is a branch connection to another cable way. Minimum height of letter shall be not less than 75 mm. For long lengths of trays, the identification shall be painted at every 10 meter. Risers shall additionally be painted/ stencilled with identification numbers at every floor.
- e) In certain cases it may be necessary to site fabricate portions of trays, supports and other non standard bends where the normal prefabricated trays, supports and accessories may not be suitable. In such cases the Contractor shall fabricate at site suitable sections of trays, supports and accessories to make the installation complete for the specific purpose after obtaining Project Manager's prior approval, which shall be neat in appearance and shall match with the prefabricated sections in the dimensions. They shall be applied with one coat of red lead primer, one coat of oil primer followed by two finishing coats of aluminium paint.

Conduits/ Pipes/ Ducts installation

- f) All openings in the floor/ roof/ wall/ cable tunnel/ cable trenches made for conduit installation shall be sealed and made water proof. GI pull wire of adequate size shall be laid in all conduits before installation. Metallic conduit runs at termination shall have two lock nuts wherever required for junction boxes etc.
- g) Conduit runs/sleeves shall be provided with PVC bushings having round edge at each end. All conduits/ pipes shall have their ends closed by caps until

cables are pulled. After cables are pulled, the ends of conduits/ pipes shall be sealed with Glass-wool/ Cement Mortar/ Putty to prevent entrance of moisture and foreign material.

- h) Exposed conduit/ pipe shall be adequately supported by racks, clamps, straps or by other approved means. Conduits / pipe support shall be installed square and true to line and grade with an average spacing between the supports as given below, unless specified otherwise.

The typical conduit sizes shall be per below table:

Sr. No.	Particular	Description
1	Conduit/ pipe size (dia)	Spacing
2	Up to 40 mm	1.0 m
3	50 mm	2.0 m
4	65-85 mm	2.5 m
5	100 mm	

Junction boxes installation

Junction boxes shall be mounted at a height of 1200mm above floor level or as specified in the drawings or as decided by Project Manager and shall be adequately supported/mounted on masonry wall by means of anchor fasteners/ expandable bolts or shall be mounted on an angle, plate or other structural supports fixed to floor, wall, ceiling or equipment foundations.

Cable installation

- i) Cable installation shall be carried out as per IS:1255 and other applicable standards. Cable drums shall be unloaded, handled and stored in an approved manner on hard and well drained surface so that they may not sink. In no case shall be drum be stored flat i.e. with flange horizontal. Rolling of drums shall be avoided as far as possible. For short distances, the drums may be rolled provided they are rolled slowly and in proper direction as marked on the drum. In absence of any indication, the drums may be rolled in the same direction as it was rolled during taking up the cables. For un-reeling the cable, the drum shall be mounted on suitable jacks or on cable wheels and shall be rolled slowly so that cable comes out over the drum and not from below. All possible care shall be taken during unreeling and laying to avoid damage due to twist, kink or sharp bends. Cable ends shall be provided with

- sealed plastic caps to prevent damage and ingress of moisture.
- j) While laying cable, ground rollers shall be used at every 2 metre interval to avoid cable touching ground. The cables shall be pushed over the rollers by a gang of people positioned in between the rollers. Cables shall not be pulled from the end without having intermediate pushing arrangements. Pulling tension shall not exceed the values recommended by cable manufacturer. Selection of cable drums for each run shall be so planned so as to avoid using straight through joints. Care should be taken while laying the cables so as to avoid damage to cables.
 - k) Cables shall be laid on cable trays strictly in line with cable schedule furnished.
 - l) Power and control cables shall be laid on separate tiers. The laying of different voltage grade cables shall be on different tiers according to the voltage grade of the cables. In horizontal tray stacks, 415 V power cables (1.1kV) shall be laid on top most tier and cables of subsequent lower voltage grades/control cables on lower tiers of trays. Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every two metre. All multi-core cables shall be laid in touching formation. Power and control cables shall be secured fixed to trays/ support with self locking type nylon cable straps with de-interlocking facilities. For horizontal trays arrangements, multi-core power cables and control cables shall be secured at every five meter interval. For vertical tray arrangement, individual multi-core power cables and control cables shall be secured at every one meter by nylon cable strap. After completion of cable laying work in the particular vertical tray, all the control cables shall be tied to trays/ supports by aluminium strips at every five meter interval and at every bend.
 - m) Bending radii for cables shall be as per manufacturer's recommendations and IS:1255.
 - n) Where cables cross roads/rail tracks, the cables shall be laid in hume pipe/ PVC pipe.
 - o) Joints for less than 250 Meters run of cable shall not be permitted.
 - p) Control cable termination inside equipment enclosure shall have sufficient lengths so that shifting of termination in terminal blocks can be done without requiring any splicing.
 - q) The installation work shall be carried out in a neat workman like manner and areas of work shall be cleaned of all scraps, water, etc. after the completion

of work in each area every day. RCC/ Steel trench covers shall be replaced after the installation work in a particular area is completed or when further work is not likely to be taken up for some time.

- r) Separation - At least 300mm clearance shall be provided between :

- HT power and LT power cables,
- LT power and LT control/ instrumentation cables,

- s) Segregation

Segregation means physical isolation to prevent fire jumping.

All cables associated with the unit shall be segregated from cables of other units.

Cable routes for one set of auxiliaries of same unit shall be segregated from the other set.

- m. Minimum number of spare cores required to be left for interconnection in control cables shall be as follows :

Sr. No.	No. of cores in cable	No. of spare cores
1	2C, 3C	NIL
2	5C	1
3	7C-10C	2
4	14C and above	3

- n. Cable fire sealing

Wherever the cables pass through walls/ floors, fire proof cable penetration seals rated for two hours shall be provided. This shall be by suitable block system using individual blocks with suitable framework or by silicon RTV foaming system. In case foaming system is offered, damming board, if used, shall not be considered for fire rating criteria. Any of the system offered shall be of proven type as per BS:476 (Part- 20) or equivalent standard.

- o. Directly buried cables

- Cable trenches shall be constructed for directly buried cables. Construction of cable trench for cables shall include excavation, preparation of sieved sand bedding, riddled soil cover, supply and installation of brick or concrete protective covers, back filling and compacting, supply and installation of route markers and joint markers. Laying of cables and providing protective covering

shall be as per IS:1255.

- RCC cable route and RCC joint markers shall be provided wherever required. The voltage grade of the higher voltage cables in route shall be engraved on the marker. Location of underground cable joints shall be indicated with cable marker with an additional inscription "Cable Joint". The marker shall project 150 mm above ground and shall be spaced at an interval of 30 meters and at every change in direction. They shall be located on both sides of road crossings and drain crossings. Top of cable marker/joint marker shall be sloped to avoid accumulation of water/dust on marker.
- p. Cable tags shall be provided on all cables at each end (just before entering the equipment (enclosure), on both sides of a wall or floor crossing, on each duct/conduit entry, and at every 20 meters in cable tray/trench runs. Cable tags shall also be provided inside the switchgear, motor control centres, control and relay panels etc. where a number of cables enter together through a gland plate. Cable tag shall be of rectangular shape for power cables and control cables. Cable tag shall be of 2 mm thick Aluminium with number punched on it and securely attached to the cable by not less than two turns of 20 SWG GI wire conforming to IS:280. Alternatively, cable tags made of nylon, cable marking ties of 'TY-CAB' or equivalent type with cable number heat stamped on the cable tags may also be provided.
- q. While crossing the floors, un-armoured cables shall be protected in conduits up to a height of 500 mm from floor level if not laid in tray.

Cable terminations and connections

- t) The termination and connection of cables shall be done strictly in accordance with cable termination kit manufacturer instructions, drawings etc. Cable jointer shall be qualified to carryout satisfactory cable jointing/ termination.
- u) Work shall include all clamps, fittings etc. and clamping, fitting, fixing, plumbing, soldering, drilling, cutting, taping, preparation of cable end, crimping of lug, insulated sleeves over control cable lugs, heat shrinking (where applicable), connecting to cable terminal, shorting and grounding as required to complete the job.
- v) The equipment will be generally provided with undrilled gland plates for cables/conduit entry. The Contractor shall be responsible for punching of gland plates,

painting and touching up. Holes shall not be made by gas cutting. The holes shall be true in shape. All cable entry points shall be sealed and made vermin and dust proof. Unused openings shall be effectively sealed by 2mm thick aluminium sheets.

- w) Control cable cores entering control panel/ switchgear/ MCCs etc. Shall be neatly bunched, clamped and tied with self locking type nylon cable ties with de interlocking facility to keep them in position.
- x) The panels where a larger number of cables are to be terminated and cable identification may be difficult, each core ferrule shall include the complete cable number as per the drawings. The ferrules shall be indelible interlocking type and shall fit tightly on cores. Spare cores shall have similarly ferrules with a suffix letter 'S' along with cable numbers and coiled up after end sealing.
- y) All cable terminations shall be appropriately tightened to ensure secure and reliable connections.

INSTRUMENTATION CABLES

General Requirements

- a. The Contractor shall supply, erect, terminate and test all instrumentation cables for control and instrumentation equipment/devices/systems included under Contractor's scope.
- b. Any other application where it is felt that instrumentation cables are required due to system/operating condition requirements, are also to be provided by the Contractor.
- c. Other type of cables like co-axial cables for system bus, cables for connection of peripherals etc. (under Contractor's scope) also shall be furnished by the Contractor.
- d. Contractor shall supply all cable erection and laying hardware like cable trays, supports, flexible conduits, cable glands, lugs, pull boxes etc. on as required basis for all the systems covered under this specification.
- e. In addition to above, Contractor shall supply all the cables including co-axial cables for station Wide LAN interconnecting entire control system in Contractor's scope as well as the control systems which are already in existence.

Instrumentation Cable Specifications

- f. All the instrumentation cables i.e. twisted and shielded multi pair cables, compensating cables, pre fabricated cables etc. shall be flame retardant low smoke (FRLS) type. The Cables shall be supplied in non returnable drums. The drum length shall be 1000m (+/-5%) up to & including 8 pairs and 500 m (+/- 5%) above 8 pairs.
- g. Voltage grade of the instrumentation cables shall be 225V (peak value).

All instrumentation cables covered in this specification shall comply with VDE 0815, VDE 0207, Part 4, Part 5, Part 6, VDE 0816, VDE 0472, SEN 4241475, ANSI MC 96.1, IS-8784, IS-10810 (latest editions) and its amendments read along with this specification

COMMUNICATION CABLES

CAT6 CABLE (CATEGORY 6 PLUS)

1. SCOPE

This specification is based on the specifications of UL 444, ANSI/TIA/EIA-568-B, ISO/IEC 11801,

UL 1685(CM) and covers the requirements for Unshielded Twisted Pair (UTP) cables of 100 Ω ,

Cat6 (U/UTP 6+) for Wideband Technology. Applicable cable size and type: 4 pairs, PVC sheath, CM Grade.

2.1 CONDUCTORS

Each conductor shall be solid bare copper wire, circular in cross-section, uniform in quality and free from defects. The diameter of each conductor shall be AWG 23 (Nom O.D. 0.54 +/- 0.005).

2.2 INSULATION

Each conductor shall be insulated with solid high density Polyethylene (HDPE).

It shall be applied uniformly around the conductor with a minimum concentricity of 90%.

The nominal insulation diameter shall be 0.98mm $\pm$ 0.03mm and the specific maximum diameter shall be 1.22mm. If the concentricity of the conductor can be tested on the manufacturing process before completing the product, it could be omitted in the test.

2.1.3 PAIRS

Two insulated conductors, designated "A" and "B" shall be uniformly twisted together to form a pair. The insulation shall be coloured and striped longitudinally, as per Table 1. The stripe colouring shall not be removable by normal stripping and wiring operations.

2.1.4 CABLE CORE ASSEMBLY

Two insulated conductors shall be twisted into a pair. Four twisted pairs shall be assembled into a cable core. The cross-shaped filler shall be inserted between pairs for sufficient isolations of pairs to improve crosstalk characteristics. Rip cord forms part of the cable construction.

2.1.5 SHEATH

The material shall, as a minimum, meet the requirements of UL 444. The sheath shall be applied over the cable assembly by an extrusion tubing technique, being close fitting, but not adhering to the insulation, and readily removable for installation termination. The sheath shall have a minimum wall thickness of 0.50mm and nominal 0.55mm. The acceptable maximum cable diameter shall be 6.4mm. The sheath colours are given in Table 2.

2.1.6 SHEATH MARKING

The cable shall be marked on the sheath to designate the transmission performance and others. The marking shall be printed through the outer sheath clearly.

The specific legend requirements are given in Table 3.

2.2 PHYSICAL PERFORMANCE

2.2.1 SHEATH

The unaged tensile strength and elongation, measured in accordance with clause 7.8 of UL 444 shall be minimum 13.5MPa and 150%, respectively. The heat-aged tensile strength and elongation, measured in accordance with clause 7.8 of UL 444 shall be minimum 12.5MP and 125%, respectively.

2.2.2 CABLE COLD BEND

All cables shall meet the requirements of clause 7.10 of UL 444. Cold bend (20deg +/- 2deg x 4h): 8 x Cable O.D. , no visible cracks. Page 4 of 5 Document ID:

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2.2.3 FLAME REQUIREMENT

A cable marked CM shall comply with the vertical-tray flame test specified in UL 1685 or IEC 60332-3.

2.2.4 CROSS-SHAPED FILLER

Cross-shaped filler (separator) complies with ROHS requirements. O.D. 4.5mm, thickness 0.45mm

IDS No 12:- - RCC DUCT & HUME PIPE

a) Supplying & laying (including excavation) reinforced cement concrete pipe of IS 458:2003 NP-2 class of 150/250 mm internal diameter in proper line, level and slope including providing and fixing collars in cement mortar 1:2 and curing etc. Complete.

b) Supplying & laying (including excavation) half round reinforced cement concrete pipe of IS 458:2003 NP-2 class of 150/250 mm internal diameter in proper line, level and slope including providing and fixing collars in cement mortar 1:2 and curing etc. complete

IDS No 13:- - RCC M-200

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 including centering, form work, compaction, finishing the formed surfaces 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. (excluding reinforcement) (Spec. No. BDF 6 Page No. 300 / IS:456(2000))

IDS No 14: - M.S. DISMANTLING JOINTS.

Various dia dismantling joint shall be provided between the discharge elbow and non-return valve in delivery line of each pump & 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 32 mm. The dismantling joint shall be withstanding test pressure of 16 Kg/Sq.cm 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 16 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 MJP and Superintending Engineer (Mech.) or his representative is as under:

- a) Review of raw material test certificate and quality control procedure.
- b) Operation test.

IDS No 15: - IRON WORK

Iron works including Fabrication of foundation frames, base girders, gantry girder with vertical frame structure to install gantry girder, grill etc. as stated in the schedule 'B' shall be provided and erected at site as per instruction of Engineer in charge .. The Beams, channels etc. shall be of mild steel The fabricated structures shall be routed firmly in the concert block if instructed by the Engineer - in - charge. (Mech.)

Modification if any shall have to be carried out to fabricated structure by the contractor with consultation with Engg. -in -charge. This Job included cutting, drilling, welding etc. and erection. in position with necessary materials, hardware 's etc. duly painted with one coat of red oxide and two coats of enameled paint to match associated equipment's.

MODE OF MEASUREMENT FOR PAYMENT

- I) Payment will be made on Kg. basis.
- II) For calculating the weight for payment on rate per KG. basis, following parameters will be applicable.
- III) Weight of fabricated item shall be based on finished / fabricated components wastage will be paid for.
- IV) Thickness shall be average thickness of basic components of supplied.
- V) Nut bolts and any sundry materials will not be considered for weight calculation
- VI) Specific weight of M.S. is assumed as 7850 Kg. /m³

The payment for concrete block will be made as per actual quantity in schedule 'B'

IDS No 16: - KINETIC AIR VALVE

Double orifice kinetic type 40/80 mm dia air valve of approved make by MJP shall be provided on 40/80 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 16 Kg/Sq.cm and isolating sluice valve designed for working pressure of 16 Kg/Sqcm shall be provided.

The air valve shall be mounted on 40/80 mm dia branch hole with taper of size x mm and at least height of mm. The air valve shall be of approved make by MJP only and shall be test at factory in presence of Third-Party Inspection agency approved by MJP

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 MJP

The scope of third-party inspection by the agency approved by MJP 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 MJP

IDS No 17: - EARTHING

GENERAL

The earthing arrangement for sub-station switch yard, indoor equipment, motors switch gear shall be designed in conformity with the I.E., rules 1956 and IS: 3043 and Rules/ Regulations/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, with prior approval from concerned authority without any extra cost.

EARTH ELECTRODE AND EARTH PITS

All earth electrodes shall be of copper bonded earthing rod with a trough and cover. 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 confirm to the provision 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 earth pits/electrodes are as under.

Each earth electrode shall have disconnected 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.

As per PWD red book specification nos. EA-EP

1. Supplying, installation and testing of maintenance free earthing comprising of Electrode of 17.2 mm diameter Low Carbon Steel with 250-micron molecular copper bonded earthing rod of Length 3m along with 25 kg Carbon based environment friendly back fill ground enhancing compound required to fill up the excavated earth with required quantity complete, and recording the results Specification no. EA-MOBI (For motors, panels,)

2. The quantity of earthing may vary as per MSEDCLs decision about installation of metering kiosk. Agency has to execute the item as required.

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 L.T. earthing system from Competent Authority before starting / Execute the above work.

IDS No 18: - APFC PANEL

a) Supplying and erecting 250 kVAr, 3 phase, 50 Hz., Power contactors Derated for microprocessor APFC controller with MPP / APP type capacitor with 525 V and having minimum overcurrent capacity of 1.8 In, peak inrush current capacity 300 In and minimum life 150000 hours with , consisting of suitable steps of MPP / APP type capacitor units with detuned aluminium filter 7% reactors with circuit breaker as main incomer and MCCB for each branch protection and Static VAR Compensator 20AMP Voltage 230VAC- 690VAC,

with dynamic hybrid switching technology, response time 10 milliseconds ,with Ultrasensitive controller, Paralleling Master-Slave / Multi-Master,USB and RS485 communication ,Operating Temperature Range-0 to 60 degree as per specification no CP-ED/APFC

IDS No 19: - ULTRASONIC INSERTION TYPE FLOW METER

Designing, providing, installing and commissioning of Ultrasonic Insertion type Flow Meter, for Raw / Pure water with accuracy +/-3% of measured value & protection as per given specifications including sensor, transmitter, surge protection device, 10 m. sensor / transmitter cable, PVC conduit pipe- 10 M with each flow meter, including the pipe cutting, leveling & installation of flow meter in the pipelines with necessary tool tackles, cranes etc. Flowmeter protection class IP68 or Better. Flowmeter Line material to be Ebonite. Measuring/Grounding electrodes to be Hastalloy C. Housing and Flanges of Carbon Steel with Corrosion resistant Epoxy coating.

Transmitter cum Display unit should be Wall mounting IP66, having Forward, reverse and net Totaliser , actual flow rate, Batch control function.

Proper earthing shall be provided for protection against high voltage surge.

- Working Condition & Specifications:
 - a. Water Temp: 10 Deg to 50 Deg
 - b. Water Quality: Potable chlorinated water.
 - c. Operating pressure: 1 - 15 Kg. /cm²
 - d. Pipeline MOC: CI, DI, MS with / without mortar lined, Non-metallic Pipes.
 - e. Pipe diameter :> as per bill of material
 - f. Flow - as per bill of material
 - g. Pipe condition: Pipe shall be running full.
 - h. Pipe: to be straight with straight run of 10d
 - i. Functional details: freely programmable.
 - j. Measurement - Volumetric flow rate, totalized flow.
 - k. Flow direction - Forward & Reverse.
 - l. Display - LCD display with suitable lines, digits, segments, markers for identification of current output. The digit shall be clear, bold & can be read from 1 Mtrs. Distance.
 - m. Output - for current - 4 mA - 20 mA HART (active/passive) for measuring flow in pipeline. Frequency output shall be 1 khz, Open collector, passive.

- n. Status output - Open collector.
- o. Meter shall be suitable for remote facility.
- p. Power supply - 85 - 260 V AC (45 - 65 Hz)/20-55 V AC (45-65 Hz)/16-62 V DC.
- q. Galvanic isolation - input & output galvanically isolated from power supply from the sensor and from each other.
- r. Instruments must carry "CE" mark.
- s. Functionality verification check should be possible inline using recommended software tools.

C) Calibration, Testing & Inspection

The 10% of total supply quantity shall be inspected and tested.

The flow meter shall be calibrated at manufacturers place in India as per NABL lab accreditation OR overseas as per ILAC Standard (International Laboratory Accreditation). Calibration certificates to be provided for Flowmeters.

Manufacturer having NABL, the calibration testing shall be witnessed by Third party approved by MJP. The manufacturer not having ILAC/ NABL lab accreditation, flow meters shall be tested at FCRI/CWPRS/IDEMI etc. for which third party inspection is not required.

D) Manufacturer's Guarantee, Certificate & training

The flow meters shall be supplied with manufacturer's test certificate, calibration certificate as above. 12 months guarantee for the trouble-free performance shall be given by manufacturer. Also, adequate training for handling flow meter and installation in field shall be given so that trainees can carry out the job independently.

Note: - The make of the flow meter will be as per MIDC approved list. Flow meter shall be tested from MIDC or MIDC norms.

Make :- E&H, Krohne Marshall and Siemens etc..

IDS No 20: - FULL-BORE INLINE ELECTROMAGNETIC FLOW METER

Providing, installing and commissioning of Full Bore (Inline) Electromagnetic Flow Meter (EMF) as per ISO 4064, for Raw / Pure water with accuracy 0.5% of measured value and protection as per given specifications including sensor, transmitter, printer, surge protections, data logger, sensor / transmitter cable - 25 m, GI duct - 25 m built in GSM (without simcard) including the pipe cutting, levelling and installation of flowmeter in the pipelines with necessary tool tackles, cranes including 36 months guarantee, etc as may be required at site etc. .

Integration of these flow meters should be done with centralize computer station. The Instantaneous and cumulative flow values should be displayed on computer. Also, these values should be sent through SMS to host mobile at regular interval.

The device shall be capable of averaging the velocities across the entire pipe cross section and measure the same with given accuracy.

A) Mandatory Accessories :-

- 01 The sensor should be as per IP-68 protection & with flanges of PN 10 rating from CS.
- 02 The sensor coil housing shall be IP- 68 . This shall be protected against external magnetic field.
- 03 The transmitter shall have one scalable pulse output, one 4 - 20 m A HART output.
- 04 The current output shall be galvanically/optically isolated. It shall be fitted with switched mode power supply capability 85-260 V & 45-65 Hz to cope with power transients without damage.
- 05 Coaxial signal and power cables shall be of 50 mtr. each with Flow Meter.
- 06 Conduit pipe (PVC plumbing 4) 25 mm diameter with suitable rating of cable with digging, laying and concealing the duct - 25 mtrs./each.
- 07 UPS working on 230 V AC, 50 Hz power supply suitable for 12 Hrs continuous operation - 1 No.
- 08 Data logger with Data storage capacity inbuilt or separate for date, time, actual Flow Rate, totalizer and Error messages (if any) with storage capacity of 120 days - 1 No.
- 09 21",80 column Dot Matrix Printer of EPSON/ WIPRO/ Hewlett Packard make with printer interface unit for printing of stored data as per 8/1 No for meter management system. The printer shall be installed as directed by Engineer Incharge.
- 10 Suitable over voltage protection unit for protection of instrument from higher voltage in the range of 275 V - 300 V AC.
- 11 Proper earthing shall be provided for protection against high voltage surge.
- 12 The meter shall be in accordance with ISO 6817 - 1992
- 13 The meter shall be Micro - Processor based with remote mounted Indicator / controller / Transmitter.
- 14 The meter shall perform well even with any disturbance in the pressure.
- 15 The remote mounted module shall not require, may signal boosting up to a distance of 300 m from the sensor tube.
- 15 The sensor body shall be of carbon steel, epoxy / polyurethane painted, double flanged with carbon steel flanges. The liner material shall be Hard rubber/Polyurethane with drinking water approval. The electrodes shall be SS 316 / Hastelloy C. the protection shall be IP 68
- 16 The controller / transmitter shall be IP 67 or better protected, cast aluminum, polyurethane painted, wall mounting type.
- 17 The communication from transmitter shall be through HART protocol. This protocol is expected to allow easy communication amendment in future.
- 18 The elastomeric gaskets (SBR) shall be used for these fittings must comply with BS 2494W.
- 19 The Totalizes value shall be protected by EEPROM during power outage and utilizes an overflow counter.
20. The accuracy shall be 0.5% flow rate.

21. The meters shall have features as bi-directional flow measurement, empty pipe detection, programmable function, password protection, built-in diagnostics and data retention in case of power failure.
 22. The testing facility shall be duly accredited in accordance with ISO 17025
 23. The following data shall be impressed either on the primary device or the name plate.
 - a. Instrument type and serial number
 - b. Rated pressure and temperature.
 - c. Power supply - Voltage, Frequency and Power.
 24. The following data shall be mandatorily impressed on the name plate :-
 - ❖ Instrument type and serial number.
 - ❖ Power supply: Voltage, Frequency and Power.
 - ❖ Output Signals.
 - ❖ Limiting load impedance.
 - ❖ Enclosure protection rating.
 - ❖ Nominal diameter.
 25. The overall length of the meter shall be accordance to ISO 13359 - 1998.
- B) Working Condition and Specifications :
- a) Water Temp: 10 Deg to 50 Deg.
 - b) Water Quality: Raw water, turbid in nature.
 - c) Operating pressure : 1-15 Kg/cm
 - d) Pipeline MOC: CI, DI, MS with/without mortar lined.
 - e) Pipe condition: Pipe shall be running full.
 - f) The supplier should have fully traceable calibration methods to either of the two primary standard means of testing i.g. mass (ISO 4185) or volume (ISO 4185) or volume (ISO 6817).
 - g) Each meter shall be wet calibrated at the place of manufacturing with 3 point calibration at sufficient flow rates. The testing facility shall be in accordance to ISO 17025.
 - h) The sensor shall be of standard length as per ISO 13359
 - i) The sensor shall have Stainless steel Grounding Electrode & Empty Pipe detection feature.
 - j) The liner material shall be either Hard Rubber (HR) or Polyurethane (PU).
 - k) The sensor & transmitter shall be capable of working in tropical environment.
 - l) The meter body shall be flanged.
 - m) The flow meter shall be suitable for both submergence as well as burial installation & shall withstand all necessary nature shock.
 - n) The transmitter & sensor shall not have any EMI interferences in the actually flow meter reading.
 - o) The transmitter shall be capable of full programming with push button. It shall have a set-up menu so that all relevant parameter may be user set from the self-prompting driven menu
 - p) The totalizer value shall be protected by EEPROM during power outage, and utilize an overflow counter.

C. Calibration and testing :

The flow meter manufacturer shall have NABL accredited laboratory. For non NABL accreditation, all meters shall have to be got tested at FCRI/CWPRS/IDEMI, the cost shall be borne by the bidder.

D. Comprehensive Maintenance

- The maintenance shall be based on "Planned Preventive Maintenance" Program (PPM) with following services included (but not limited) for 36 months. The cost of comprehensive maintenance is included in rate of flow meters/water meters.
- Planned Preventive Maintenance (PPM):
- Regular visit to the flow meters (once in 2 months to check the healthiness of instruments)
- Repairs / replacement of components / spare parts as may be necessary and observed during the flow meter inspection.
- Free replacement of the spare parts & consumables as necessary.
- Emergency visit to site within 48 hours for attending any major trouble shooting & break downs.
- Technical training / trouble shooting training to the concerned MJP staff by the supplier.
- Providing complete technical details on instrument with necessary manuals.
- The period of comprehensive maintenance will commence after satisfactory commissioning of the meters. .
- In case of failure to attend sites / Flow meter, penalty as given below shall be applicable.
- Failure to visit to the flow meter once in two months - Rs. 1000/- Per visit per flow meter.

Failure in case of emergency visit to site within 48 hours for attending any major troubleshooting / breakdowns - Rs. 1000/- Per day.

Make :- E&H, Krohne Marshall and Siemens etc..

IDS No 21: - GAS CHLORINATION SYSTEM

Providing, Erecting, commissioning and giving test and trial of gas chlorination system confirmation to all applicable compressed Gas Association recommendations and comprising of following : Vacuum operated chlorinator unit of capacity as mentioned below : Two set of Rota meter assembly and control valve assembly, two sets of Remote injector assembly (1W + 1SB), 10 RMT of vacuum tubing, 10 meters of uPVC piping for chlorine solution & suitable booster pumps (1W + 1SB) with 10 meters water inlet piping, valves, fittings etc. Automatic switchover type vacuum regulators (2 nos) or with vacuum operated switchover system. Control panel of suitable capacity wall mounted industrial type with voltmeter, ammeter, starter, MCB indicating lamps. Preventive maintenance kit for injector, Rotameter & vacuum regulator including

erection.Limits of toxic substances which are likely to be present in significant quantities from the current production process and raw materials are given in Table I.

Make :- Metito,Toshniwal and Siemens

IDS No 22: - REPAIRS TO CLF

Repairs to CLF Flocculator and End Carriage Assembly of 24 and 18 MLD WTPs

- Dismantling of old Scrapped Flocculator Assembly with its Gear box and motors, End carriage drive system & rubber squeezers of Scrapers.
- Providing and Fixing new Flocculator Assembly with its Reduction Planetary gear box Model 4KT-08X or suitable with Ratio 290.68:1 and TEFC motor Flange mounting 1.5 KW/2.00 HP / 1440 RPM, SS 1:20 Shaft in 304 with M.S arms and PP Blades Bevel and Pinion Gear Set.
- Providing and Fixing New Reduction Planetary Gear box , model 3KT-08 or suitable with Ratio 71.92:1 and TEFC motor Foot mounting 5:00HP/ 3.7 KW/1440 RPM for End Carriage drive system with wheel SHP pedestal bearing 63mm dia with Switchgear, Sprocket Gears & chain etc. Complete.
- Providing and Fixing new Rubber squeezers Neoprene make 12mm thick for Scraper Mechanism in Clarifier & Flocculator Basin (Strip 1800X350 mm Each) with G.I Nut bolts and Washers.
- Providing & Fixing new outdoor Cubical panel with switch gear and necessary cables as per requirement.
- Complete Replacement of Bridge Structure as design approved by Engineer-In Charge including removing and dismantling of existing bridge structure and its rebate.

Repairs to Flash mixer Including replacement of agitator, panel, Planetary Gear box Model- 2KA-05A or suitable with Ratio 14.74:1 Motor - Flange Mounting motor 2.2KW/ 3HP/ 1440 RPM.

IDS No 23: - VIBRATION MONITORING SYSTEM

Supplying Installing Testing Commissioning Vibration Monitoring System on VT Pump. The model ISO-07 series with Three channel Vibration Transmitter in a variety of configurations. The transmitter converts rotating machinery vibration measurements into industry standard 4-20mA. Signal data can be transmitted to the Central Control Room or DCS for trending or is available for separate or integrated local display in the transmitter. Standard ISO-07 houses in polycarbonate enclosure certified to IP65

Technical Specifications

Construction	Ruggedly packaged in Polycarbonate IP65 enclosures
Mounting	Surface on Site
Channels	Single / Dual or Three Channel Input and Output
Signal Inputs	• Piezo Accelerometer • Piezo Velocity • ECP
Frequency Response	2 Hz - 10 KHz
Display	4 digit
LED	Alarm and Trip visible in Polycarbonate Enclosure
Alarm Relay	One Independent Relay per channel
Trip Relay	One Independent Relay per channel
Signal Output	• Buffered TWF output per channel from BNC socket • 4-20 mA to DCS with max load of 300 ohms
Accuracy	±1 % of full scale
Power	90 - 270 VAC SMPS
Weight	1 Kg
Dimension	230 x 160 x 110 in mm

IDS No 24: - MOTOR PROTECTION RELAY

Providing, installing numerical motor protection relay for motors controlled through circuit breaker providing instantons 3 ph overcurrent, unbalance and single phasing, earth fault and separate built-in stalling preaction similar to ABB/L&T make type REM 601 or similar

IDS No 25 : -E.O.T. CRANE 5T (SPAN - 6-8 Mtr)./ 10T (SPAN - 8-10 Mtr)./

General

A 5-tonne safe working capacity and tested to 1.50 times working capacity electrically operated overhead travelling double girder crane with all accessories shall be provided of approved make by MJP. Functional requirement of the crane is as under:

- To lift complete weight of the pump or motor from any point in the pump house. The operation shall be electrical, lift of hoist rope should be 6 mtr. Minimum.
- To travel longitudinally along entire length of the pump house including loading / unloading bay. Operation shall be electrical.
- To travel across entire nominal pump house by span. Operation shall be electrical.

The sub-work includes

- Minimum 20 Mtr., 50 mm x 50 mm square bars or 30 pounds/yard rail sections shall be installed on continuous RCC corbel with necessary anchoring, etc.

- b) Bridge girder mounted on track wheel and end carriages.
- c) Motorized mechanisms (Hoist speed limit of 4 mtr. / minute)
- d) Electric wire rope hoist suitable for 6 mtr, lift.
- e) Trolley and hoist
- f) Push button operated pendant with control cable to operate crane from floor level of pump house.
- g) Control gear and switch gear including earthing.
- h) Mercury/Sodium vapour lamps on crane girder or end carriages to illuminate area particularly while pump erection / dismantling.
- i) Micro speed of crane say 0.40 mtr/Min. shall be provided in hoist.
- j) Key operated pendant main switch for additional protection shall be provided.
- k) Make of the motor shall be suitable for crane duty.
- l) Material of hook shall be forged steel / EN-9.

Minimum capacities of crane ISMB square bars/rail section are stated above. It shall be the responsibility of the tenderer to design and provide higher capacities if the heaviest load of the equipment to be handled need so without any extra cost.

The crane shall generally conform to IS: 3177 and IS: 807.

Bridge, Rails and Supporting RSJS: -

The bridge girder shall be designed to carry 5-ton load at any position during travel. The wheels of end carriage shall be machined and shall have flanged on both sides. The end carriage shall be driven by common shaft extending full span for longitudinal travel power to end carriage shall be through reduction gear box.

The rail shall be either square bars not less than 50 mm x 50 mm or equivalent rail section. The rail/square bars shall be secured on supporting ISMBs with all required fasteners and end stops to prevent over travel.

The ISMB sections shall be secured on the provided MS plate on RCC corbels.

Travelling Trolley And Hoist

The travelling trolley shall have single flanged 4 wheels and shall be mounted on bridge girder. Suitable stops shall be provided to prevent over travel of trolley.

The hoist shall be mounted below travelling trolley. The hoist shall incorporate swivel hook with ball and roller bearing.

Reduction Gear Box

The reduction gear boxes shall be of robust construction and for arduous duty. They shall be fully enclosing with oil level markings for minimum and maximum levels. The bearing shall be ball and roller type and taper roller bearings shall be provided where thrust loads are to be sustained.

Brakes And Clutches

Automatic electro-mechanical brake system shall be provided for hoisting motion. The hoisting motion shall have limit switches to stop motion automatically at upper and lower limits. Electro-magnetic clutches or similar safety device shall be provided on all power transmission system to disengage the motor in case of over loading and obstruction.

Motor

The electric motors shall be totally enclosed fan cooled with enclosure conforming to IP-55 or superior. They shall be squirrel cage induction 230 V/415 V A.C. supply with class-F insulation. The motor shall preferably be foot mounted and shall be designed for S.5 duty as per IS: 325.

IDS No 26: - SURVILLIANCE SYSTEM

Designing, supplying, installing, commissioning & testing of CCTV IR water proof camera suitable for upto 100ft. with control key board, DVR, Hard Disk, cables, UPT trans receivers etc. complete with not less than following specifications (12 Pumping Stations)

1. 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.
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 includes design, sizing, supply, erection and commissioning of ultrasonic transmitters. The pressure transmitters are to be installed on the individual delivery of Pumps one each & one transmitter on common manifold of pipe line

IDS No. 27 - ULTRASONIC LEVEL TRANSMITTER

COMMON TECHNICAL SPECIFICATIONS

1.0 General Requirement

The scope of this work includes design, sizing, supply, erection and commissioning of ultrasonic transmitters including Third Party Inspection.

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.

2.0 Transducer Required Features

Ultrasonic level transducers and manufacturer's cable assembly shall be provided with at least the features specified below:

Measuring Principle	Ultrasonic, time-to-flight / Pulse Time of flight
Range	0 - 6 Mtr (0-30 mtr for Radar Type Sensor at Jackwell)
Level Resolution	Better than 1 mm
Beam angle	6 Degrees
Process connection	Suitable for the Reservoir
Cable	As indicated on the datasheet
Temperature compensation	Full, automatic
Mounting	As indicated on the datasheet
Nominal frequency range	Manufacturer's Standard suitable for the application
Operating conditions	45 - 50 Deg. C

Max Pressure	4 Kg / cm ² (g)
Range	Liquids 0 to 6 m / 0-30 m for Radar Type
Sensor materials	Corrosion resistant PVDF wetted material
Principle	Pulse Time of flight
Agency listings	UL listed or FM approved

3.0 Display/Transmitter Unit Required Features

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:

Display	External Display 4" LCD.
Configuration	Using Keypad on display OR suitable field configuration tool
Memory	Parameters held in non-volatile memory
Display Location	Local / Sensor mounted
Temperature compensation	Automatic, built in transmitter
Outputs	4 to 20 mA analog, two wire, linear with process engineering units. One Form C SPDT relay contacts, 5 amperes at 250 volts ac, non-inductive
Output Variables	Level, Distance, Volume
Supply voltage	24 VDC, loop powered
Accuracy	+/-0.25% full scale or better
Radio Frequency Interference (RFI)effect & Electromagnetic compatibility	Less than 0.1 percent of span for frequencies 27 to 1,000 MHz and field intensity of 30 V/m Interference emission to EN 61326; Equipment class B, Interference immunity to EN 61326; Appendix A (Industrial)
Voltage transient immunity	Up to 1000 volts common mode and 500 volts normal mode with output shift less than 1.0 percent
Surge suppression	On board transmitter compartment. Compatible with HART or Foundation Field bus communications as applicable. Compliant with IEEE C62.41 Cat. B and IEEE C37.90.1.
Housing & Ingress Protection	Aluminum, rated NEMA 6P (IP65)
Operating conditions	-20 to +50°C
Agency listings	UL listed and FM approved

Hazardous area classification	Safe Area

4.0 Typical data sheet for transmitter

GENERAL	1	Tag Number	During detail engineering
	2	Service	Pure Water
	3	Location	On top of an ESR
	4	Quantity	As per BOM
	5	Mounting	A special arrangement of SS structure to be fabricated & mounted to install the
	6	Area classification	NA
	7	Certification	Required
	8	Enclosure	IP 65
	9	Pipe Line number	Vendor to confirm during detail Engineering
PROCESS CONDITIONS	10	Fluid	Pure water
	11	Fluid State	Liquid
	12	Operating Pressure	Atmospheric
	13	Operating Temperature	50 Deg C
	14	Operating specific gravity	Suitable for water
	15	Operating Viscosity	Suitable for water
	16	Min./ Max Pressure	Atmospheric
	17	Design Pressure	Vendor Standard
	18	Design Temperature	75 Deg C
TRANSMITTER	19	Application	Pure water ESR level
	20	Type	Ultrasonic
TRANSMITTER	21	Principle	time-to-flight / Pulse Time of flight
	22	Housing	Aluminium
	23	Paint	Epoxy or polyurethane- coated
	24	Protection	IP 65
	25	Power Supply	24 V DC

	26	Output	Loop powered at 750 Ω 4-20 mA, 2 wire linear with process (HART)
	27	Level Resolution	Better than 1 mm
	28	Transmitter Location	Local/Sensor mounted
	29	Process Flanges and Mounting arrangement	Mtl Wet-side
	30	Material	SS 316 Corrosion resistant PVDF wetted material
	31	Body Material & Bolt & accessories Material	SS 316
	32	Beam Angle	6 Degree
	33	Instrument Span	Vendor to size the transmitter based on process data & submit for Approval
	34	Calibration Range	Vendor to confirm
	35	Alternate Range	NA
	36	Process connection	Manufacturer's standard
	37	Electrical Connection	Manufacturer's standard
	38	Accuracy	$\pm 0.2\%$ of span, 0.2% full scale measuring distance OR 4 mm (+/- 2 mm) whichever is better
	39	Allowable Temp.	Later* DISPLAY
	40	Display	4/5-line LCD display
	41	Display Scale Required,	External Display, Menu guided operation Match Calibration
	42	Hydrostatic	Certificate to be provided
	43	Testing Memory	Parameters held in nonvolatile memory
	44	Mounting Brackets	50 mm Pipe mounting
	45	Lightning Protection	YES Required
COMMUNICATION AND SOFTWARE	46	Communication Type	HART
	47	Communication with:	PLC -SCADA
	48	Configuration from:	Factory

	49	Internal Diagnostics	Required
PURCHASE	50	Approved Manufacturer	HWM/ABB/E&H/Siemens/Forbes Marshall/ Rosemount
	51	Model	Vendor to confirm
	52	Purchase Spec	Datasheet is a part of Specification
	53	Serial Number	During detail engineering

IDS No. 28 - EMERGENCY SHUT OFF DRIVE

Providing Erecting testing and commissioning of Electronic Shut off Drive & ESD Panel for Twin tonner Gas Chlorination System including sensor cables etc..

DRIVE :- Intelligent 24V DC motor with integrated torque limitation Degree of Protection: IP65

CONTROL CABINET:- Variant available: ESD -6 For up to 6 drives Dimensions: 600 x 600 x 200 mm Power Supply: 1/N/PE AC 120-230V 50/60Hz Degree of Protection: IP65 Battery Life: up to 2 years

CONTROL FEATURES:- Multicolour display with touch screen 1 potential-free input for gas warning system 1 potential-free input for external emergency stop button 4 Relay Output for Alarm -Hard wired a) Mains A/C failure b) System Error c) Battery Low d) Emergency Close Data exchange via Modbus® TCP and optional Profibus™ DP Languages: English / German Actuator Connection Cable length 25 mtr

Make:- Xylem

IDS No. 29 - TURBIDITY METER

Designing, Supplying, Installing, commissioning & testing of Turbidity meter I analyser as per ISO 7027 scattering light method at A.F. and Interfacing with PLC panel. Turbidity meter shall comprises of 3 components i.e. sensors, signal distributor and transmitter with indicator. Transmitter converts the signal to 4-20 mA and gives 2 outputs one to SCADA and another to indicator.

Specifications

Service	: Water
Line	: Extractive type online
Measurement Type	: Scattered light in 90 degree to 135 degree
Area Classification	: Non - Hazardous Area
Protection	IP 65

Contractor

No. of correction

Executive Engineer

Fluid	:	Water/sewage
Pressure (bar)	:	Max 10 Bar
Temperature	:	5-50 Dec.
Sensor	:	
Overall Range		0-2000 NTU (Raw Water) 0-100 NTU (Pure Water)
Ingress Protection		IP 68
Accuracy		+/- 0.02 NTU
Process Connection	:	¼ INCH
Transmitter	:	
Measuring Signal	:	Digital Signal from sensor
Measuring Parameter	:	Turbidity
Enclosure IP rating	:	IP65, NEMA 4X
Measuring range	:	0.02 to 500 NTU
Out put	:	4-20 mA, 2 nos isolated
Power Supply	:	100-230V AC 50 HZ
Display		Graphic Display with backlit
Cable entry		½" NTP

IDS No. 30 - RESIDUAL CHLORINE ANALYZER

Designing, Supplying, Installing, commissioning & testing of Residual chlorine analyzer / meter must have automatic sensor cleaning facility at pure water sump and Interfacing with PLC panel. Residual Chlorine meter shall comprise of 3 components i.e. sensors, flow through assembly and transmitter with indicator. Transmitter converts the signal to 4-20 mA and gives 2 outputs one to SCADA and another to indicator.

Specifications

SENSOR

Method	:	Amperometric - Potentiation
Electrodes	:	Gold Cathode/Silver Anode
Sensor shaft	:	Glass
Range:	:	0.05 to 5 mg/ltr (ppm)
Response Time	:	T90<2 min
Temperature Sensor	:	PT1000 (internal Sensor)
Temperature	:	0-50 deg.C
Pressure	:	6 Bar
Mounting	:	Flow through Assembly

TRANSMITTER

Type		Microprocessor based programmable
Display		Backlit LCD Display

Accuracy	: +/- 2% of Max range
Repeatability	: 1 % of Measuring range
Resolution	: 0.01 mg/lit
Mounting	: Field mount type
Analog Output	: 4 - 20 mA, 2 nos
Temperature Compensation	: Manual/Automatic
Enclosure Protection	: IP 65, Polycarbonate
Power Supply	: 100-230 V AC, 50/60 Hz
Alarm	: 4 Pot free Relay contact
Diagnostic Button	: Available

IDS No. 31 - pH ANALYZER

Designing, Supplying, Installing, commissioning & testing of pH analyser for Pure Water as per IUPAC(International Union for Pure & Applied Chemistry)at A.F. and Interfacing with PLC panel Range 0 -14 (As per IEC 61000-6-2 & IEC 61000-6-3)

Specifications

Type of Cell	: Flow thru'
Process Connection	: Extractive ¼ inch
Type of Measurement	: General purpose
Temp. Compensation	: Automatic
Preamplifier	: Integral
Range	: 0-14 pH
Measuring Electrode	: Glass
Liquid Junction	: Ceramic/Kyner or equivalent
Pressure rating	: 7 kg/cm2
Cable	Up to transmitter in flexible conduct
Transmitter	
Type	Microprocessor based
Mounting	Flush Panel
Protection Class	: IP-65 or better
Output	: 4-20 mA,
Display	: LCD type display
Calibration	: Two-point calibration with standard buffer solutions.
Temp. Compensation	: Automatic
Accuracy	: Better than 0.5% of full scale
Repeatability	: +/- 0.1% or better
Response Time	: 6 seconds for FSD or better
Power Supply	: 85-230V AC 50 HZ
Operating Temp.	0-50 degree C

IDS No 32: - PRESSURE TRANSMITTER**TECHNICAL SPECIFICATIONS****1.0 General Requirement**

The scope of this work includes design, sizing, supply, erection and commissioning of ultrasonic transmitters. 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 +/- 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 Aluminium 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 manifolds to be considered for absolute pressure, 3 valve manifold for gauge pressure and 5 valve

manifolds 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.

1.0 Detailed Technical Specifications

Sr. No.	Features	Minimum requirement for electronic transmitter
1	Type of transmitter	Loop powered Microprocessor based 2 wire type, SMART, HART protocol compatible.
2	Sensor type	Capacitance
3	Material	Measuring Capsule - AISI 316 SS or better; Body - CS / Stainless Steel as per fluid application.
4	Ambient Temp.	0 - 50 Deg. C
5	Accuracy	± 0.1% of span
6	Output signal range	4-20 mA DC (Analog), Linear, along with superimposed digital signal (based on HART protocol)
7	Range	About 1.5 times normal value (min.)
8	Turn down ratio	100:1 for High pressure & 50:1 for Low pressure
9	Repeatability	± 0.05% of span or better
10	Stability	± 0.1% of calibrated span for 6 months up to 70 Kg/cm ² and ± 0.25% for range more than 70 Kg/cm ²
11	Sensitivity	0.05% of span or better
12	Zero and span drift	± 0.015% per deg C at Max Span and 0.11% per deg. C at min. span.
13	Load impedance	500 ohms (min.)
14	Body / Element Rating	1.5 times the maximum span / Full static Pressure on one side with other side venting for DPT.
15	Housing & Enclosure Class	Weather proof as per IP- 67 with durable corrosion resistant coating. Die cast aluminium
16	Over pressure	150% of max. operating pressure
17	Connection (Electrical)	Plug and socket type
18	Process connection	1/2-inch NPT/BSP will be accepted
19	Instrument Valve Manifold	2-Valve for PT / 5-Valve for DPT (Stainless Steel)

20	Output Indicator	LCD type.
21	Span and Zero adjustability	Continuous, tamper proof, non-interacting remote as well as local manual from instrument with zero suppression and calibration facility.
22	Accessories	a.Diaphragm seal, pulsation dampers, siphon etc as required by service & operating conditions b.Two valve manifolds for absolute pressure transmitters Three valve transmitters & Five valve manifold for DP transmitters
23	Mounting Bracket	Required
24	Diagnostic	Self-indicating feature
25	Power Supply	24V DC $\pm$ 10%
26	Adjustment/ calibration/maintenance	Total five (5) no. of handheld calibrators shall be provided.
27	Response time	Suitable to meet closed loop control reaction time specified else where
28	Make	As Per Approved Make

IDS No 33: -INDOOR AND OUTDOOR ELECTRIFICATION

Qty	Item of work	
1	2	
	Internal Electrification	
	Item No. : 1 - Point of Wiring	
16.00	Pts	Point wiring in PVC trunking (casing-capping) with 1.5 sq.mm (2+1E) FR grade copper wire, flush type switch, earthing and required accessories as per specification No: WG-PW/SW
	Item No.: 2 - Independent Plug Point	
2.00	Pts	Providing wiring for independent plug concealed type in min 20 mm PVC conduit with 1.5 sqmm FR grade copper wire with modular type switch and socket and required accessories as per specifications WG-PW/CW
	Item No.: 3 - Indoor Fitting	
10.00	Nos.	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.
	Item No.: 4 -Plug on Board	

2.00	Pts	Wiring for plug on board with switch socket with copper point wiring and earthing as per specifications WG-PW/SW
		Item No. : 5 - Exhaust Fan
4.00	Nos.	Supplying, erecting standard fresh air cum exhaust fan of heavy duty 250 V AC 450 mm 1400 RPM rust proof body & blades, wire mesh, duly erected in an approved manner and marking Sr. No. & erection date
		Item No. : 6 - CAWL for Exhaust Fan
4.00	Nos.	Supplying, erecting 22 gauge GI sheet metal CAWL sector shaped with 25 mm x 25 mm x 3 mm angle iron frame, metal mesh to avoid birds entry and necessary material suitable for 450 mm exhaust fan
		Item No. : 7 - Mains in PVC Conduit
50.00	Mtr.	Supplying and erecting mains with WP 2 x 2.5 sq. mm. 1100 V grade aluminium PVC insulated and PVC sheathed wires on G.I. bearer wire No. 8 SWG complete erected with required size of porcelain reel insulators and 16 SWG G.I. binding wire.
		Item No.: 8 - MCB Switch
3.00	Nos.	Supplying, erecting & marketing DPMCB 6A to 32 A, B-series in provided distribution board as per specifications
		Item No.: 9 - Distribution Board
1.00	Nos.	Supplying & erecting triple pole and neutral distribution board (TPNDB), SPMCB of 4 ways/phase (12 poles), with door, 1.2mm thickness, surface/flush mounted, IP 43 protection on iron/GI frame (horizontal busbar type) as per specification no. SW-SWR/MCBDB
		Item No.: 10 - Earthing
2.00	Nos.	a) Supplying, installation and testing of maintenance free earthing comprising of Electrode of 17.2 mm diameter Low Carbon Steel with 250 micron molecular copper bonded earthing rod of Length 3m along with 25 kg Carbon based environment friendly back fill ground enhancing compound required to fill up the excavated earth with required quantity complete, and recording the results Specification no. EA-MOBI
18.00	Kgs	b) Supplying and erecting GI strip of high purity required size used for earthing on wall and/or any other purpose with necessary GI clamps fixed on wall painted with bituminous paint with joints required. As per specification no EA-EP.
		External Electrification
		Item No. : 9 - Outdoor LED Fitting

6.00	Nos.	Supplying and erecting integrated LED street light fitting 100-110W IP65 & IK08 class having single piece pressure die-cast aluminium housing, having system lumens output of Min. 11000 Lumens, min. efficacy of 110 lumen/W, CRI>70, CCT upto 6500K, THD<10%, p.f. >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.
		Item No. : 10 - Outdoor Bracket
6.00	Nos.	Providing and erecting galvanised 1000mm single arm sword type bracket with FRP dome and ball as per specification no. OH-PL/PBKT
		Item No. : 11 - Cable
200.00	Mtr.	Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 4 core 10 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
		Item No.: 12 - Bunch of Wires
60.00	Mtr.	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
		Item No.: 13 - Double Pole Isolator
6.00	Nos.	Supplying erecting and marketing double pole isolator only switch version of MCB 40 A with required wiring connections & lugs etc
		Item No.: 14 - Street Light Terminal Box
6.00	Nos.	Supplying & erecting FRP box of size 150mm x 125mm x 100 mm, 2.7 mm thick complete on pole/wall as per specification No. CB-SB
		Item No.: 15 - Steel poles
6.00	Nos.	Providing & erecting 6 m high (clear height) galvanised octagonal pole with foundation bolts having bottom of 130 mm A/F, top 70 mm A/F on provided foundation as per specification no. OH-PL/OPL
		Item No.: 16 - C.C. Foundation
6.00	Nos.	Making M- 20 grade reinforced cement concrete foundation by considering the safe soil bearing capacity at site as 10 T/sq.m at 1.5 m depth including supply of steel, concrete, excavation and fixing provided nut bolts with the help of template, duly plastered as per design complete (for 6m to 8m high octagonal /conical GI pole).
		Item No.: 17 - Earthing
6.00	Nos.	Providing pipe type earthing with 40 mm dia GI pipe or 20 mm dia GI rod complete with all materials as per specifications

		Item No.: 18 - G.I. pipe
25.00	Mtr.	Providing, erecting 25 mm dia GI Drop Pipe A class for enclosing PVC submersible cable

		Electrification: - Sub work No 1 Item No 28	
Qty		Item of work	Unit
1		2	4
		Internal Electrification	
		Item No. : 1 - Point of Wiring	
16.00	Pts	Point wiring in PVC trunking (casing-capping) with 1.5 sq.mm (2+1E) FR grade copper wire, flush type switch, earthing and required accessories as per specification No: WG-PW/SW	Pts
		Item No. : 2 - Independent Plug Point	
2.00	Pts	Providing wiring for independent plug concealed type in min 20 mm PVC conduit with 1.5 sqmm FR grade copper wire with modular type switch and socket and required accessories as per specifications WG-PW/CW	Pts
		Item No. : 3 - Indoor Fitting	
25.00	Nos.	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.	Nos.
		Item No. : 4 -Plug on Board	
2.00	Pts	Wiring for plug on board with switch socket with copper point wiring and earthing as per specifications WG-PW/SW	Pts
		Item No. : 5 - Exhaust Fan	
20.00	Nos.	Supplying, erecting standard fresh air cum exhaust fan of heavy duty 250 V AC 450 mm 1400 RPM rust proof body & blades, wire mesh, duly erected in an approved manner and marking Sr. No. & erection date	Nos.
		Item No. : 6 - CAWL for Exhaust Fan	
20.00	Nos.	Supplying, erecting 22 gauge GI sheet metal CAWL sector shaped with 25 mm x 25 mm x 3 mm angle iron frame, metal mesh to avoid birds entry and necessary material suitable for 450 mm exhaust fan	Nos.
		Item No. : 7 - Mains in PVC Conduit	
300.00	Mtr.	Supplying and erecting mains with WP 2 x 2.5 sq. mm. 1100 V grade aluminium PVC insulated and PVC sheathed wires on G.I. bearer wire No. 8 SWG complete erected with required size of porcelain reel insulators and 16 SWG G.I. binding wire.	Mtr.
		Item No. : 8 - MCB Switch	

10.00	Nos.	Supplying, erecting & marketing DPMCB 6A to 32 A, B-series in provided distribution board as per specifications	Nos.
		Item No. : 9 - Distribution Board	
1.00	Nos.	Supplying & erecting triple pole and neutral distribution board (TPNDB), SPMCB of 4 ways/phase (12 poles), with door, 1.2mm thickness, surface/flush mounted, IP 43 protection on iron/GI frame (horizontal busbar type) as per specification no. SW-SWR/MCBDB	Nos.
		Item No. : 10 - Earthing	
10.00	Nos.	a) Supplying, installation and testing of maintenance free earthing comprising of Electrode of 17.2 mm diameter Low Carbon Steel with 250 micron molecular copper bonded earthing rod of Length 3m along with 25 kg Carbon based environment friendly back fill ground enhancing compound required to fill up the excavated earth with required quantity complete, and recording the results Specification no. EA-MOBI	Nos.
90.00	Kgs	b) Supplying and erecting GI strip of high purity required size used for earthing on wall and/or any other purpose with necessary GI clamps fixed on wall painted with bituminous paint with joints required. As per specification no EA-EP.	Kgs
		Total for Internal Electrification	
		External Electrification	
		Item No. : 9 - Outdoor LED Fitting	
16.00	Nos.	Supplying and erecting integrated LED street light fitting 100-110W IP65 & IK08 class having single piece pressure die-cast aluminium housing, having system lumens output of Min. 11000 Lumens, min. efficacy of 110 lumen/W, CRI>70, CCT upto 6500K, THD<10%, p.f. >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.	Nos.
		Item No. : 10 - Outdoor Bracket	
16.00	Nos.	Providing and erecting galvanised 1000mm single arm sword type bracket with FRP dome and ball as per specification no. OH-PL/PBKT	Nos.
		Item No. : 11 - Cable	
200.00	Mtr.	Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 4 core 10 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	Mtr.
		Item No. : 12 - Bunch of Wires	
60.00	Mtr.	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	Mtr.
		Item No. : 13 - Double Pole Isolator	

16.00	Nos.	Supplying erecting and marketing 4 pole isolator only switch version of MCB 40 A with required wiring connections & lugs etc	Nos.
		Item No. : 14 - Street Light Terminal Box	
16.00	Nos.	Supplying & erecting FRP box of size 150mm x 125mm x 100 mm, 2.7 mm thick complete on pole/wall as per specification No. CB-SB	Nos.
		Item No. : 15 - Steel poles	
16.00	Nos.	Providing & erecting 6 m high (clear height) galvanised octagonal pole with foundation bolts having bottom of 130 mm A/F, top 70 mm A/F on provided foundation as per specification no. OH-PL/OPL	Nos.
		Item No. : 16 - C.C. Foundation	
16.00	Nos.	Making M- 20 grade reinforced cement concrete foundation by considering the safe soil bearing capacity at site as 10 T/sq.m at 1.5 m depth including supply of steel, concrete, excavation and fixing provided nut bolts with the help of template, duly plastered as per design complete (for 6m to 8m high octagonal /conical GI pole).	Nos.
		Item No. : 17 - Earthing	
16.00	Nos.	Providing pipe type earthing with 40 mm dia GI pipe or 20 mm dia GI rod complete with all materials as per specifications	Nos.
		Item No. : 18 - High Mast Structure	
7.00	Nos.	Supplying and erecting 12.5 m (clear height) motorized high-mast (Top -150mm, Bottom- 360mm) hot dipped galvanized material with average minimum thickness 65 micron, made from high tensile structure grade steel as per BSEN - 10025 S 355/E350 & 3mm thickness, with base plate 25 mm thick x OD 520 mm grade as per IS-2062, pole made in single section & submerge arc welded, with lowering & raising motorized unit, wire rope stainless steel 316 grade 2 nos., 7x19 construction 5mm, SG-DG U clamps, double drum with assembly 250 kg, 5x2.5 Sq.mm. flexible copper cable with lantern carriage assembly suitable for max. 12 nos. luminaires and its control gear box, lightning arrestor, arrangement for fixing aviation light, high-mast with serial number, factory inspection report/test report of high-mast should be provided as per specifications on provided foundation J type stud/bolts with necessary accessories complete as per specification no. OHPL/HM (excluding luminaires)	Nos.
		Item No. : 19 -Highmast Control Panel	
7.00	Nos.	Supplying and erecting outdoor stand mounted feeder pillar for high-mast of the same manufacturer with 63A TPN MCB incomer, 24hr astronomical time switch with minimum 5 Years battery backup, , IP 54 and IK10 protection, 45 A TP contactor for automatic switching of luminaires, 2 no 9A contactors and raise/lower push button, and provision for termination of adequate size of incoming and outgoing cables complete erected in min. 14 SWG CRCA sheet box powder coated with supporting angles, self lock, gasket and slanting top erected on CC foundation complete.	Nos.
		Item No. : 20 - Flood Light	

42.00	Nos.	Supplying and erecting integrated LED flood light fitting Max. 100W IP65 & IK07 class having pressure die-cast aluminium housing, having system lumens output of Min. 12000 Lumens, min. efficacy of 120 lumen/W, CRI>70, CCT upto 6500K, THD<10%, p.f. >0.90, operating range of 140-270V, inbuilt surge protection of 4 kV, Life class of 50,000 Hrs. at L70B50, including driver with U shaped bracket with 3 Years warranty as per specification No FG-ODF/FLS2.	Nos.
		Item No. :21 - C C Foundation	
7.00	Nos.	Making M- 20 cement concrete foundation by considering the safe soil bearing capacity at site as 10 T/sq. m at 2 m depth including excavation and fixing provided nut bolts with the help of template, duly plastered as per design complete (for 12.5 m raising lowering high mast)	Nos.
		Item No. : 22 - LT Earthing	
7.00	Nos.	Providing pipe type earthing with 40mm. dia. G.I. pipe or 20 mm dia. G.I. Rod complete with all materials as per specification no. EA-EP (For Pole and Panel)	Nos.
		Item No. : 23 - MCB	
7.00	Nos.	Supplying, erecting & marking FPMCB 40A to 63A, with rated short - circuit breaking capacity (Icn) 10kA in provided distribution board as per specification no. SW-SWR/MCB	Nos.
		Item No. : 24 - LT Cable	
350.00	Rmt	Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable 1100 V, 4 core 16 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	Rmt
		Item No. : 25 - Encasing Pipe	
250.00	Rmt	Supplying and laying (including excavation of suitable width & depth up to 90 cm) 50 mm outside dia. double wall corrugated pipes (DWC) of HDPE for enclosing cable below ground/road surface, to required depth complete.	Rmt
		Item No. : 26 - G.I. pipe	
30.00	Mtr.	Providing, erecting 25 mm dia GI Drop Pipe A class for enclosing PVC submersible cable	Mtr.

IDS No 34: -L. T. PANEL

LT Cubical Panel at Proposed Jackwell			
Sr.no	Description	Qty	Unit
1	Supplying and erecting metal work in CRCA sheet including Iron work for supports with fabrication of boxes, panel boards, etc. including cutting, bending, drilling, welding, riveting, treated with anti-rust treatment and duly powder coated or painted with one coat of red lead paint and 2 coats of enamel paint complete	1375	Kgs

Contractor

No. of correction

Executive Engineer

2	Supplying and erecting of any size electrolyte aluminium patti or bar in bus bar chamber / in panel or any other purpose, 500 V with require capacity 99.9%aluminium purity with E91E Grade as per IS 5082 & Current Density 0.8 A per sq. mm. with fixing arrangement (like lug or bottle type lug) to both the end with high grade polyolefin insulation sleeve complete as per specification no. BCPBB	1210	Kgs
3	Supplying and erecting iron work, sheet metal work consisting of CRCA sheets, various sections of iron, plates, chequered plates, rods, bars, MS pipes, etc. for panel board or any other purpose with bending, cutting, drilling and welding complete erected at the position with necessary materials duly painted with one coat of red oxide and two coats of enamel paint to match the switchgears or as per directions by the authority.	260	Kgs
4	Supplying, installing, testing and commissioning air circuit breaker manual drawout type, 650V, 2500A rated at 50° C without deration, 12kV Impulse, 4 pole (100% Neutral Protection) 50 kA (Ics=Icu=Icw for 1s),with standard accessories with ready to close, individual fault trip, alarm and trip indications, mechanical and electrical anti pumping, soft/hard rating plug (including hard rating plug CT) with Micro-processor based LCD display release with LSIG and temperature rise protection & with 4 C/O contacts for On-Off-Trip indication, min. 5 event and trip history on breaker display on provided iron frame as per specification no. SW-SWR/ACB	3	Nos
5	a)Providing & erecting 3 Pole MCCB 415V, 400A, rated short-circuit breaking capacity 36 kA (Ics=100% of Icu), adjustable thermal (overload) setting and adjustable magnetic setting with provided leads, provision for installation of shunt/ UV/ trip alarm contact and MCCB should have phase barriers both sides, with insulation withstand capacity 800V, no line-load bias in provided enclosure /panel as per specification no. SW-SWR/MCCB	2	Nos
	b) Providing & erecting 3 Pole MCCB, 415V, 200A, rated short-circuit breaking capacity 25 kA (Ics=100% of Icu), adjustable thermal (overload) setting and adjustable magnetic setting with provided leads, provision for installation of shunt/UV/trip alarm contact and MCCB should have phase barriers both sides, with insulation withstand capacity 800V, no line-load bias in provided enclosure/panel as per specification no. SW-SWR/MCCB	2	Nos

6	Supplying, installing, testing and commissioning air circuit breaker manual drawout type, 650V, up to 800A rated at 50° C without deration, 12kV Impulse, 4 pole (100% Neutral Protection), 50 kA (Ics=Icu=Icw for 1s),with standard accessories and with ready to close, individual fault trip, alarm and trip indication, mechanical and electrical anti pumping, soft/hard rating plug (including hard rating plug CT) with Micro-processor based LCD display release with LSIG and temperature rise protection & with 4 C/O contacts for On-Off Trip indication, min. 5 event and trip history on breaker display on provided iron frame as per specification no. SW-SWR/ACB	8	Nos
7	Supplying, erecting & marking TPMCB 40A to 63A, with rated short-circuit breaking capacity (Icn) 10kA in provided distribution board as per specification no. SW-SWR/MCB	4	Nos
8	Supplying, erecting & marking DPMCB 40A to 63A, C-series with rated short circuit breaking capacity (Icn) 10kA in provided distribution board as per specification no. SW-SWR/MCB	4	Nos
9	Supplying, erecting & marking SPMCB 0.5A to 5A, C-series with rated short circuit breaking capacity (Icn) 10kA in provided distribution board as per specification no. SW-SWR/MCB	16	Nos
10	Supplying Auxiliary contactor	4	Nos
11	Supplying & replacing Electronic timer above 30 H.P motor starter.	10	Nos
12	Supplying and erecting self-locking arrangement with keys in duplicate, made of brass of grade 1 compliance to IS 729-1979 duly erected, flush with surface of panel / cupboard	12	Nos
13	Supplying and erecting panel mounting type digital voltmeter having three and half digit LED display, calibrated for 0 to 750V AC suitable to operate on 500V having accuracy class of 0.5 ,AC supply with necessary PVC wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.	2	Set
15	Supplying and erecting panel mounting type digital ammeter having three and half digit LED display, external CT operated, calibrated for suitable to operate on 500V, 0 to 1000A having accuracy class of 0.5, AC supply with necessary PVC wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.	8	Nos
16	Supplying and erecting LT current transformer with bar primary 50/5 to 1000/5 ratio with 15 VA burden erected in provided CRCA box duly secured with insulating materials connected to the meter with test certificates	24	Nos
17	Supplying & erecting LED type indicating pilot lamp with LED colours red / yellow / green, 230 / 250V on provided box / panel with necessary material, wiring & connections etc.	21	Nos
18	Supplying & erecting LED type indicating pilot lamp with LED colour blue, 230 / 250 V on provided box / panel with necessary material, wiring & connections etc.	3	Nos

19	Supplying and fixing PVC synthetic elastomer electrically insulating mat with class C insulation conforming to IS: 15652- 2006 tested having 3mm thickness up to 33 kV	20	m2
20	Supplying & erecting Carbon Dioxide (CO2) fire extinguisher of 4.5 kg. capacity cartridge type conform to IS 2878 /15683 complete erected with necessary clamp made from 50 x 6 mm. M. S. flat with nut & bolts routed in wall complete.	3	Nos
21	For Labour charges for internal wiring of panels including all material Add as below	12	Set
22	Supplying & replacing contactor for DOL motor starter from 7.5 H.P. to 10 H.P	1	Nos
23	Supplying and erecting 1cx1.5 sq.mmFRLSH copper PVC insulatedwire laid dedconduit/trunking/insidepole/Busbarsor any other places as per specification No: WG-MA/BW	300	Mtr
24	Supplying and erecting 1cx2.5sq.mmFRLSH copper PVC insulatedwire laid inprovidedconduit/trunking/insidepole/Busbarsor any other places as per specification No: WG-MA/BW	100	Mtr
25	Supplying and erecting 1cx16sq.mmFRLSH copper PVC insulatedwire laid inprovidedconduit/trunking/insidepole/Busbarsor any other places as per specification No: WG-MA/BW	300	Mtr

RATE ANALYSIS FOR LT PANEL BOARD -100 HP VT PUMP (1+1)			
Sr.no.	Description	Qty	Unit
1	Supplying and erecting metal work in CRCA sheet including Iron work for supports with fabrication of boxes, panel boards, etc. including cutting, bending, drilling, welding, riveting, treated with anti-rust treatment and duly powder coated or painted with one coat of red lead paint and 2 coats of enamel paint complete.CRCA Sheet / 16 gauge 1.8 Mtr x 1.5 Mtr x .4 Mtr	250	Kg
2	Supplying, installing, testing and commissioning air circuit breaker manual fixed type, non-drawout type, 650V, 630A, rated at 50° C without deration, 12kV Impulse, 4 pole (100% Neutral Protection), 50 kA (Ics=Icu=Icw for 1s), with standard accessories with ready to close, individual fault trip, alarm and trip indications, mechanical and electrical anti pumping, soft/hard rating plug (including hard rating plug CT) with Micro-processor based LCD display release with LSIG and temperature rise protection & with 4 C/O contacts for On-Off-Trip indication, min. 5 event and trip history on breaker display on provided iron frame as per specification no. SW-SWR/ACB	1	nos

3	Providing & erecting 3 Pole MCCB 415V, 630A, rated short-circuit breaking capacity 36 kA (Ics=100% of Icu), adjustable thermal (overload) setting and adjustable magnetic setting with provided leads, provision for installation of shunt/UV/trip alarm contact and MCCB should have phase barriers both sides, with insulation withstand capacity 800V, no line-load bias in provided enclosure/panel as per specification no. SW-SWR/MCCB 3 Pole, MCCB of 630 A for outgoing for 150 HP Motors & 1 spare	2	nos
4	Providing & erecting 3 Pole MCCB 415V, 400A, rated short-circuit breaking capacity 36 kA (Ics=100% of Icu), adjustable thermal (overload) setting and adjustable magnetic setting with provided leads, provision for installation of shunt/ UV/ trip alarm contact and MCCB should have phase barriers both sides, with insulation withstand capacity 800V, no line-load bias in provided enclosure /panel as per specification no. SW-SWR/MCCBfor APFC	2	no
5	Providing & erecting 3 Pole MCCB, 415 V, 100A, rated short-circuit breaking capacity 25 kA (Ics=100% of Icu), adjustable thermal (overload) setting and fixed magnetic setting with provided leads, provision for installation of shunt/UV/trip alarm contact. MCCB with phase barriers on both sides, insulation withstand capacity 800V, no line-load bias in provided enclosure/panel as per specification no. SW-SWR/MCCB	3	no
6	Providing & erecting 3 Pole MCCB, 415 V, 63A, rated short-circuit breaking capacity 25 kA (Ics=100% of Icu), adjustable thermal (overload) setting and fixed magnetic setting with provided leads, provision for installation of shunt/UV/trip alarm contact. MCCB with phase barriers on both sides, insulation withstand capacity 800V, no line-load bias in provided enclosure/panel as per specification no. SW-SWR/MCCB	1	no
7	Supplying and erecting aluminium strip of high purity required sizes used for earthing on wall and/or any other purpose with necessary aluminium clamps fixed on wall painted with bituminous paint with joints required as per specification no EA-EP.	100	Kgs
8	Providing and erecting Busbar Insulators	30	nos
9	Supplying and erecting panel mounting type digital ammeter having three and half digit LED display, external CT operated, calibrated for suitable to operate on 500V, 0 to 1000A having accuracy class of 0.5, AC supply with necessary PVC wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.	3	nos
10	Supplying and erecting panel mounting type digital voltmeter having three and half digit LED display, calibrated for 0 to 750V AC suitable to operate on 500V having accuracy class of 0.5 ,AC supply with necessary PVC wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.	1	no
11	Supplying and erecting selector switch suitable for voltmeter/ammeter for 3 phase AC supply 500V, 50Hz, on provided box / panel and duly connecting with necessary PVC wire leads and lugs.	4	nos

12	Supplying and erecting LT current transformer with bar primary 50/5 to 1000/5 ratio with 15 VA burden erected in provided CRCA box duly secured with insulating materials connected to the meter with test certificates.	15	nos
13	Supplying & erecting LED type indicating pilot lamp with LED colour blue, 230 / 250 V on provided box / panel with necessary material, wiring & connections etc.	8	nos
14	Labour charges for internal wiring of panels including all material Add as below -150 HP x 2 = HP	300	HP
15	Electronic Motor Protection relay Providing, installing in panel EMPR for protection like overload, phase failure, locked rotor, phase reversal with trip indication and adjustable over current function, DIN rail mounted.(For LT motors)	2	nos
16	Supplying and erecting bank of All Polypropylene capacitors with the standard capacities of 1, 2, 3, 5, 7, 12.5, 15, 20 and 25 KVAR units of power factor correction for operation on 3 phase, 50Hz, 400V +/- 10% with externally discharging resistances, earthing terminals and built on angle iron or channel iron frame work and provided with terminal cover box complete erected and tested. Capacitor 50*2	100	Kvar
17	Supplying and erecting GI sheet 1.6mm (16 SWG) caution board of size 250 x 200 mm duly painted with red oxide and enamel paint in Marathi, Hindi and English erected at position for HV/EHV (11000 Volts) installation with compliance to IS 2551-1982	3	nos
18	Supplying, erecting & marking DPMCB 6 A to 32 A, B-series with rated short circuit breaking capacity (Icn) 10kA in provided distribution board as per specification no. SW-SWR/MCB	1	No
19	Supplying and erecting dual source intelligent flush mounted panel meter three phase four wire (IPM) 415V CT/ PT site programmable class I flush mounted (96 x 96 mm) meter with voltage, current, frequency, power factor, ON hrs, kWh, EB and DG set metering with LED display (excluding CT'S) complete with RS 485 communication protocol, class I accuracy and wiring connections and mounting hardware on provided panels complete with calibration certificate from manufacturer	1	no
20	Supplying and erecting Hour meter	2	nos
21	Supplying and fixing PVC synthetic elastomer electrically insulating mat with class B insulation conforming to IS: 15652-2006 having 2.5 mm thickness up to 11 kV	5	sqm
22	Supplying and erecting self-locking arrangement with keys in duplicate, made of brass of grade 1 compliance to IS 729-1979 duly erected, flush with surface of panel / cupboard	15	Nos
23	Providing erecting Earthing Terminals in panel	2	Nos
24	Providing erecting Louvers in panel	4	Nos
25	Supplying and erecting fresh air cum exhaust fan of light duty 250 V A.C. 50 cycles 225mm. 1400 RPM rust proof body & blades, wire mesh, duly erected, complete	2	Nos

26	Supplying and erecting T8 Fluorescent tube day light 600mm, 18 W	2	Nos
27	Providing and erecting name Board	1	no

LT Cubical Panel at Vadavli Booster

Supplying & erecting automatic control panel for 3 Ph, 415 volt, A.C. Submersible/centrifugal pump set up to 30 HP consisting of Star Delta starter having relay range 30-50 Amp, S.P.P., Combined ammeter/ voltmeter, phase indicating lamp enclosed in CRCA powder coated Vibration proof enclosure with IP 54 protection. Control Panel should offer single phasing, phase reversal, phase imbalance etc.

IDS No 35: -HERMETICALLY SEALED TRANSFORMER

Supplying, installing, testing & commissioning 3 phase, 22/0.433 kV, 50 Hz., Natural Estor oil immersed and naturally cooled outdoor type, Copper wound ,without gas cushioning ,**hermetically 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 B winding insulation (kraft paper) , with HV tapping (with on load tap changer) on load +5 to -15 in steps of 2.5%, with standard accessories complete with test certificate with test certificate as per IS:1180 (part 1) : 2014 with necessary permissions of Electrical Inspector, as per specification no SS- TR-SL

Make:- Telawane, Cahores and VoltAmp

IDS No 36: -HT METERING CUBICAL

Supplying, erecting, testing and commissioning 22KV HT metering cubical (compact type) approved by MSEDCL / licensee fabricated with 2 mm (14 SWG) M.S. sheets with supporting angle, painted with powder coating / epoxy paint of required shade, copper bus bar size 25 x 6 mm, heavy duty mechanical lock, with counter meter for measuring no. of times the opening of meter door, top side cover (CT, PT cover) interlock with meter door, epoxy casted 3 nos. CT having required ratio between 25/5A to 200/5A, VA 10 or 15, Class 0.2S, epoxy casted 3 nos. PT having ratio 22000/V3/110/V3 VA 50, Class 0.2 suitable for provided trivector meter, and provision for incoming and outgoing cables complete duly tested by licensee with necessary test certificates and erected on provided plinth/ cc foundation.

IDS No 37: - TEST & TRIAL

Minimum staff required for 24 hours operation, maintenance, watch and ward of equipment and system for continuously 24 hours. However, the requirement is bare minimum and contractor has to arrange additional staff as and when required considering the nature of work. Agency should submit the valid wireman license of the pump operators which they will be employed along with medically fitness report prior to their employment at Baramati pumping station/ booster

The duties expected to be carried out by various categories are as under

Pump Operator :

The pump operator shall work in shifts and shall operate pumping machinery along with their allied electrical and mechanical equipments like panel board, starter, transformer, Load break switch, Metering Kiosks, valves by Valve actuator Crane, Flow Meters etc. The delivery sluice valve shall be closed while starting the pump. The valve shall be got opened with valve actuators. All entries regarding operation of pump shall be entered by operator only. Capacitors shall be taken in circuit as and when required and maintain the power factor. The circuit of capacitor shall be checked regularly. While taking the charge of the shift, every operator should ask regarding position of the pumping to his successor. He should check personally working machinery, cable connections, motor temperature, log book entries etc prior to take the operational charge. The electrical connections should keep clean & tight.

The reading of current of all running motors, Voltage, Power Factor, Pressure Gauge and Flow meters shall be taken hourly and noted in log book supplied by department in prescribed form. All electrical maintenance work shall be carried out under supervision of Electrical supervisor.

The pump operator shall not be relieved from the shift unless the operator of next shift attend the pump house and handing over the charge with written noting in log book regarding happening of events during his shift.

The work of operation, periodical maintenance, cleaning, sweeping, regular check up of system, testing for serviceability and routine rectification etc works of system are included in the Item and described in (1) Operational Schedule and (2) Maintenance Schedule.

If agency fails to maintain the system or attend to any work arises during the contract period, including schedule - B items and required to be executed or instructed by Engineer-in-charge within the period of 24 hours, the same shall be carried out by Department at risk and cost of contractor and the same will be recovered from his bill.

Any claim of agency after not attending the work within 24 hours, will not be entertained. Written instructions given in log book or otherwise by Engineer-in-charge will be final and separate notice will not be served in such case.

Shutdown / Breakdown shall be attended by the contractor promptly and up to the requirement of the department. If any emergency repairs which is not included in the scope of tender but is required to be done in the public interest for maintaining smooth water supply, shall be done by the contractor, as per written instructions of engineer-in-charge. If contractor fails to attend any work or if the delayed in restoring the water supply on part of contractor the same shall be treated as loss of revenue to the department and the same will be recovered as loss of water due to overflow at sump or ESR.

The co-ordination includes communication from pumping stations, SMC Section Office, SMC Division and Sub Division Office and MSEDCL office Ambarnath. In case of power failure immediate communication with MSEDCL authorities shall be done at required level and same shall be reported to MJP. This shall be done by the operating staff during all the three shifts and communicating shift wise pumping, breakdowns, power failure and low voltage problems as per the schedule given by Engineer-in-charge.

It is the responsibility of the contractor to pay the contract labours as per minimum wages act and its amendments from time to time applicable to the zone concerned. In case of any dispute it is responsibility of the agency to settle the issue with workmen or their union if exists and with labour office / court etc. MJP will not take any responsibility in case of any allegation on part of contract labours either wages or for any other facilities.

The offer shall be inclusive of all taxes and contributions towards Provident Fund, ESIC, Over Time, Leave Salary, License & Consulting etc.

Attendance register shall be maintained at site and shall be got verified by Engineer-in-charge. The person appointed by the agency shall have the identity card with photographs and one copy of the identity card shall be submitted to the office of Engineer-in-charge. It is the responsibility of the contractor to produce attendance register before 2nd day of every month to engineer-in-charge otherwise monthly bill will not be prepared.

The workmen of the agency who will be absent from duties shall be marked as ABSENT. The absentee will be recovered from the contractor as per rate given in Mode of payment of General Conditions of Contract.

No person shall do his duties or more than one shift within 24 hours. If found, he will be penalized and the actual person on duty will be marked as absent and recovery will be affected as per said annexure.

Schedule of shifts are as under , however it may change if required by MJP

Shift I	:	7.00 hrs to 15.00 hrs
Shift II	:	15.00 hrs to 23.00 hrs
Shift III	:	23.00 hrs to 7.00 hrs

It is necessary to give weekly off to pump operator. To cover absentee on public holiday, festival, weekly holidays, casual leave, other holiday or compensatory holidays, agency shall be given the required minimum staff in any case of three shifts or in general shift. The provision for reliever is made in the scope of work. However in spite of available staff in general shift, the arrangement is not materialized, agency has to provide extra staff at his own expenses so that the work shall not be hampered. If agency's any workmen goes on leave then in such case agency has to provide substitute in leave period of the person going on leave and the payment payable thereof shall be borne by the agency. Unless the reliever comes on duty, the staff from earlier shift cannot be relieved .Maharashtra

Jeevan Pradhikaran reserves the right to reduce the Pump operator or Helper and it shall be binding on the contractor.

IDS No 38: - H.O.T. CRANE- 5.0 MT- 8 MTR. SPAN

General Particular	For Pure water pump house
Qty	As Per SCH B
Capacity	5.0Tonnes
Span	8.0Mtr.
Lift	6.0Mtr

Contractor

No. of correction

Executive Engineer

- i) The contractor should design & provide the H.O.T of 5.0 tone safe working capacity tested to 50 % overload times working capacity, overhead travelling crane with all equipment's & 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, I 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 confirm 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 MJP 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.

SQUARE BAR / RAIL

The rails shall be square bars, not less than 50 mm x 50 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.

IDS No 39: - Tools

Providing Tool set as per following List

Sr.No.	ITEM	Qty	Unit
A)	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)	Supplying tong tester to read current 0 to 1000 Amp. voltage 0 to 600 V, & insulation Resistance with housing box Make Shanti/ Meco/Motwane only	1	No
3)	Supplying shock proof type hand lamp with lamp Holder guarded glass and 10 meter 3 core PVC Flexible cord with hand shield type 3 pin 6 Amp plug top (MR)	1	No
4)	Hydraulic flip flop crimping tool with set of dies ranging From 6 sq.mm to 630 sq.mm cable size lugs (Make Ushall Ismall or Dowels)	1	No
A)	TOOLS: OF MAKE GODREG/HALANI/TAPARIA/EVEREST ONLY		

Contractor

No. of correction

Executive Engineer

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 6.22 mm size	1	set
4)	Hack saw frame 300 mm size with blade heavy duty	1	No
5)	Insulated combination cutting plier size 200 mm 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 Engineer pattern blade from selected Steel chrome plate size 5x200	2	Nos
9)	Screw driver Electrical pattern blade from selected crone plated size 5x300 mm (insulated)	1	No
10)	Diagonal cutting plier of size 150 mm (insulated)	1	No
11)	Long nose plier carbon steel of size 200 mm PVC coated	1	No
12)	25 mm dia heavy duty 1.2 mtr long crow bar	1	No
13)	12 mm size 2 MT capacity wire roap 3 mtr long With dog bolts	2	Nos
14)	Tool box made from 16 SWG MS sheet duly painted With two coats of anticorrosive paint and two coats of Post office red colour of minimum size 4 ft. x 2 ft. x 1.5 Ft. having compartment for keeping of various tools	1	No
15)	Hydraulic flip flop crimping tool suitable for 6 to 500 sq mm size cable lugs (Usha-Ismail or similar make	1	NO
B)	NAME BOARD :- Providing & fixing wall mounting type name Board duly painted all details / instructions of Pumping machinery i.e. for details of PMC 1 No + for pump operation guide instructions 1 No + single line diagram of complete installation etc details on GI 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 (minimum size 21/2 Ft x 4 ft) T.W. battons on the back side@ Rs.1000/- (MR)	3	No

IDS No 40: - Firefighting Equipment

Designing, providing, erecting, commissioning & testing of & safety equipment and tools as per detailed specifications etc comp.

Contractor

No. of correction

Executive Engineer

(a) Instruction chart-	2	No.
(b) Rubber hand gloves -	2	Pair.
(c) Fire buckets	4	No.
(d) Mounting stand for 4 buckets	1	No.
(e) First Aid Box	1	No.
(f) Rubber matting 12mm	30	Sqmt
(g) Fire Extinguisher 5 Kg DCP	4	No.

IDS No 41: - POWER ANALYSER

Designing, Supplying, Installing, commissioning & testing of Power Analyser interfacing to PLC Panel with modbus communication port , as per IEC 62053 and in the prescribed format including mounting arrangement.

IDS No. 42 - PLC PANEL FOR PUMPSETS

a) Design, manufacture, supply, installation, testing and commissioning of indoor type PLC panel of size approx. 1000 mm X 700 mm X 1500 mm (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 - 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

b) 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 - 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

IDS No. 43 - Scada system for Raw 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 Pro OS, Microsoft Office & Antivirus & Internet

SCADA Software of reputed company with developer & runtime license with minimum 256 number of Tags with following features & functions

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.

IDS No. 44 - PLC with HMI for sand filter (with 4 Filter beds)

Design, manufacture, supply, installation, testing and commissioning of indoor type PLC panel of size approx. 1200 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 WTP Plant (sand filter bed wasing & operation).

PLC shall have Ethernet port & protocol for Modbus TCP communication with following IO

DI -72 num DO - 40 num AI -24 num AO - 16 num 10 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 sand filters filters (sand filter bed wasing & operation)

MCB 10A DP - 1 num

MCB 4A DP - 4 num

24 VDC Power Supply 10A - 1 num

Push Buttons - 30 num

Selector Switch -15 num

Control Contactor - 15 num

Annunciator with 12 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 - 15 num

Wiring + TB etc - 1 lot

Hardware - 1 lot

2 HP VFDs - 3 num

IDS No. 45 - PLC PANEL FOR WTP

Designing, Providing, installing, testing and commissioning of indoor type PLC panel of size approx. 1200 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 WTP Plant (raw water monitoring, alum dosing control, clarifloculator operation & control, recirculation & mud pump operation). PLC shall have Ethernet port & protocol for Modbus TCP communication with following IOs DI -72 num DO - 40 num AI -12 num AO - 4 num 10-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 WTP plant. MCB 16A DP - 3 num MCB 10A DP - 1 num MCB 4A DP - 4 num 24 VDC Power Supply 10A - 1 num Push Buttons - 30 num Selector Switch -16 num Control Contactor - 16 num Annunciator with 12 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 - 16 num Wiring + TB etc - 1 lot Hardware - 1 lot

IDS No. 46 - SCADA SYSTEM FOR FILTERS & WTP EQUIPMENTS

Design, manufacture, supply, installation, testing and commissioning of SCADA System for WTP Plant, Sand Filter beds & 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 Pro OS, Microsoft Office & Antivirus & Internet Security software for 3 years license.

SCADA Software of reputed company with developer & runtime license with minimum 512 number of Tags with following features & functions.

1. Supervise real-time data in the form of graphical presentation.
2. Control WTP 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 WTP operation from operator desk. All important alarms & events shall be logged. All the data from field 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.

IDS No 47: - LED MONITOR

Supply, Installation, Testing, Integration & Commissioning of 49" LED monitor at Conf. Room for display of total water system (Online). Agency should install 49" UHD LED monitor in MCR. It should be interfaced with multi-screen animation which would cover entire overview of WSS including a separate screen for the CCTV footage in the office premises.

IDS No 48: - SECONDARY WORK STATION

Supply, Installation, Testing, Terminating & Interfacing Secondary Computer Station 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 Pro OS, Microsoft Office & Antivirus & Internet Security software for 3 years license.

IDS No 49: - PLC Panel suitable for Wireless communication

Water distribution lines in water supply scheme consists of number of (Master Balancing Reserior (MBR) and Elevated Service Reservoir (ESR). These MBR/ESR may be located at different levels, some may be at higher levels and some may be at lower level. Under such circumstances it is often seen that distribution of pure water will be different in different zones. Lower zones will get water with more pressure and flow, where as higher zones will face shortage of water with low pressure.

Remote Controlled MBR/ESR management system is the only solution to avoid above mentioned difficulties. This is a most modern and versatile concept of automation in distribution system of water supply scheme. This unit works remotely on timer or remote switch which will operate from central computer over GSM based network. The unit requires very less amount of electrical power and can be easily made available from Solar Power. Since opening and closing is entirely automatic, timing of water supply to consumers never changes. Also this Remote Controlled Water Delivery Unit has arrangement to control flow rate of water, hence it is possible to have equal distribution of water through out water supply scheme. Remote Controlled MBR/ESR management system has arrangement of measuring volume of water flow (Cubic meter) and can be added .

Looking at these important features of Remote Controlled Water Delivery Unit, aim of rendering maximum satisfaction to consumers is expected.

Features:

Equal distribution of water through out water supply scheme.

Automatic OPEN and CLOSURE of valve at desired set time through timer.

Remote and Automatic OPEN and CLOSURE of valve from central computer with GSM network.

No need of man power.

Works on Solar power.

Provision of measuring water quantity being delivered

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 colour. 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 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 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

The Field Data Transmitter with in-built micro plc has got a highly-sensitive circuitry of measuring parameters like Flow/level/Pressure which will be sensor output and in the form of analog output like current (here typically it will be 4 to 20 mA) or pulse particularly with bulk flow sensors and pressure sensors, that can be periodically detected corresponding to a particular water fixture including Third Party Inspection. It is also possible to monitor and control automatic control valve from remote location or from web site. The system can also include with a GSM/GPRS circuit which will create a set of text instructions for relaying water data as and when required by user in the form of SMS or data packets and will communicate water data after pre-set period to the central computer that can collect, store, and further analyze data or to web server. It is also possible to log water data over to website for set scan time. Field Data Transmitters will have setting of scanning time in min or hours from 1 min. to 24 Hrs. and shall be user friendly. Field Data Transmitter will have back up supply in the form of rechargeable battery to provide water data readings over to central computer even in case of power failure. FDT works over GSM / GPRS network of suitable service provider. PLC shall have 1 wireless port / GPRS, Modbus port/Battery status for valves

GPRS / GSM based RTU with PLC controller Panel:

This panel will control Automatic flow control valve depending upon water level of MBR / ESR. 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 pushbuttons 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 has 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 master unit. RTU is used for remote control and monitoring in the various applications.

Features of GPRS / GSM controller:

- ❑ Wireless Communication.
- ❑ Event notification.
- ❑ Remote Control.
- ❑ Remote cell phone support for data messaging
- ❑ Simple installation

Specification of GPRS / GSM controller:

S. N.	Parameters	Range
1	Operating Voltage.	12 VDC.
2	Mode of Transmission.	Supporting to GSM dual band
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.

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.

Specifications:

1. Monitors two digital inputs.
2. 2 relay controlled digital outputs.
3. 2 analogue input to measure 4 to 20 mA from sensors.
4. Monitors two pulse inputs from flow meter.
5. Able to operate on GSM/GPRS network.
6. Reports on set point alarms and sends SMS as desired
7. Working voltage is 12 VDC.

Features

- ❑ Battery backup through rechargeable battery of 12 VDC.
- ❑ Analogue input: 4-20 mA or pulse from bulk flow meter and pressure Transmitter.
- ❑ Scan time is settable and in steps of 1 hour with maximum 24 hours.
- ❑ Parameters are set through software provided with device.
- ❑ WEB based Data Acquisition software should be suitable for data collection from different FDT.
- ❑ Mode of transmission: GSM/GPRS network.
- ❑ Transmission antenna: High gain whip antenna of 3 dB
- ❑ Data transmitting format: Through RS 232 compatible.
- ❑ Backup supply in case of power failure: Available.
- ❑ Enclosure: Antistatic and antimagnetic PVC enclosure.
- ❑ Mounting: Wall mounting enclosure.
- ❑ PLC Software: Run Time + Development version with limited Tags.
- ❑ Wireless module along with antenna which can work on suitable frequency

of GHz at the minimum distance of 10 KM with bound rate of 10 Mbps. A group of micro-PLCs on Ring network and common wireless network module

IDS No 50: - SCADA FOR MBR/GSR WITH PLC BASED CONTROL VALVE MANAGEMENT SYSTEM

Design, manufacture, supply, installation, testing and commissioning of SCADA System for MBR/GSR/ESR Management system 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 LTE Cellular Gateway with minimum following specifications shall be provided with Dual Sim Support, Support for all LTE bands used by Indian Cellular Operators, with at least one, Ethernet, one USB & one serial port for connectivity with host device, rugged construction for hazardous location.

One remote dice management software shall be provided to manage IP addresses of RTUs SCADA Software of reputed company with developer & runtime license with unlimited

number of Tags with following features & functions

1. Supervise real-time data in the form of graphical presentation
2. Control MBR/GSR/ESR 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.

IDS No 51: - SOLAR PANEL WITH BATTERY

Designing, Supplying, installing commissioning & testing of photovoltaic solar panel with its charger, MS Stand for mounting solar panel so as to have maximum exposure of sunlight for desired location and maintenance free battery with 3 days battery backup.

Solar technology that directly converts sunlight into electricity is called solar

photovoltaic (PV) technology. PV produces direct current electricity, which can be used on-site, stored or converted to alternating current for long-distance transmission.

Solar modules are the key element of every solar power system as they convert sunlight into electricity. Their quality and the optimum use of the respective technology are therefore decisive for the yield and profit of the system.

Solar panel should be capable of charging 12/24 VDC 36Ah or 3 days backup (whichever is more) batteries through charge controller. Solar modules are the key element of every solar power system as they convert sunlight into electricity. Their quality and the optimum use of the respective technology are therefore decisive for the yield and profit of automatic ESR / MBR / GSR filling system.

Open Circuit Voltage (Voc) in Volts - 21

Short Circuit Current (Isc) in Amps - 1.15

Maximum power during full exposure - Suitable to automatic ESR filling system.

Maximum System Voltage - 600 V

Physical Parameters

Solar Cells Per Module (Units) - 36

Junction Box (Terminals) - 2

Diode in Junction Box - 1

Measurement Tolerance on Power +/- 5%.

Battery Capacity - 12/24 VDC 18Ah or 3 days backup (whichever is more)

All electrical parameters Specified at STC 25° cell temperature, 1000W/M² irradiance,

Type of cell Mono-Crystalline Si Certifications: IEC 61215 / IEC 61730-1 / IEC 61730-2

Front Face Tempered Glass & Low Iron All modules are supplied with screw less Hollow

section frames Encapsulate Ethylene Vinyl Acetate Warranty: Limited Extended

warranty up to 10 years Frame Anodized Aluminum Junction Box Weather Proof Nylon

6

Mode of Payment

a) 65% Against Supply of Material as per given Specifications including TPI.

b) 25% Against Erection as per instruction of Site Engineer

c) 10% Against Successful commissioning and trial as per instructions of Engineer In Charge

IDS No 52: -COMPREHENSIVE OPERATION and MAINTANACE

The entire Pumping Station and SCADA & AUTOMATION system to be installed under this work is to be compulsory operated & maintained by the contractor for the period of 2 years after one-year initial guarantee period.

Contractor

No. of correction

Executive Engineer

Since this work is intended for human drinking water supply project the efficient & qualitative operation is of utmost importance.

In order to meet the day-to-day operation & maintenance of the entire project following persons are to be deployed on full time basis as under

- 1) ESR and MBR Management system: All ESR and MBR's covered under this project are to be operated, monitored and maintained through a team of 2 skilled technicians having in depth knowledge of Vsat / GSM based modems, level transmitters, pilot operated Automatic flow control valves, solar panel and inverter battery system etc. Two teams each comprising of 1 person shall be formed & each team shall 9 ESR's per week. The team shall be responsible for the day-to-day operation of the ESR Inlet/Outlet Automatic Control valves with solar panel system, level sensor, Pressure Transmitter, Field Data Transmitter etc. Also, this solar panel system installed over the ESR for Power supply requirements, shall be thoroughly cleaned with water every week. The electrolyte in the battery shall have to be checked and replenished every 2 months.

Operation & Maintenance

Operation and maintenance of the system broadly can be divided in into following parts-

1. Spares, components for the system
2. Consumables during operation of the system
3. Assistance Services for operation of the system
4. Maintenance Services for the System
5. Special purpose tools and calibration equipment's.

Operation and maintenance of the system generally involves following activities -

1. Operational Assistance:

This includes routine day to day operation of the system like operation of the control instruments and pumps from the system, generating the reports based on the real-time archived data, monitoring & acknowledging alarms and taking necessary action to deactivate critical alarms.

2. Preventive Maintenance:

This includes preventive maintenance of the measurement equipment's, calibration of the instruments and replenishing the regents and other consumables, to ensure the smooth working of the system components.

3. Corrective Maintenance:

As and when required it is necessary to carry out the corrective maintenance of the faulty instruments, equipment's. This includes the removing the faulty instrument from the system, replace with the spare instrument and repair the same at site or in the manufacturers workshop depending upon the severity of the fault.

Specifications for O&M

This section applies to the specifications for operation and maintenance of Instrumentation and controls used in the System. The Contractor shall maintain the complete system including instrumentation & control system for WTP

Specifications

The specification of materials used for repairs shall be the same as have been used in the original work. Specifications for any materials which were not used during construction shall be approved by engineer prior to commencement of the operation and maintenance period. Without being limited by this clause, during O&M period the Contractor shall use appropriate material for repairs even if material required for such repairs has not been approved earlier, and no delay in making such repairs shall be subjected to such limitation. However, subsequent to use of such material, the Contractor shall submit proposals for the approval of specifications of such material.

Activities during O & M Period

General

Within the framework of the Contractor's responsibilities, the Contractor shall carry out the following activities. However, these shall not limit the requirement for other activities which otherwise are required as per terms and conditions of Contract or to fulfill the Contractor's responsibilities or are essential as per good industrial practices. The Contractor shall be responsible for, but not limited to, the following:

- a) Providing the maintenance services for the system as directed by the engineer in-charge.
- b) Providing the required staff during operation and maintenance period.
- c) Providing all required consumables required for functioning of plant and equipment.

- d) Maintenance of instrumentation (all field instruments) & control system, software, PCs, control room, radio telemetry system UPS, A.C. etc. and all other works constructed in this Contract.
- e) Entering into AMC (Annual Maintenance Contract) contracts with system/equipment suppliers, as necessary.
- f) Periodic calibration check of all supplied instrumentation and controls during the period of operation and maintenance.
- g) Reporting;
- Repair history of all mechanical, electrical and instrumentation control equipment in above mentioned item 1 to 7
 - Daily log of operations of all the important instrumentation & equipment
 - Hourly readings of pressure, flow rate and integrated quantity of water;
 - Hourly levels of ESRs;
 - Daily list of alarms with time tag;
 - Logbook format and the data to be included in the logbook shall be decided in consultation with department;
 - Last periodic maintenance done for all equipment/buildings of the system;
- h) Providing required spares and maintaining adequate inventory of required accessories or equipment itself for repair of system so that all instrumentation and control equipment's, software and communication system can work efficiently for the proper functioning of System. Prior approval to the changes required to be carried out during O&M shall be obtained by the contractor from the engineer. The required changes shall be reported well in time. Necessary drawing and literature for any changes shall be submitted to the employer's representative. The Contractor shall be solely responsible for the safety and security of the goods in the store and will be responsible for any loss or damages in stores for any reason. He may opt for insurance cover against the value of the goods to be stored without any additional costs on the Department.
- i) Periodic routine maintenance of structures/control room / chambers of each location of WTPs, ESRs etc. and others built in the Contract. Such maintenance must ensure adequate cleanliness, ventilation, illumination and structural safety. In addition to this, the general hygienic standards must be maintained.
- j) Co-ordination with other contractors and/ or agencies responsible for the execution, operation and maintenance of other works of the system.

- k) Insurance: The Contractor shall, without limiting his or the Employer's obligations and responsibilities, insure;
- l) The work together with material and plant for incorporation therein, to the full replacement cost (term "cost" in this context shall include profit).
 - II. The Contractor's equipment and other things brought onto site by the Contractor, for a sum sufficient to provide for their replacement at the site.
 - III. The insurance shall be in the joint names of the Contractor and the Employer at the Contractor's cost and shall cover the Employer and the Contractor against all losses or damages from whatsoever cause arising from the start of the O&M until the date of completion of O&M in respect of the facility or any section or part thereof as the case may be.
 - IV. Any amount not insured or not recovered from the insurer shall be borne by the Contractor

WTPs, ESRs'

- (i) Operation of System as required, including provision of required manpower and services for proper operation and monitoring of remote locations of WTPs, and Reservoirs'.
- (ii) Periodic site calibration of all measuring/metering equipment and instrumentation at every 6 months minimum or as recommended by the manufacturer.
- (iii) Repair or replacement, as required, of damaged instrumentation and controls for proper functioning of system.
- (iv) Maintenance of the System including central server, software's, PCs, UPS, A.Cs, telemetry system etc.
- (v) Routine maintenance of the field instruments as per recommendation of the manufacturer.
- (vi) Routine monitoring of each remote location for damage / repair of any equipment / parts and taking preventive measures as required
- (x) Providing safety accessories such as gloves, shoes, first aid box etc.
- (xi) Ensuring safety of plant and equipment.
- (xii) Furnishing required information to Employer as and when required.

Spare parts & stores

All spare parts used for the equipment in the maintenance of the system must be from the manufacturer of the equipment or, if the equipment itself has been made with parts from other manufacturers, the parts must be of the same make as used in the equipment supplied and installed.

All spare parts shall be packed for long storage under the climatic conditions prevailing at the Site. Each spare part shall be labelled on the outside of its packing with its description, number and purpose and, if more than one spare is packed in a single case, a general description of the case contents shall be shown on the outside and a packing list enclosed. The cost of O & M shall inclusive of spare parts during O & M contract period. The store inventory, the issuing and recording of spare parts will be the responsibility of the Contractor.

The Contractor is also be responsible for providing spare parts and instrumentation required for the Operation and Maintenance during the operation period, and shall bear the cost of the same, including the cost of storing and safeguarding.

The Contractor will make all necessary arrangements to ensure the continuous supply of spare parts and instrumentation for the works, and the rate of supply of these materials shall be in such quantities and amount as would ensure uninterrupted operations.

COMPLETION OF O&M CONTRACT

On the date of Contract Completion or if the Contract is terminated, all the installations, works and equipment's placed under the Contractor's responsibility shall be handed over to the Employer, at no cost, in good working order, barring normal wear and tear. The Employer may perform any inspections, tests from expert appraisals he shall find necessary with a view to checking that this property is in good working order.

At the end of O&M period, the Contractor shall be entitled to receive an Operation & Maintenance Completion Certificate within One Month of the Completion of the Contract.

The delivery of such Completion Certificate will relieve the Contractor from his responsibility as regard to the Operation and Maintenance and confirm that the Contractor has fulfilled all of his obligations under the Contract.

Documents to be provided by the Contractor (Operation Log book)

The Contractor shall keep a permanent record of plant in Operation (logbook).

This logbook shall be kept at the site and shall be presented on request to the Employer.

On a daily basis the following information shall be recorded in the logbook -

Result of analysis and tests conducted on site to determine the quality of raw and treated water and treatment parameters,

Machinery Operation data, its operating parameters

Maintenance records, shut down record of each machinery & equipment

Readings from the different meters, indicators and recorders (Including but not limited to consumption of energy and chemicals, volume of water treated, operating times of the different equipment's).

Computer documents and tapes produced by monitoring and surveillance equipment, shall be attached to the logbook.

Financial Provisions

No Advance shall be paid by the Employer.

Method of Payment

The contractor will be paid per year for the period upto 3 years. The first year will be the warranty period during which O & M services will be free. During 2nd and 3rd year the contractor will be paid appropriate amount as mentioned in schedule B to carry out entire O & M for items mentioned in Schedule B.

Penalties for Failure to achieve the Functional Guarantees

In case of failure to generate the desired report, liquidated damages shall be imposed for such failure to meet the performance criteria or satisfactory service. The Employer will be entitled to recover any such damages from the monthly progress payments to be made to the Contractor in the month in which the failure occurred, or at any time thereafter from the subsequent monthly progress payments. The penalty charges will be applicable Rs. 500 per location per day.

Mode of Payment

The O & M Contract includes lump sum price per year for services, spares, consumables, insurance, taxes & duties, royalties, license fees and other incidental costs.

The payment for the completed month will be measured and paid on pro rata basis.

Agency has to submit BGs of equivalent O&M amounts at the end of the first year. Against BG Submission agency will be eligible for O&M Payment disbursement.

**Maharashtra Jeevan Pradhikaran
WATER SUPPLY DEPARTMENT
DETAILED SPECIFICATIONS**

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 equipment's by the Superintending Engineer (M). The pumping machinery and allied equipment's 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 equipment's for approval well in time or as directed by the Executive Engineer (M).

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 equipment's 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 boned by the Contractor. Considering this offer may be quoted

Mode of Payment

Break-up of the payment admissible for pumping machinery and other Electrical,

Mechanical items shall be as under :

- 70% against supply of material as per approval
- 15% after completion of erection at site
- 10% after satisfactory commissioning of equipments
- 5% after satisfactory operation of 12 months.

ITEM NO. SURGE VESSEL/AIR VESSEL IF Required

General Scope:

The contractor will have to design, manufacture, supply including installation and commissioning with satisfactory test and trial. The vessel shall be installed at the raw water pump house to protect the 842 mm dia DI K9 pumping main from the adverse effects of the water hammer when the pumps trip off due to the power failures or sudden stoppage of the pump. The Air Vessel shall consist of a horizontal /vertical steel tank with/without butyl rubber bladder connection valve, pipes and all necessary appurtenances to arrest surges in water pumping main.

The air vessel specified herein be supplied by a single manufacturer & the contractor shall have to maintain (comprehensive) the Air vessel for five years.

The supply and services included in scope of works:

- Design, manufacture ,supply ,install and commissioning of the air vessel as described below.
 - Design and construction of suitable concrete base for the surge vessel
 - Installation of the surge vessel
 - Supply and installation of necessary pipes and fittings, valves, portable air compressor

Of adequate capacity, etc., necessary for smooth function of the air vessel.

Design and Drawing

The air vessel is required to be provided as protection equipment against surge pressures exerted on the mm dia rising main . The capacity of the air vessel shall be adequate to restrict the transient surge pressures due to sudden pump shut down when the plant is operating at MLD and the extreme surge pressures shall be restricted to

Maximum : Kg/sq.cm
Minimum : Atmospheric

The air vessel designed for Kg/sq.cm. The air vessel design shall ensure that under no conditions sub-atmospheric conditions are created anywhere along the pipe line including the pump. Similarly the maximum transient pressure at any point along the pipeline shall not exceed Kg/sq.cm. while operating at MLD.

The contractor shall carry out his own analysis for designing the air vessel based on above considerations and the data furnished else where. Design calculations, anticipated performance of the vessel for various discharges through pipeline and other relevant details shall be furnished along with the tender,

Material and Workmanship:

The air vessel shall be designed, fabricated and tested as per IS : 2825, code for unfired pressure vessels. The material of construction of the air vessel shall be boiler quality plates confirming to Grade - I of IS - 2002 or equivalent.

The air vessel shall be of welded construction. The welds shall be cleanly finished, free of cracks, blow holes, lamination and other defects. The welds shall be radiographically inspected for the defects like blow holes, cracks, slag, inclusion, etc. and if any defects are found, the particular welded portion will be repaired before dispatch. Radiographic inspection shall be to the extent of 10% of welding.

The air vessel shall be coated with epoxy paint as specified elsewhere on both the inside and outside surfaces for longer life.

The vessel shall have Bladder of heavy duty Butyl rubber and shall be designed and manufactured by vessel manufacturer. Other Bladders will not be allowed. The valid certificate of Bladder manufacturer shall be submitted.

4. Air Vessel Fittings:

Air vessel shall be complete with the following fittings and connecting branches(vessel as well as fittings) which shall be flanged conforming to IS - 1537

One 50 mm dia pressure relief safety valve of the spring loaded type.

One 15/25 mm ball plug type valve for connecting the air supply to the vessel.

One 200 mm dia pressure gauge having scale reading from 0 to twice the pressure to which air vessel is designed.

An adequate size flanged branch from the vessel for intermediate pipe connection between air vessel and delivery main branch.

Inspection manhole cover of suitable size..

1 No. 100 mm dia. Drain connection with hand operated sluice valve.
Lifting lugs and sturdy supports for mounting.
Hydro control level gauge equipment with 4 switches & outlet 4/20
MA..

In addition to the above any other fittings/ accessories required for the satisfactory operation of the system shall be provided by the contractor.

All the fittings shall be supplied by the contractor and transported to the site of installation. These shall be fixed at the proper locations as per the instructions of the Engineer -in- charge. The fittings shall be fixed to the flanges by bolts, nuts and washers with necessary rubber insertion, etc.

The rubber insertion and steel washers as well as necessary fastening bolts and nuts shall be supplied by the contractor himself and shall be of approved quality and dimensions. The fittings shall be fixed true to line with the pipe and in plumb, valves and specials shall be properly supported until permanent anchors are completed.

All specials and other fittings shall be supplied by the contractor only. The specials shall be of steel capable of withstanding the same test pressure to which Air vessel is subjected.

Foundations :

The Air vessel shall be placed on concrete foundation. The contractor shall furnish the drawings of the foundations as he proposes , and other layout details of the vessel, piping, fittings, etc. The vessel shall be raised off the ground to a height of not less than 350 mm.

Testing & Inspection :

The Air Vessel shall be subject to factory test in presence of Superintending Engineer (M) or his representative and third party inspection agency approved by MJP.

The scope of inspection is as under:

1] Review of raw material test certificate and quality control procedure 2]
Dimensional check as per approved design and drawing

3]Review of radiographic test certificate of welding joint of vessel and air receiver as per standard and dye penetration test certificate of dish ends.

4] The surge vessel shall be hydrostatically tested at 1.5 times the maximum surge pressure for not less than 30 minutes. During the test, the vessel should not show any undue deflection, signs of weakness at any point or leaks through welded joints/ gaskets or other defects.

- 5] Total Quality Assurance system shall comply with ISO 9001 or 9002 series.
- 6] Product inspection, test and certification

Inspection certificate in triplicate shall be submitted to MJP.

6.1 Radiographic Tests :

The contractor shall produce all films of radiographic tests . The radiographic tests shall be carried out by the independent agency acceptable to the Engineer -in-charge. The contractor shall bear all expenses for the tests.

6.2 Hydraulic Testing :

The vessel shall be tested hydrostatically with a testing machine . The vessel shall stand the test pressure required i.e. 1.5 times the design pressure without showing any signs of weakness, leak or sweating. The test should be carried out in the presence of the Engineer-in-Charge to his entire satisfaction The required pressure should be maintained for atleast 30 minutes for inspection purpose . The vessel shall be fitted with an accurate calibrated pressure gauge approved by the Engineer-in- charge. Any section showing leak of welded seam will be rejected , and shall be repaired by chipping the weld and rewelding ,after obtaining permission of Engineer -in- charge in writing, all such shall be indicated in the logbook for reference. The rejected air vessel will be retested hydraulically for specified pressures. If on retesting the joints show any leak in the welded seams, it will be rejected. Accepted vessel shall be marked with legible mark for identification.

6.3 Performance Testing :

After completion of installation of air vessels , the installation will be subjected to performance test as guaranteed by the contractor in presence of Engineer-in-charge. If the performance is accepted below accepted parameters , the contractor shall repair or rectify or replace the defective parts as directed by the Engineer till such time the satisfactory performance is given.

Pipe Work :

The D.I. Tee of mm dia shall be installed on mm dia rising main with suitable size flanged branch connection. The contractor shall provide pipe of suitable size with specials ,etc. for interconnecting the above branched flange connection and inlet branch connection of the air vessel.

The contractor shall design the piping and specials and will be suitable for hydraulic test pressure to which air vessel is designed for.

The M.S. Specials and M.S. piping required shall be fabricated out of suitable shell thickness of M.S. Steel plate conforming to I.S. 226. The welding of M.S pipes and flanges shall be generally by the any of processes as described in IS : 3589 and the welding standard shall conform to IS : 823

The flanges for pipes and specials shall be suitably designed to withstand twice the duty head. Mating faces of the flanges shall be properly machined. The flanges shall be drilled to IS : 1537

The joint rings, nuts, bolts, and washers required for jointing shall be provided. The joint ring shall be of rubber of proven hardness, suitable for water-tight joints and shall be of a flat section 3 mm thick. The joint ring shall cover the whole surface of the flange and shall have drilled holes to pass the bolts.

Suitable and adequate numbers of concrete saddles for pipe work and valve shall be provided by the contractor. The contractor shall also provide all steel packing plates required for erection of the plant.

Sluice Valve (Glandless) :

A mm dia Class 300, Cast Steel sluice valve shall be provided on the delivery and fixed on the inlet branch of air vessel. 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 hand wheel with spur gear .

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 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**

TESTING

The valve should be tested by the Third Party inspection agency or Superintending Engineer(Mech.) or his representative.

The scope of third party inspection by the agency approved by MJP is as under

- Review of raw material test certificate and quality control procedure.
- Body and seat test
- Test with operation of actuator and reduction gearbox fully assembled with valve opening and closing with synchronizing.
- Checking wear travel.

Air compressor with motor :

Two electrically driven Air compressors of suitable capacity (1 working + 1 standby) shall be supplied to charge the air vessel. Output of each compressor shall be suitable to charge air vessel in 20 minutes or less at a maximum pressure of 17 kg/sq.cm.

Each compressor shall be electrically driven by a three phase TEFC squirrel cage Induction motor and shall be mounted on a common base frame. The compressor shall be suitable type capable of developing the required pressure, air cooled type, complete with automatic off-loading device, pressure gauge, inlet air filters and inter cooler.

The contractor shall include all of the pipe work and valves to connect the air compressors to the air receiver.

The Air compressor motors shall be TEFC, three phase, squirrel cage induction motors suitable for operation on 415 V, 3 phase, 50 Hz. Supply at degree ambient temperature and shall be suitable for satisfactory operation with voltage variation of +/- 10% and frequency variation of +/- 5% and combined variation of +/- 10%. The motors shall generally conform to IS : 325 with class "B" insulation.

The motor shall be sized for proper operation of the driven equipment. The rated horse power of the motor shall be at least 10% in excess of the power requirements of the air compressor for the design output and pressure. The motor shall be designed for high power factor and efficiency.

The motor shall be horizontal with suitable flange or pulley to transmit the power to the air compressor. The rotor of each motor shall be statically & dynamically balanced and the critical speed of the rotor shall not be in range of $\pm 20\%$ of the rated speed of the motor. The bearing shall be heavy duty, antifriction type and suitable for intermittent operation. Anti condensation heaters shall be provided with all necessary transformer rectifier, etc. to prevent condensation when motor is idle.

The motor shall be shop tested in accordance with IS : 325 for routine test. Manufacturer's certificate shall be furnished.

Air Receiver :

The Air compressor unit shall have air receiver of suitable capacity not less than 2 cum. And tested to suitable pressure, each with suitable size delivery valve, pressure relief valve, pressure gauge, with automatic start and stop pressure switches for operating the compressor within predetermined limits. The air receiver shall be hydraulically tested to twice the working pressure.

Piping of suitable size and strength with necessary controls shall be provided to connect air compressors to air receiver and air vessel. Material and workmanship, foundation requirements, etc. for air receiver shall be generally as per that of air vessel. On the discharge pipes from the air compressors, the duplicate filters with oil separators shall be provided to ensure oil free and clean air to air receiver.

The air receiver shall be complete with the following fittings and connecting branches, connections for air vessel, compressor, fittings, etc. shall be flanged to IS : 1537

One 200 mm dia pressure gauge having scale reading from 0 to twice the work-ing pressure to which air receiver is designed.

1 No. 50 mm dia. Drain connection with hand operated sluice valve. Inlet and outlet connections.

Pressure switches to control automatic working of the air compressor to work within predetermined limits.

Lifting lugs and sturdy supports for marking.

Switch gear & Motor controls :

The totally enclosed, dirt, dust, vermin and weather proof panel shall be wall mounted and the panel shall be fabricated from 14/16 swg. M.S. sheet with suitable angles. The cable entries and exits to and from the panel shall be from bottom and through suitable cable glands. Meters, indication, and control points shall be provided on the front door and the height of operating, indicating, etc. shall not exceed 1.6 meters from floor level. Mounting of the panel on wall shall be rigid but removable. The clearance

between wall and panel shall not be more than 25 cms.

A 50 x 6 mm aluminium earthing running flat across the length of the panel shall be provided. Metal frame of the switch board shall have two separate and distinct earth connections of adequate size.

The panel shall consist of the following equipment, meters and indication and protection :

MCCB & starters :

- No. 63 A for incoming.
- Nos. 63 A for outgoing.
- No. 63 A as bus coupler
- Nos. STAR DELTA type fully automatic starters for 3 pH, 50 Hz. For 415 squirrel cage induction motors of compressors
- No. ELCB.

Required capacitor with isolator MCB, indication and annunciation

- Nos. Pilot lamps LED type for incoming supply
- Nos. Pilot lamps LED type for motor „ON“, „OFF“ for individual motor.
- 2 Nos. Pilot lamps LED type for high and low water level in air vessel with alarm annunciation

Metering :

- Nos. 96 sq.mm ammeter for each motor of suitable range.
- No. 96 sq.mm voltmeter with selector switch.

Protection :

Suitable protection shall be provided in starter for individual motors as follows

- Bi- metallic or electromagnetic type adjustable over current protection.
- Negative current operated single phasing protection
- Starters shall be electrically interlocked so that only one of the two motors shall run at a time.

Controls :

12.1 Pressure Control :

The Air Compressor shall be automatically started and stopped at present pressure limits by approved pressure contact switches or other devices which

shall be mounted on the Air receiver unit and shall be of adjustable type. A hand operated sequence change over switch or plug and socket box shall be provided in order that the first motor to cut is may be changed from time to time including standby unit.

12.2 Level Control :

The air pressure in the Air vessel shall be controlled by means of suitable equipment. The suitable sensing element shall be mounted on the Air vessel and shall provide a signal to the controller unit when air pressure in the vessel reaches a predetermined high level. The controller shall then operate a solenoid valve to be provided at the Air inlet to the Air vessel thus admitting compressed air from air receiver to Air vessel. The solenoid valve shall automatically closed once adequate air has been filled. Adjustable shall be provided in order to avoid operation of solenoid valve during transient conditions.

All the equipments offered shall be suitable for operation on 230 Volt single phase, 50 Hz. Supply.

Cables and Cabling :

This section includes the general requirement of control and power cables and cabling work including preparation of cable trenches, trays and ducts. Cable size to be designed for double the full load current. This job includes providing cable from supply point in pump house/ VCB room whoever is shortest & availability of required power.

The cables shall be aluminum conductor, PVC insulated and sheathed galvanized flat steel wire armoured cable. The cables conforming to IS : 1554 shall be suitable for satisfactory performance when laid on trays, trenches or cable duct under a power supply system, voltage variation of $\pm 10\%$, a frequency variation of $\pm 5\%$ and combined voltage and frequency variation of $\pm 15\%$. The contractor shall be responsible to supply actual lengths and sizes required at site for cabling all the circuits. All cables shall be connected to the equipments with the help of water tight cable glands.

Suitable conduit or cable trays shall be provided for proper installation of cables. Cables running on cable trays shall be clamped at a maximum interval of 2000 mm. or as directed by Engineer-in-Charge. Cable trays shall be galvanized after fabrication.

Each cable whether power or control shall be provided with a metallic or plastic tag of an approved type bearing a cable reference number indicated

in the cable and conduit list (prepared by contractor) at every 5 mtr .run or part thereof and at both ends of the cable adjuscent to terminations. Cable routing is to be done in such a way that cables are easily accessible.

Sharp bending and kinking of cables shall be avoided. The minimum radii for PVC insulated cables 1100 V grade shall be 15D where D is the overall diameter of the cable . In each cable one extra length shall be provided at suitable points to enable one or two straight through joints to be made.

Earthing Arrangement :

Earthing of complete medium voltage system and equipment, etc. shall be carried out in accordance with IE rules 1956 and IS : 3043, code of practice for earthing and as per requirements of Electrical Inspector, Govt. of Maharashtra.

Painting :

Air vessel and piping shall be given three coats of epoxy paint as specified below for ensuring long life of the equipment.

The metal surface shall be clean, dry, and free from mill scale, rust, grease and oil, weld surfaces and edges and sharp corners shall be ground to curve and all weld spatter removed. The surface shall be prepared by sand blasting process or any other process approved by the Engineer.

Paint containers shall be opened only when required for use. The paint shall be thoroughly mixed to uniform smooth consistency, suitable for proper application or as per instructions of the manufacturer of the paint. The paint shall be prepared and handled in a manner to prevent deterioration and inclusion of foreign matter. The paints shall be generally prepared and applied as per manufacturer"s instructions.

Each coating of paint shall be applied at the proper consistency and brushed evenly, free from brush marks, sags, runs, with no evidence of poor workmanship. Finished paint surfaces shall be free from defects. Applications of different coats shall be in accordance with paint manufacturer"s instructions. The final appearance shall exhibit a uniformly textured and coloured coating system free of excessive gloss or dull spots, sags and other defects.

The painting shall be in three coats of painting.

Primer - Zinc rich epoxy primer
 Intermediate - Coal tar epoxy polyamide
 Finish - same as intermediate

The machined machine surfaces of flanges of pipes, tees, specials will not be painted but shall be coated by suitable lacquer.

As the pipes and Air vessel are installed in the system of conveying potable water, the inside coating shall not contain any constituent soluble in water nor shall impart any taste or odour after sterilization and suitable washing out. The contractor will furnish the specification of paint.

The date of manufacture, date of test and inspection, identification number, etc. shall be painted in white on the Air Vessel and pipe work.

Civil Works. :

The civil works i. e. required foundations for Air Vessel , supports for pipes and valves, etc. shall be provided by the Contractor. The contractor shall design and furnish the drawings with details to the Engineer-in- charge for approval.

17. Sluice valve chamber. :

A sluice valve chamber shall be of adequate size in plan, with clearances not less than 300 mm around all parts of the sluice valve for ease of operation and maintenance . The overall height of chamber shall be decided at site , depending on invert level of the pipe with adequate provision for 150 mm thick concrete bedding below pipes . The top of the chamber will be covered with either 6 mm thick M.S. chequered plate supported on M.S. channels of suitable size or any other light weight material for ease of frequent removal for operation.

The chamber shall be of R.C.C. for Sluice valve with 15 cm thick M-150 (1:2:4) PCC bedding ,10 cm thick RCC 1:2:4 raft slab, 15 cm thick RCC M-150(1:2:4) wall and cast in situ RCC cover 12 cm thick on chamber in RCC M-150 (1:2:4) including normal dewatering, centering, plywood formwork, bully/ steel prop.-ups, compaction, finishing the formed surface with C.M. 1:3 of sufficient minimum thickness to give smooth and even surface finish with curing including providing & fixing in position steel M.S. HYSD bar reinforcement of various diameter for RCC raft Slabs, wall cover, etc. including cutting ,bending, hooking the bars, binding with binding wires, etc. complete as directed by Engineer-in-charge.

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	Fibre chair of “Nilkamal” make only	6 Nos
2	Fibre 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

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) a)	Supplying tong tester(clip on meter) to read current 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,guauded glass and 10 meter 3 core PVC flexible cord with hand shield type 3 pin 6 Amp Plug top	1 No
6)	Engineer"s precision steel level of size 300mm	1 No

7)	Hydraulic crimping Tool suitable for 6 sqmm to 500 sqmm (minimum) 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 sq mm to 185 sq mm 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 12 inches, 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.
13)	1400 VA capacity inverter with UPS for control supply HT Panels (With suitable batteries)	2 Nos.

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

Contractor

No. of correction

Executive Engineer

9) a)Screw driver Electrical pattern blade from selected crome plated size 5 x 200mm (Insulated)	2 Nos
Screw driver Electrical pattern blade from selected crome 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 Executive 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	1 No

post office red color of minimum size 4 feet x 2 feet x 1.5 feet having compartment for keeping of various tools

D) Board of PMC 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)

FIRE FIGHTING & SAFETY EQUIPMENTS

1	GI Buckets	4 Nos
2	Stand for GI Buckets	1 Nos
3	a) First Aid Box	1 No
	b) Hand Gloves	1 Pair
	c) Instruction charts	3 Nos.
4	Fire fighting Extinguisher ABC type- 5 Kg capacity	4 Nos.

ITEM NO ELECTRIFICATION OF PUMP HOUSE

The item includes electrification to the pump house internally & externally. The wiring shall be done in copper conductor 1.50 Sqmm. PVC insulated wire only. PVC suitable size conduit shall be used for encasing. Following work shall be carried out as per direction of Engineer-in-charge.

Point wiring

Point wiring for light/bell & independent plug with ISI mark 2-1 sqmm. 1100 V grade PVC insulated, Fire Retardant grade copper wire in 20 mm dia. ERW H.G. steel conduit of 16 gauge with ISI mark duly painted with 2 coats of good quality approved shade enamel paint erected on wall/ceiling with 3mm. x 20 mm .M.S spacers & G.I saddles screwed & with 12 SWG G.I / 1.50 Sqmm. bare copper wire clamped to conduit with 22 gauge 10 mm. width copper earth clips at every one meter length & at ends joints with ISI mark

piano type 6 Amp. Switch/bell push erected on Filled polypropylene ISI marked board or polished double wooden or 3 mm. Thick hylam sheet hylam sheet / 4 mm. plywood pasted „sunmica with thickness not less than 1.50 mm. with S.M. Screws & ISI mark ceiling rose batten / slanting holder on PVC block / junction box of ISI mark erected with S.M. screws. - **Points**

LED Fitting 2 x 40 Watts..

Supplying & erecting ISI mark 2 x 28 watt T-5 Energy Efficient Retro Fit Stand alone LED Tube Light Fitting box type complete with Electronic ballast & lamp holders duly wired ready to use for 230 Volts, 50Hz, Single phase A.C. supply to IS : 10322 as per quality requirement and erected on varnished wooden blocks with Felxible wire twin core 24/0.2mm and with LED Fluorescent lamp and making Sr.No. & date of erection - **Nos.**

LED Flood Light Fitting

Supplying and erecting ISI mark LED flood light luminaries suitable for use with 150 watt with LED lamp. The luminair comprising and having made of

die cast Aluminium of low copper content to offer high resistance to corrosion and to accommodate the optical system. consisting of Aluminum electro chemically brightened and anodized. A glass retaining frame made of die cast Aluminium is provided to hold glass cover in position and is hinge able to main housing and this facilitated to replace the lamp easily complete with control gear box suitable for 150 watt LED lamp - nos.

LED Lamp fitting

Supplying & erecting street light 70 Watts LED lamp fitting with lamp having deep drawn one piece aluminium body nickel chrome plated reflector with clear acrylic cover and necessary control gear & ignitor etc. with necessary wiring complete with accessories such as copper wound choke, condenser etc. Marking serial number and date of erection. - Nos.

5) MCB

Supplying, erecting & marking miniature circuit breaker of single pole breakers 6 A to 32 A in provided distribution boards with required wiring connections and lugs etc for distribution of circuits as shown in diagram Nos.

Street light bracket

Supplying & erecting street light bracket for erection of side entry W.P. LED. fitting / M.V. fitting / Sodium Vapour fitting made from 40 mm. dia. „B” Class G.I. Pipe, along with necessary nipples, reducers etc. if required 1.20 m. in length welded to pole cap 4 mm. thick, 30 cms. in length of suitable dia. On top of the pole with 15 cms. welded corner support of suitable size of MS sheet 3 mm. thick complete erected with 6 mm. dia. set screws duly painted with one coat of aluminum paint complete. erected with provided leads. Nos.

Plug Socket

Plug socket 6 amp & 16 amp (6 pin) with 16 amp - Nos.

GUARANTEE :-

The Contractor has to give minimum one year guarantee for each type of fitting/M.C.B and switches and all accessories of the same from the date of commissioning.

DOCUMENTS :-

The Contractor shall furnish the following documents to the Engineer-in-charge

- Dimensional drawings and electrical system connections drawing
- Manufacturer's test certificate for MCB/fittings etc
- Guarantee card for all fittings/MCB/ etc.

ITEM NO. AREA LIGHTING

The item includes electrification of approach bridge to the pump house & substation. The wiring shall be done in copper conductor 1.50 Sqmm. PVC insulated wire only. PVC suitable size conduit shall be used for encasing. Following work shall be carried out as per direction of Engineer-in-charge.

G.I. Pole

Supplying & erecting ISI mark G.I. pipe pole „B” grade 75 / 80 mm. dia. 6 mtr. long complete with 75 mm. Deep pole cap and MS. / C.I. base plate of size 30 x 30 x 0.60 cms. welded at the bottom and duly painted with two coats of red oxide paint and one coat of bituminous paint for the 1 / 6 thick. length to be embedded in ground and muffing (Square/round) and two coats of silver paint for the remaining portion and complete erected in provided C.C. foundation & muffing (Square/round) with welded earthing stud

..... **Nos.**

LED Street light fitting

Supplying & erecting street light 150 Watts LED lamp fitting with lamp having deep drawn one piece aluminium body nickel chrome plated reflector with clear acrylic cover and necessary control gear & ignitor etc. with necessary wiring complete with accessories such as copper wound choke, condenser etc. Marking serial number and date of erection **Nos.**

Street light bracket

Supplying & erecting street light bracket for erection of side entry LED fitting M.V. fitting / Sodium Vapour fitting made from 40 mm. dia. „B” Class G.I. Pipe, along with necessary nipples, reducers etc. if required 1.20 m. in length welded to pole cap 4 mm. thick, 30 cms. in length of suitable dia. On top of the pole with 15 cms. welded corner support of suitable size of MS sheet 3 mm. thick complete erected with 6 mm. dia. set screws duly painted with one coat of aluminum paint complete. erected with provided leads**Nos.**

Terminal box

Providing and erecting street light terminal box of 16 swg. CRCA sheet 200 x 150 x 150 mm to erect suitable kitkat, etc. complete on provided G.I. pole **Nos.**

G.I,PIPE (A Class) :-

Supplying and erecting ISI mark G.I. Pipe „A” grade 25 mm erected for enclosing PVC armoured cable from G.L.to Terminal Box on pole and Terminal Box to fitting on Pole with clamps and upper end closed with T.W. bush and sealed with compound **Mtr.**

G.I,PIPE (B Class, 75 mm dia) :-

Supplying and erecting ISI mark G.I. Pipe „B” grade 75 mm erected for enclosing PVC armoured cable along the Bridge with clamps and upper end closed with T.W. bush and sealed with compound **Mtr.**

G.I,PIPE (B Class, 50 mm dia) :-

Supplying and erecting ISI mark G.I.Pipe „B” grade 50 mm erected for enclosing PVC armoured cable along the Bridgewith clamps and upper end closed with T.W.bush and sealed with compound **Mtr.**

Foundation

Providing cement concrete foundation including excavation for the poles (45 cms. x 45 cms. x 1.20 Mtr.) deep in 1:3:6 cement concrete (20 to 25 mm stone metal) and 45 cm. x 45 cm. x 45 cm. / 45 cm. dia. x 45 cm. Height plinth duly plastered and with necessary curing and finishing in an approved manner **Nos.**

Cable, 10 Sq.mm

Supplying & erecting 2 core 10 Sqmm. PVC armoured Aluminium conductor cable 1100 volt. Grade with ISI mark twin core solid / stranded aluminium conductor with 6 mm. thick 25 mm. width M.S. spacer with G.I. earth wire 6 Sqmm. complete erected on wall / on pole with 25 x 3 mm. M.S. clamps or in provided trench in an approved manner **Mtr.**

10) Cable, 4 Sq.mm

Supplying & erecting 2 core 4 Sqmm. PVC armoured Aluminium conductor cable 1100 volt. Grade with ISI mark twin core solid / stranded aluminium conductor with 6 mm. thick 25 mm. width M.S. spacer with G.I. earth wire 6 Sqmm. complete erected on wall / on pole with 25 x 3 mm. M.S. clamps or in provided trench in an approved manner Mtr.

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.

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.

Operation of all pump, motor, valve and supply water as per the requirement of deptt.

To maintain all records i.e. logbook, for operation and maintenance.

To monitor all parameters such as pressure temperature, substation equipments and for all other systems specified in the tender.

To carry out routine checks water level, operation of equipments noise, vibrations and shall maintain all corresponding records.

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.

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.

To give training to the operators or to the agency envisaged by the department for smooth O & M.

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.

Operate the pump set.

Operate the pumps as & when required to meet the water demand & as per instruction of engineer in charge.

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.

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 pump set to meet the daily requirement of the water as per instruction of Engineer in charge.

House keeping, watching & guarding:-

The contractor shall provide for watching & guarding of premises. He is responsible for any loss of material from our premises.

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.

ITEM NO. DESIGNING AND CONSTRUCTING METER ROOM & VCB ROOM:
If included in Schedule B

The contractor will have to design & construct meter room with brick masonry of minimum size 6mx4mx4.5 m for accommodating kV metering kiosk of MAHADISCOM near sub-station & VCB room with brick masonry of minimum size 15 m x 6 m x 4.5 m as directed by Engineer In Charge. There should at least 1.0 mtr clearance from all sides. The layout drawing shall be got approved from MJP before construction. A 3 m wide shutter shall be provided and fixed to meter room & VCB room .Two Aluminum sliding windows for meter room & four sliding windows for VCB room shall be provided and fixed at location as directed by Engineer In Charge.

Important Note

The Specifications shall be checked by the Executive Engineer (Mech.)/ Superintending Engineer (Mech.)

Electromagnetic Flow meter (AMR) - Raw Water, Pure Water
Rising main - upto 300 mm

- 3) Ultrasonic Flow meter (AMR) - Raw Water, Pure Water Rising main -above upto 300 mm
- 4) Ultrasonic Bulk meter (AMR) - Gravity main ESR Outlet - upto 50 to 300 mm

Sub station shall be Indoor Type.

- 13) Third Party Inspection of Equipments shall be as per MJP s Letter No350/ 4161 , dated 10 /12/1998. (Copy attached)

For Raw Water Pumping Machinery, Water Treatment Plant, Pure Water Pumping Machinery, all Sluice Valves (Glandless) & Butterfly Valves shall be compatible to Actuator.

Detailed Specifications

Item No. 1 : Turbidity Meter

The turbidity meters shall be installed in pure water sump to measure turbidity of pure water. It shall be installed in safe and suitable place so that meters shall get protection from sunlight / rain & chlorine vapours.

Turbidity 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 turbidity meter shall have following specifications.

Construction :As per ISO 7027 scattering light method with sensor, signal distributor and transmitter with local digital indicator.

B) Range	:	0 ~ 1000 NTU
C) Measuring range	:	0.02 ~ 500 NTU
D) Accuracy	:	± 0.25% of Full Scale
E) Output	:	4 - 20 mA
F) Supply Voltage	:	230 V,AC / 24V,DC
G) Enclosure	:	IP 65 of suitable material
H) Temperature	:	Ambient
I) Service	:	Water
J) Display	:	8x1 LCD

a) General

i) Service	:	Turbidity of Raw Water measurement
ii) Quantity	:	As per scope of work
iii) Process fluid	:	Raw Water
iv) Accuracy of measuring	:	± 2.0% of reading or better loop

b) Turbidity Sensor and Measurement

i) Type	:	Turbidity and suspended solids transmitter
ii) Principle of measurement	:	Nephelometric measuring principle 90 degrees NIR scattered light according to EN27027
iii) Output	:	4 -20 mA, 4 wire type
iv) Supply voltage	:	230 V AC +10/ -15%, 50 Hz
v) Material	:	Field Housing : ABS PC Fr or Cast Al
vi) Display indicators	:	LC display, two lines, with status

Electromagnetic compatibility :interference emission and interference

Immunity acc. To EN 61326-1 : 1998

- viii) Protection class : IP 68
- ix) Ambient Temperature : 0 to +60 degrees Celsius
- x) Self Diagnostic feature : Required

Sensor

- i) Measurement range : 0,000 - 9999FNU 0,00-3000 ppm
- ii) Material
 - Sensor shaft : PVC/PPS GF40
 - Optical window : Sapphire
 - Cable : TPEO
- iii) Max Process temperature : 50 degrees Celsius
- iv) Max Process pressure : 6 bar
- v) Temperature sensor : Integrated NTC temperature sensor
- vi) Connection : Fixed cable connection
- vii) Ingres protection : IP68
- Additional Certifications : Calibration certification
- ix) Resolution : 0.001 FNU, 0.01 ppm, 0.1g/l, 0.1%
- x) Inaccuracy : +2% of meas, value (min. 0.02 FNU)
- xi) Repeatability : $\pm 1\%$ of eas , value (min. 0.02 FNU)

Item No. 2 : pH Meter

The pH meters shall be installed in pure water sump to measure pH of pure water. It shall be installed in safe and suitable place so that meter shall get protection from sunlight / rain & chlorine vapour.

pH 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 pH meter shall have following specifications.

- a) Construction : pH meter with transmitter as per IUPAC
- b) Range : 0 ~ 14 pH

- c) Accuracy : $\pm 0.25\%$ of Full Scale
- d) Output : 4 - 20 mA
- e) Supply Voltage : 230 V, AC / 24V, DC
- f) Enclosure : IP 65 of suitable material
- g) Temperature : Ambient
- h) Service : Water

a) General

- i) Service : pH of Raw Water and Pure Water measurement
- ii) Quantity : As per scope of work
- iii) Process fluid : Raw Water & Pure Water
- iv) Accuracy of measuring : $\pm 0.5\%$ of reading or better loop

Transmitter

- i) Sensor Type : Glass electrode
- ii) Principle : Glass electrode with dirt repellent PTFE diaphragm
- iii) Output : 4-20 mA, 4 wire
- iv) Supply Voltage : 230 V AC $\pm 10\%$ -15% 50 Hz
- v) Material : Field Housing ABS PC Fr or Cast Al
- vi) Display : LC display, two lines, with status indicators

Electromagnetic compatibility : Interference emission and interference immunity

Acc. To EN 61326: 1997/ A1: 1998

Protection class of field housing : IP 65

- ix) Ambient temperature : 0 to 60 degrees Celsius
- x) Diagnostic feature : Required

Sensor

- i) Measurement Range : 0-14 pH
- ii) Material : Glass
- iii) Max Process temp. : 130 degrees Celsius
- iv) Max Process pressure : 6 bar
- v) Temperature sensor : Integrated NTC temperature sensor
- vi) Connection : Inductive Digital Connection with Transmitter
- vii) Ingres protection : IP68

Additional Certifications : Calibration certification

- ix) Resolution : 0.01pH, Temp 0.1 degree Celsius
- x) Inaccuracy : $\pm 0.5\%$ of measuring Range
- xi) Repeatability : $\pm 0.2\%$ of measuring Range

Item No. 3 : 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 chlorine
Output	:	4 - 20 mA
Supply Voltage	:	230 V,AC / 24V,DC
Enclosure	:	IP 65 of suitable material
Temperature	:	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 interference immunity acc. To EN 61326: 1997/A1 : 1998

Protection class of field housing	:	IP 65
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) Ingres 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 mm ² , 7 Strands/ 0.53 Dia, BS: 6360, Class 2, as per table of BS 5308: Part 2: 1986 As per BS : 5308 (Table 11)
Pair Identification :		PVC
Conductor Insulation		PVC
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.

Item No.5 :- Web based Software

The item includes software as well as hardware required to install the system. Central computer and peripherals are not in the scope of material supply for the item.

5.1 Necessary web based software system of following specifications .

Programming options according to IEC 61131-3

PLC with integrated quad band modem

Frequencies 850 MHz, 900 MHz, 1800MHz, 1900 MHz

Support data logging functionally.

Supports SMS/email functionally.

Supports FTD protocol.

HTTP-HTML 5 supported, web pages can be downloaded to controller and can be accessed from central location. 8. Supports remote communication to SCADA using GPRS.

5.2 Micro PLC Design

Micro PLC with minimum I/Os (AI, AO, DI and DO), capable of measuring the values from the above mentioned instruments shall be supplied. I/O cards shall have 4-20mA input / output. Spare card shall be provided for manual switchover incase of failure of the primary connected card. All the necessary hardware accessories for mounting, powering and operating the PLC shall be provided by the contractor. The operating consoles / computers will be supplied by MJP.

All equipment of the PLC System shall operate at 230 Volts AC $\pm$ 10%, single phase, 50 Hz $\pm$ 2 Hz obtained from UPS supplied and installed by the Contractor. Bidder to provide UPS and necessary cables for the same. Any converters required for powering the system / sub system shall be contractor's scope of supply. The UPS (load includes PLC and other supplied equipment etc). At any point of time, UPS shall be able to cater to 20% above the total load requirement of the system.

PLC shall be provided with suitable hardware for GSM / GPRS connectivity.

PLC shall be equipped with a miniature LCD for digital read out of all the monitored parameters, along with date and time in a graphical format.

5.3 Software

MMI (Man Machine Interface) software shall be based on Windows operating system platform working over internet browsers like “IE”, “Chrome” etc. Software will display the measured values of all parameters in a graphically designed, over web browser. Pre-defined reports shall be embedded on the proposed software. Details of these reports will be provided during FDS preparation. Software shall have authentication based of ID / password provided by MJP. All the measure values shall be stored on the central server.

Bidder shall supply all the necessary software licenses for the proposed system and are inclusive of one time license fee.

Proposed software shall have a database adequate for handling the monitoring operations of all parameters over the life time of the system. The updating of complete database at centre for the system to acquire fresh measured values from all instruments and required time shall not exceed 10 seconds.

5.4 Mobile Version

Entire data should be made available over mobile platform (either by virtue of APP or mobile browser) with proper authentication.

5.5 DOCUMENTATION

The Contractor shall be responsible for the development and supply of all the work schematic drawings, termination details etc. along with the instruments dispatched for the instruments being supplied. These documents shall enable a separate contractor engaged by Owner to install the instruments under the supervision of the contractor without any difficulty. Contractor shall include the same in his scope.

5.6 EXPANDABILITY

Provision shall be kept so as to cope up with future requirements without any major modification and programmer's support in the proposed System. Special attention is brought on PLC and the necessary communication software, which shall be modular in structure and conforming to ISO/OSI architecture. While designing the master data centre features / facilities, the Contractor should consider and equip necessary memory requirements, communication ports in the networking hardware interrogation facility and software packages for the future expansion of the system with appropriate ports / I/O expansion blocks. In this regard the Contractor shall supply all the necessary documents, information, codes & details which are essentially required for development of these software packages so that required modifications can be incorporated by the owner at a later date as per system requirement. Also, Contractor shall confirm that all necessary help

shall be extended by the Contractor for implementation of these future expansion plans as and when these are implemented and required by MJP.

Hardware and software are to be based on distributed and open system architecture facilitating expansion and system growth over the life of the system. Expansion shall be performed by addition of equipment and resources. Expansion shall not require the replacement of computer central processor or restructuring of software or database of previously installed equipment's. Expansion of database and scan load shall not cause degradation of circuit responsiveness.

5.7 Calibration, Inspection & Testing

5.7.1 All analyzers shall be factory calibrated

5.7.2. The Contractor/bidder's quality plan shall include a comprehensive fully documented inspection and testing plan.

5.7.3. MJP reserves the right to reject any or all test and calibration work if found not complying with the Specification requirement. The contractor/vendor/bidder shall complete and submit documentation for all calibration, inspection & testing. Company Representative prior to shipment shall check out instruments & accessories for their compliance with specification requirements.

5.8 Installation and commissioning

The Erection, Installation and Commissioning of the system shall be done by the bidder. In brief it includes the supply & transportation of equipment, erection, installation, cable termination, wiring, testing and commissioning of PLCs and associated I/O sub systems and all other equipment.

This shall cover....

Delivery of the equipment to the stores and transporting to the location.

Supervision for field wiring termination with appropriate ferruling and dressing of cables inside the PLC panel.

Loading of PLC configuration and Logics for mentioned functionality

Field data verification and validation.

Creation and Loading of HMI graphics, creation and loading of Database and association of the field database points for dynamic data display and also creation of Reports, trends, Alarm points and all associated graphics.

Supply of field instruments and supervision of its commissioning by other contractor of Owner.

Item No.6 : Annual Maintenance Contract

Agency has to provide three years comprehensive maintenance service after the warranty period of 12 months. Payment towards such services will be made as per schedule. However, after installation of meters and on line monitoring system agency has to provide services as under.

6.1 Periodic Maintenance Services

Periodic Maintenance Services shall be provided by the bidder on site as preventive care of offered system. The service will be provided on a schedule generally quarterly basis during the contract calendar year period. Field Service Engineer will be sent to site to conduct periodic Maintenance activities to ensure the system is in accordance to requirement. Following activities shall be carried out during each Periodic Maintenance Services:

Checking of items installed to ensure satisfactory performance

Checking of software program

Investigations of the problems reported by MJP if any

During AMC visit, if any item is found defective then it will be replaced from

MJP owned emergency Stock or with additional cost (after the warranty period is elapsed).

Service Report on the activities performed and observations.

No of Periodic Maintenance Services visits : 4 Nos. in a year

6.2 Emergency Maintenance Services:

Visits shall be provided by bidder as emergency services, as and when required during the contract period in the event of breakdown of the system. Remedial advice shall be provided to MJP over the telephone / fax e-mail. If still system could not be brought to normalcy, engineer shall reach site at the earliest to attend the problems and restore the system back to normalcy.

Emergency situation is defined as: Failure of the system or part of the system resulting in shutdown or tripping.

Minimum Nos. of Emergency Services visits: As required subject to situations defined above but limited to minimum 2 visits in a year.

6.3 WARRANTY

All the offered items shall have a minimum Warranty period of 12 months.

Offered item shall be freely replaced in case of manufacturing defect, during warranty period.

6.4 Special Conditions

The AMC shall NOT cover...

Damage of any equipment due to conditions like lightning or any damage caused intentionally. However bidder shall support in putting up the system at nominal cost.

Service necessitated by relocation of systems / machines.

Computers and its accessories, Printers, Consumables, papers, Printer cartridge, Data storage Hardware, HD drives etc. Same shall be provided by MJP free of cost.

Third party software and Hardware"s linked / interfaced with offered system.

Attending the system under AMC by unauthorized personnel and any type of modifications.

Acceptable Makes -

UNDERTAKING FOR GUARANTEE

I/ We Guarantee that

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 of amendment to such specification as referred to in specifications attached to tender, fair wear and tear expected until the completion and for a period of 60 Months for Sub work A & B from the date of acceptance certificate issued under Article-24 of General Conditions of Contract.

All the works will be reliable.

All the works 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.

I/We accept and abide by the clause relating to quality and guarantee of work.

DECLARATION

I/We Guarantee that

I/We hereby declare that I/We have made myself / ourselves thoroughly conversant with the local conditions regarding all materials and labour on which, I/We have based our rates from this work. The specifications and requirements for this work have been carefully studied and understood by me/us before submitting the tender.

I/We undertake to use only the best materials, to be approved by the Executive Engineer in-Charge of the work or his duly authorized representative before starting the work and also to abide by this decision.

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 other as applicable.

DECLARATION

The local condition regarding all materials such as stone, murum, sand, availability of water, electricity and labour 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 Executive Engineer In-charge of the work or his duly authorised representative, before starting the work and also to abide by his decision.

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

ANNEXTURE LIST				
Sr No	ANNEXURE NAME		FROM	TO
1	ANNEXURE -1	Form Of Bank Guarantee	444	445
2	ANNEXURE -2	Collaboration Agreement	446	447
3	ANNEXURE -3	Joint Venture Agreement	448	451
4	ANNEXURE -4	Declaration (local conditions and lead)	452	452
5	ANNEXURE -5	Undertaking For Guarantee	453	453
6	ANNEXURE -6	(Affidavit on Rs.500/- Stamp Paper)	454	454
7	ANNEXURE -7	Self Declaration (Litigations)	455	455
8	ANNEXURE -8	Details of Key Personnel available with Contractor	456	456
9	ANNEXURE -9	Details of Works of similar type and magnitude carried out by the Contractor	457	457
10	ANNEXURE -10	Details of Plant and Machinery available with the bidder for the work	458	458
11	ANNEXURE -11	Maximum value of Civil Engineering works in any one year during last 5 years	459	459
12	ANNEXURE -12	Undertaking	460	460
13	ANNEXURE -13	Authority to seek references from the bidder's bankers.	461	461
14	ANNEXURE -14	Proposals for sub-contracting components	462	462
15	ANNEXURE -15	Bar Chart	463	463
16	ANNEXURE -16	Self Declaration (Not blacklisted)	464	467
17	ANNEXURE -17	MJP Circular Number 231 - Penalty for contractor	468	477
18	ANNEXURE -18	MJP Circular Number 105- Lumpsum provisions	478	478
19	ANNEXURE -19	MJP Circular Number 223 - Sublet of Work	479	482
20	ANNEXURE -20	Draft Affidavit Regarding the work in hand & work where bid have been submitted	483	484
19	ANNEXURE -21	Declaration/ Authority letter for site visit and Geo tagging	485	485

ANNEXURE--1
FORM OF BANK
GUARANTEE
BANK GUARANTEE
(Security for Performance)

In consideration of the Executive Engineer, MJP Division, Ambarnath (hereinafter called "MJP" 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 Executive Engineer, MJP Division, Thane 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 _____)

1. we, (hereinafter referred to as "the Bank" at the request of the said contractor do hereby undertake to pay to the MJP 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 MJP 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 MJP stating that the amount claimed is due by way of loss or damage caused to or would be to or suffered by the MJP 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 contractor's failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this Guarantee shall be restricted to an amount not exceeding the above said amount Guarantee.

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

The payment so made by us under this 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 been forceable till all the dues of the MJP under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged till MJP 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 that the MJP shall have the fullest liberty without our consent and without affecting in any manner our obligations here under to vary any

Contractor

No. of correction

Executive Engineer

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 MJP 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 MJP any indulgence by the MJP to the said contractor or by any such matter or thing whatsoever which under 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 MJP inwriting.

Dated the _____ day of _____

For _____
(Indicate the name of the Bank)

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

ANNEXURE- 2

COLLABORATION AGREEMENT

This agreement made at (Place) _____ this day (date, month and year) between M/s. _____ (Name of the bidder, who intends to collaborate and its registered office address) here-in-after referred as (Principal contractor) which expression shall unless it be repugnant to the context or contrary to the meaning there of be deemed to mean and includes its successors in business and permitted assigns of the ONE PART and M/s _____ (name of the collaborator and its registered address) here-in-after referred as (Collaborator) which expression shall unless it be repugnant to the context or contrary to the meaning there of be deemed to mean and includes its successors in business and permitted assigns of the OTHER PART.

WHERE AS (Principal contractor) _____ registered with Maharashtra Jeevan Pradhikaran/MCGM/MIDC/CIDCO ANY GOVT ORGANIZATION in Class I is a well established contractor engaged in the activities of execution of water supply projects.

1. (Collaborator) _____ Registered with Maharashtra Jeevan Pradhikaran/MIDC/MCGM/CIDCO/ANY GOVT in Civil Class----- is well established contractor having the experience of work mentioned in para 4.

1. The principal contractor desires to collaborate with the collaborator for execution of following works, as he don't have sufficient experience of this particular work included in tender as mentioned in para 1 above.

2.

Sr.No.	Name of work	Amount
	Total :-	

(Note :- It is obligatory to furnish above information otherwise collaboration agreement will not be considered).

1. The Parties hereto have come together to set up a collaboration in order to quote for the tender mention in para 1 above and on award of the tender to jointly execute the work as mentioned in para 4 above as well as to guarantee it's perfect execution utilizing the technical experience. The principal contractor involved in this collaboration, directly or indirectly will hold fully responsible towards Maharashtra Jeevan Pradhikaran to look after the execution of the said work as per the terms and conditions and specifications mentioned in tender.

NOW IT IS HEREBY AGREED BY AND BETWEEN THE PARTIES HERE TO AS UNDER :-

1) In consideration of the mutual understanding, trust and confidence each of the parties in other, they have mutually agreed to form a collaboration to submit the tender and if the tender is accepted by the Maharashtra Jeevan Pradhikaran then carry on the business as a collaboration in respect of development and execution of the said work in accordance with the terms and conditions that may be imposed or agreed by and between the Maharashtra

Jeevan Pradhikaran and the Principal contractor hereto.

- 2) The collaborator shall be responsible for completion of works for which the collaboration is made, however the principal contractor shall be ultimately responsible and liable for completion of entire works in accordance with the terms and conditions on which the award to execute the work is made by Maharashtra Jeevan Pradhikaran under the said tender.
- 3) In the event of any dispute or difference or misunderstanding arises between both of them in course of execution of the work after the award of the work to the Principal contractor by Maharashtra Jeevan Pradhikaran the same shall be referred to Chief Engineer, Maharashtra Jeevan Pradhikaran and his decision in this respect shall be final and binding on both the parties.

IN WITNESS WHERE OF the parties hereunto have set and subscribed there respective hands and seals the day, month and year first above written.

SIGNED, SEALED AND DELIVERED
BY THE WITH NAME

(Name of First Party)

(Name of Second Party)

WITNESS :-

1.

2.

ANNEXURE –3**JOINT VENTURE AGREEMENT****JOINT VENTURE AGREEMENT**

This agreement of joint venture made and entered into at ____ on this . day ____ of _____ by and between.

1. PARTY NO.1:- _____

2. PARTY NO.2:- _____

1. Name of joint venture firm _____

1. Period of Joint Venture is valid upto _____.

DEFINITION

In this deed the following words and expressions shall have the meaning set out below

The joint venture (J.V.) shall mean _____ (*Party No.1*)
 _____ and _____ (*Party No.2*)

Collectivity acting in collaboration for the purpose of this agreement.

"Appex Co-ordination Body (ACB) shall mean the body comprising the managing director of _____ (*Party No.1*) and managing director of _____ (*Party No.2*) - as the two partners of the Joint Venture.

New firm will be _____ (*Name of joint venture firm*)
 _____".

"The Employer" shall mean the Executive Engineer of Maharashtra JeevanPradhikaran (MJP)

The _____ 'work' _____ shall _____ mean

"The contract" shall mean the contract emerged into or to be entered into between the joint venture and the employer for the wor

JOINT VENTURE

Whereas Parties hereto declare that they agree and undertake to form a joint venture for the purpose of applying for pre-qualification for tender and if pre-qualified to execute the work, as an integrated joint venture. The J.V. shall be called as " _____ *Name of joint venture firm* _____".

The parties are not, under this agreement entering into any permanent partnership or joint venture to tender for undertake any contract other than the subject work.

WITNESS

Whereas the Executive Engineer of M.J.P. hereinafter referred as the Executive Engineer, have invited _____ pre-qualification _____ for _____ the _____ work of.....

Whereas "as _____ *Name of joint venture firm* _____ wish to apply for pre-qualification for tender and if pre-qualified to execute the work if awarded as per the terms for the bid documents contract.

Now Therefore This Deed of Partnership Witnesses As Follows:-

1. That these recitals are and shall be deemed to have been part and parcel of the present Agreement of joint venture.
2. That this Agreement shall come into force from the date of this Agreement i.e. _____ day of _____.
3. That the operation of this agreement for joint venture firm concerns and is confined to this work only.
4. That the name of the joint venture firm shall be " _____ *Name of joint venture firm* _____.
5. That " _____ *Name of joint venture firm* _____ " shall jointly execute the work according to all terms and conditions as stated in the relevant instruction contained in the bid document contract as integrated joint venture styled.
6. That this agreement for J.V. shall regulate the relations between the parties and shall include without being limited to them the following condition.
 - a. " _____ *Name of joint venture firm* _____ " shall be the lead company in charge of the joint venture, for all intents and purpose.
 - b. The parties here to shall be jointly and severally liable to employer for all act, deeds and things pertaining to the contract.
 - c. That the managing director of the lead partner of the joint venture shall be the manager of the joint venture firm and shall have the power to control and manage the affairs of the joint venture.
 - d. That on behalf of the " _____ *Name of joint venture firm, the manager* _____ " shall have the authority to incur liabilities, receive instructions and payments, sign and execute the contract for and on the joint venture. All payment and under the contract shall be made into the joint venture's bank account.
 - e. One bank account shall be opened in the name of J.V. to be operated by the individual signatory as mutually decided by the representatives of joint venture partners.
 - f. That each partners of the J.V. agrees and undertakes to place at the disposal of the joint venture the benefit of its individual experience, technical knowledge and skill and shall in all respects bear its share of the responsibilities including the provision of information, advice and other assistance required in connection with the work. The share and the participation of the all the partner in the joint venture shall broadly be as follows.

Name of partner	Percentage of shares
1. <u>Party No.1</u>	
2. <u>Party No.2</u>	
- a. And all rights, interests, liabilities, obligations, work experience and risks (and all net profit or net losses) arising out of the contract shall be shared or born by the parties in proportion to these share. Each of the parties shall furnish its proportionate share in any bounds, guarantees, sureties required for the work as well as its proportionate share in any working capital and other financial requirements, all in accordance with the decisions of the ACB.
 - b. Any loan/advances shall be shared by the Party No.1 and Party No.2 at the ratio of _____ & _____ respectively.
 - c. All funds, finance or working capital required for carrying out and executing the works or contract shall be procured and utilized by the parties as mutually agreed by them.
- a. **Site management :-**
- A project manager appointed by ACB will manage the execution of the work on the site. The project manager shall be authorized to represent the joint venture on site, in respect of matters arising out of or under the contract.
- a. The _____ *Name of joint venture firm* shall be jointly and severally responsible and liable towards the employer for the execution of the contract condition.
 - b. The joint venture deed shall be registered with the Registrar of partnership firms, Govt. of Maharashtra.
 - c. This joint venture agreement shall not be dissolved till the completion of defect liability period as stipulated in the tender document condition of works.
 - d. This joint venture agreement is deemed to be null and void in case the joint venture firm is not qualified by the employer or unsuccessful in the award of work.
 - e. That question relating to validity and interpretation on this deed shall be governed by the laws of India. Any disputes in interpretation of any conditions mentioned herein shall be referred to Member Secretary, Maharashtra Jeevan Pradhikaran and his decision in this respect shall be final and binding to both the parties. Neither the obligation of each party hereto performs the contract nor the execution of the work shall stop during the course of this arbitration processing or as a result there of.
 - f. That no party to the J.V. has the right to assign any benefits, obligations or liability under the agreement to any third party without obtaining the written consent of the other partner and employer.
 - g. Bank account in the name of the joint venture firm may be opened with any scheduled or nationalized bank and the representatives of the J.V. partner are authorized to operate upon individually.
 - h. That both the parties to the J.V. shall be responsible to maintain or cause to maintain proper books of accounts in respect of the business of the joint venture firm and the same shall be closed as at the end of the every financial year.
 - i. That the financial year of the firm shall be the year ended on the 31st March of every year.
 - j. That upon closure of the books of account balance sheet and profit and loss account as to that

state of affairs of the firms as the end of the financial year and as to the profit or loss made or incurred by the firm of the year ended of that day, respectively shall be prepared and the same shall be subject to audit by a chartered accountant.

LEGAL JURISDICTION

All matters pertaining or to commencing from this joint venture agreement involving the employer shall be subject to jurisdiction of high court of judicature at Mumbai.

NOTICES AND CORRESPONDENCE

All correspondence and notice to the joint venture shall be sent to the following address.

(Address)

SIGNED, SEALED AND DELIVERED BY THE WITH NAME

(Name of First Party)

(Name of Second Party)

WITNESS:-

- 1.
- 2.

ANNEXURE –4**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 Executive Engineer in charge 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 -5**UNDERTAKING FOR GUARANTEE**

I/We guarantee that :

1. I/We will replace 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 referred to in our specifications attached to tender, except fair wear and tear until the completion and for a period mentioned under clause 20 mm from the date of 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 to abide by the clause relating to quality and guarantee of work.

Date :

CONTRACTOR

ANNEXURE -6
(Affidavit on Rs.500/- Stamp Paper)

I age.....address
.....(Authorized signatory to sign the contract).hereby submit, vide this
affidavit in truth, that I am the owner of the contracting firm
...../authorized signatory and I am submitting the documents in
envelope no.1 for the purpose of scrutiny of the contract. I hereby agree to the
conditions mentioned below:-

- 1) I am liable for action under Indian penal code for submission of any false
/fraudulent paper/information submitted in envelope.
- 2) I am liable for action under Indian Penal Code if during contract period and
defect liability period, any false information, false bill of purchases supporting
proof of purchase, proof of testing submitted by my staff, subletting company or
by myself, I will be liable for action under Indian Penal Code.
- 3) I am liable for action under Indian Penal Code if any paper are found
false/flatulent during contract period and even after the completion of contract
(finalization of final bill).

(Signature of Contractor)
(seal of company)

ANNEXURE-- 7**NAME OF WORK :- AUGUMENTATION OF KULGAON BADLAPUR WATER
SUPPLY SCHEME, AMBERNATH, DIST.-THANE****SELF DECLARATION FOR ALL CONTRACTORS**

- All the information provided 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 contracts in time.
- I have / have not participated in the previous bidding 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 the Other Party (s)	Cause of dispute	Litigation where (Court/arbitration)	Amount involved

- I am not financially failed.

Signature of Contractor

ANNEXURE– 8**NAME OF WORK :- AUGUMENTATION OF KULGAON BADLAPUR WATER
SUPPLY SCHEME, AMBERNATH, DIST.-THANE****Details of Key Personnel available with Contractor****Name of the Tenderer :**

Sr. No.	Designation of Staff	Name	Qualification	Total experience in years	Experience in present designation in years

Contractor

No. of correction

Executive Engineer

ANNEXURE-- 9
DETAILS OF WORKS OF SIMILAR TYPE AND MAGNITUDE CARRIED OUT BY
THE CONTRACTOR

NAME OF WORK :- AUGUMENTATION OF KULGAON BADLAPUR WATER
SUPPLY SCHEME, AMBERNATH, DIST.-THANE

Name of the Tenderer :

Sr. No.	Name of Work	Cost of Work	Date of starting	Stipulated date of period of completion	Actual date of completion	Remarks

Contractor

No. of correction

Executive Engineer

ANNEXURE– 10**DETAILS OF PLANT AND MACHINERY AVAILABLE WITH THE BIDDER FOR THE
WORK**

**NAME OF WORK :- AUGUMENTATION OF KULGAON BADLAPUR WATER
SUPPLY SCHEME, AMBERNATH, DIST.-THANE**

Name of the Tenderer :

Sr. No.	Name of Equipment	No. of Units	Kind and Make	Age and Condition	Present Location	Remarks

Contractor

No. of correction

Executive Engineer

ANNEXURE-- 11, Form No. IV**MAXIMUM VALUE OF CIVIL ENGINEERING WORKS IN ANY ONE YEAR DURING
LAST 5 YEARS****NAME OF WORK :- AUGUMENTATION OF KULGAON BADLAPUR WATER
SUPPLY SCHEME, AMBERNATH, DIST.-THANE****Name of the bidder:**

Sr. No.	Name of work	Tender Cost	Civil works executed during					Remarks
			2019-20	2020-21	2021-22	2023-24	2024-25	
								In support of the details entered in this statement, the tenderer shall attach the attested copies of the works from the authority not below the rank of Executive Engineer
		Total						

(1) Tenderer shall work out this bid capacity on basis of highest amount "A" i.e. the total cost of work done in any one year out of the last three years and the amount "B" i.e. the total cost of works in hand as per Statement No. 1 and shall work out the Bid Capacity.

Contractor

No. of correction

Executive Engineer

ANNEXURE– 12

**NAME OF WORK :- AUGUMENTATION OF KULGAON BADLAPUR WATER
SUPPLY SCHEME, AMBERNATH, DIST.-THANE**

**Undertaking that the bidder will be able to invest a minimum amount upto 25% of contract
value of work, during implementation of work**

ANNEXURE– 13

**NAME OF WORK :- AUGUMENTATION OF KULGAON BADLAPUR WATER
SUPPLY SCHEME, AMBERNATH, DIST.-THANE**

Authority to seek references from the bidder's bankers.

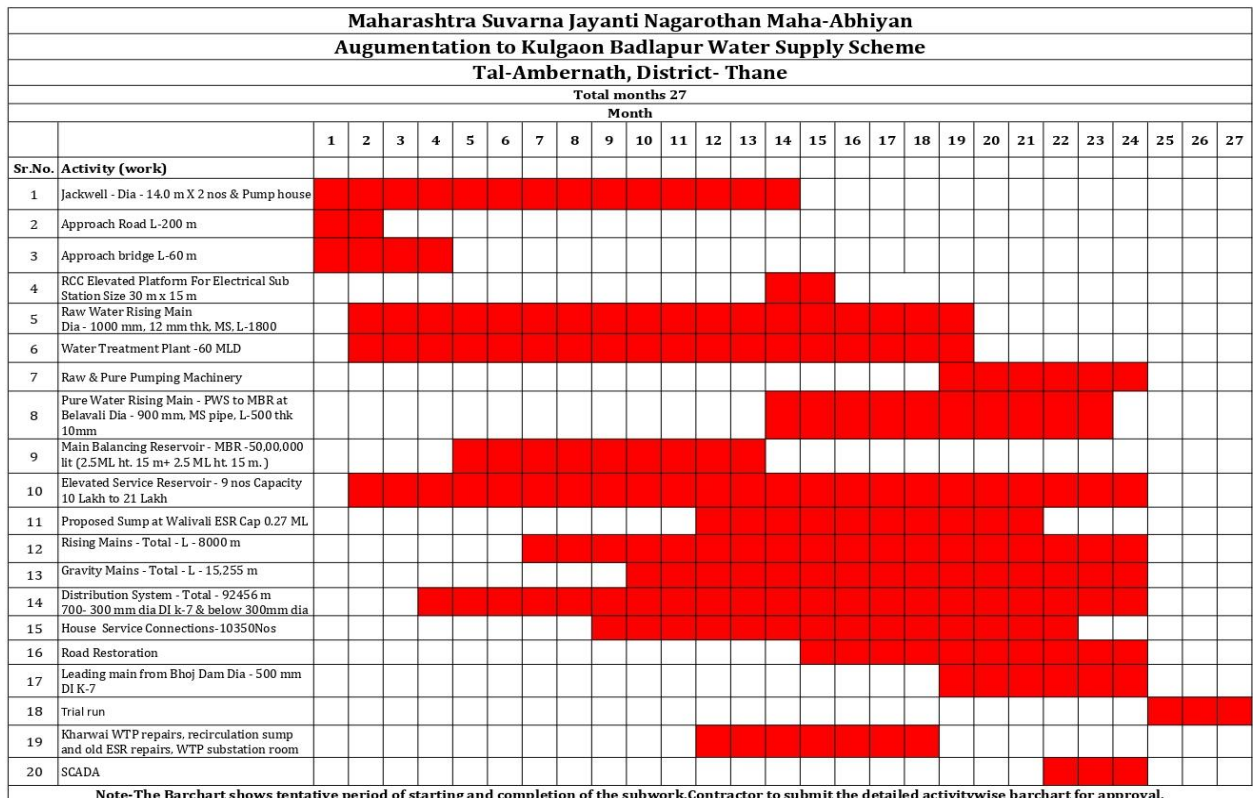
ANNEXURE– 14

**NAME OF WORK :- AUGUMENTATION OF KULGAON BADLAPUR WATER
SUPPLY SCHEME, AMBERNATH, DIST.-THANE**

**Proposals for sub-contracting components of the works amounting to more than 10% of the
Bid price (for each, the qualifications and experience of the identified sub-contractor in the
relevant field should be annexed)**

ANNEXURE 15 BAR CHART

NAME OF WORK :- AUGUMENTATION OF KULGAON BADLAPUR WATER SUPPLY SCHEME, AMBERNATH, DIST.-THANE



Contractor

No. of correction

Executive Engineer

ANNEXURE 16
SELF DECLARATION

I..... age years occupation business
residing at
.....do hereby state on both 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 and 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)
Name of Bidder (in Proprietorship
firm) or Authorised Representative
(Name & Designation) (in case of
other type of bidder)

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

(To be supported with certificate signed by Executive Engineer or equivalent officer)

Sr. No	Name of Works	Name of Division /MC	Accepted tender Cost.	Cost of work completed as on submisison of proposal	Proportion of Col.7 to Col.6 %	Reason for delay (if any) for completion of balance work.
1	2	3	4	5	6	7

Signature of Contractors

Seal of company

Contractor

No. of correction

Executive Engineer

FORM-2
FINANCIAL INFORMATION
Turnover certificate (on CA's letter head)

TO WHOMSOEVER IT MAY CONCERN

This is to certify that M/s. (name of contractors) is having registered office at (detailed office address). The turnover and net worth of the (name of contractors) from the construction business for the three financial year (FY 2017-18, 2018-19 2019-20) is as under.

Sr. No.	Financial Year	Turnover (in lakhs) as per audited balance sheet	Average positive Net worth (in lakhs)
1			
2			
3			
	Average Turnover		

The above information/figures are true and authentic to the best of my knowledge and belief. I / we, am/ are well aware of the fact that furnishing of any false information/fabricated document would lead to rejection of Pre-qualification at any stage, besides liabilities towards prosecution under appropriate law.

Signature of the Chartered Accountant

Name of the Firm

Registration No.

Date:

Place:

(Seal of the Chartered Accountant)

Note:

1. If felt necessary, MJP may ask contractor to submit details duly supported by figures in balance sheet/ profit & loss account for the last three years duly certified by the Chartered Accountant, as submitted by the applicant to the Income Tax Department. Bidder will have to make available such details to MJP as and when demanded.
2. Separate turnover and networth certificate to be submitted for each of the joint
venture partner / collaboration partner

FORM-3

Experience of the Contractor relevant to the eligibility for Sub Contracting

Contractor Name :

Contractor successfully completed work under Single Contract

Sr No	Name and Address of Client	Name Project	Name of Work	Cost of complete d work in Rs. Lakh s.	Contract completi on date as per contract	Sta rt Dat e	En d Dat e	Actual Date of completi on	Actual cost in Cr.	Attached Supportin g document page Nos
1										
2										
3										
.										
.										
				Total						

3. Authorized Signature [In full and initials]:

4. Name and Title of Signatory:

5. *Note: It is mandatory to submit work order/ the Completion certificate duly signed / counter signed by the officer not below the rank of superintendent engineer or equivalent rank shall be submitted for the each claimed assignment/ project. Failing which proposal shall not be evaluated and rejected*

Contractor

No. of correction

Executive Engineer

ANNEXURE 17



महाराष्ट्र जीवन प्राधिकरण

४ था मजला, एक्सप्रेस टॉवर्स, नरीमन पॉईंट, मुंबई - ४०० ०२१.

दूरध्वनी : ०२२-२२०२६२४९, २२८३५२४७, २२०२५३५४.

ई-मेल प्रस्ता : ms@mjp.gov.in, headquarters@mjp.gov.in, cao@mjp.gov.in

वेब पत्ता : www.mjp.maharashtra.gov.in

परिपत्रक क्र.२३१

विषय: स्वीकृत निविदेतील कलम-२ नुसार, कंत्राटदारास दंडाची आकारणी, दंड कमी करणे, दंड स्थगित करणे, दंडाची रक्कम परत करणे या विषयी सुधारित सूचना निर्गमित करणेबाबत.

- संदर्भ: १. मजीप्राचे परिपत्रक क्र.१०४, दि.२७.९.२००५
२. मजीप्राचे परिपत्रक क्र.१६३, दि.३१.८.२०१५
३. मजीप्राचे परिपत्रक क्र.२११, दि.१३.४.२०१८

निधी, उपांगासाठीची जागा इत्यादि सर्व बाबी उपलब्ध असून ठेकेदारास काम करण्यास कोणतीही अडचण नसतानाही स्वीकृत निविदेतर्गत कामांची बारचार्टनुसार प्रगती न राखणे, काम पूर्णत्वास नेण्यास टाळाटाळ करणे, सूचना देवूनही कामे संघर्षातून करणे इत्यादि बाबतीत बी/१ निविदेतील कलम-२ च्या अनुषंगाने ठेकेदारावर आकारावयाच्या दंडाबाबत संदर्भित परिपत्रक क्र.२ व ३ अन्वये, सविस्तर सूचना देण्यात आल्या आहेत. त्याचप्रमाणे ठेकेदाराने विहीत मुदतीत काम पूर्ण केल्यास आकारण्यात आलेल्या दंडाचा परतावा करण्याविषयीच्या सूचना संदर्भित परिपत्रक क्र.१ अन्वये, देण्यात आल्या आहेत.

तथापि, क्षेत्रिय स्तरावर दंडाच्या आकारणीमध्ये सुसूत्रता दिसून न आल्याने, त्याचप्रमाणे दंडाची अचुक परिगणना करून दंडाची आकारणी करण्यात येत नसल्याची बाब निदर्शनास आल्याने, त्याचप्रमाणे सरसकट निविदेतील अंदाजित किंमतीवर आधारित दंडाची आकारणी करण्यात येत असल्याने, दंडाच्या रक्कमेत फार वाढ होत असल्याने, दंडाची आकारणी व परतावा या बाबतीत सुधारित सूचना निर्गमित करणे आवश्यक ठरली आहे.

१. यापुढे निविदेनुसार प्रकल्प पूर्ण करण्याचा कालावधी विचारात घेऊन, निविदेत समाविष्ट सर्व उपांगांचे काम पूर्ण करण्यासंबंधीचे नियोजित कार्यक्रम दर्शविणारा बारचार्ट मजीप्रामार्फत निविदा संज्ञामध्ये अंतर्भूत करणे क्रमप्राप्त राहील. ठेकेदाराने निविदा सादर करताना, सदर बारचार्टवर संमतीदर्शक स्वाक्षरीसह किंवा योजना पूर्ण करण्याच्या कालावधीमध्ये बदल न करता, सुधारित बारचार्ट तयार करून स्वाक्षरीसह निविदेसोबत सादर करावा.

२. ३(१) उप अभियंता यांनी प्रत्येक महिन्यात कामाचा आढावा घेऊन खालील भिक्वणपत्रानुसार नियोजित व प्रत्यक्ष प्रगतीचा तपशील चालू देयकासोबत विभागीय कार्यालयास पुढील सहपत्र क्र.१ मध्ये सादर करावा.

Sr.	Date of work	Name of Sub-work	A/T Cost as per the number of sub-work schedule / in Rupee	Actual cost of work as per / in Rupee / in %	Not amount of work included as per / in Rupee / in %	Expected physical progress as per / in Rupee / in %	Expected cost of work as per / in Rupee / in %	Actual physical progress in %	Cost of work as per / in Rupee / in %	Difference in physical progress in % (a-b)	Difference in cost of work (c-d) in %
1											

(महाराष्ट्र शासन उपक्रम)

पाणी हे जीवन आहे । पाण्याची बचत करा ।

②

ब) विभागीय कार्यालयाने आढाव्या बाबतचे विवरणपत्र तपासून ज्या-ज्या उपांगांच्या बाबतीत प्रत्यक्षात प्रगती कमी आहे, अशा कामांच्या उल्लेखासह ठेकेदारास नोटीस द्यावी. मार्गदर्शनार्थे ठेकेदारास द्यावयाच्या नोटीशीचा नमुना सहपत्र-२ नुसार या परिपत्रकासोबत संलग्न केले आहे.

३. अ) संबंधीत कार्यकारी अभियंता यांनी निविदेतर्गत कामांच्या प्रगतीचा आढावा दरवर्षाच्या जानेवारी व जुलै महिन्याच्या दुसऱ्या आठवड्यात घ्यावा. आढाव्याचा तपशील पुढील सहपत्र क्र.१ मधील विवरणपत्रानुसार अभिलेखी ठेवावा.

[illegible]

ब) दंड आकारणी करताना भूसंपादन, वनजमीन संपादन, छात्यामाफत पाईप पुरवठा वेळेवर न होणे, पुढील टप्प्यामधील कामांना मंजूरी प्राप्त नसणे, रोड/रेल्वे क्रॉसिंग इत्यादि कारणांमुळे बंद असलेल्या / क्लीअर लाईनआऊट न दिलेल्या म्हणजेच कामाच्या विलंबास ठेकेदार जबाबदार नाही अशा कामांसाठी दंडाची आकारणी करण्यात येऊ नये. विलंबास ठेकेदार जबाबदार नाही अशा कामांची किंमत वजा करून दंडाची आकारणी करण्यात यावी.

क) आढाव्या अंती वरीलप्रमाणे अभिलेखी ठेवलेल्या दिवरणपत्रानुसार ठेकेदाराने मान्य केलेल्या बारचाटमधील नियोजित प्रगती आणि ठेकेदाराने प्रत्यक्षात साध्य केलेली प्रगती यांच्यामध्ये कमी प्रगती दिसून आल्यास स्तंभ क्र.१२ मधील फरकाच्या किंमतीवर कंत्राटदारावर दंड आकारणी करण्याचा प्रस्ताव तयार करून दंड मंजूर करण्यास अधीक्षक अभियंता यांच्याकडे ७ दिवसामध्ये सादर करावा.

इ) दंड आकारणीच्या प्रस्तावासोबत बारचार्टनुसार पूर्ण करावयाच्या कामांचा तपशील, विलंबास ठेकेदार जबाबदार नाही अशा कामांचा तपशील, ठेकेदाराने पूर्ण केलेल्या कामांचा तपशील, निविदेनुसार काम पूर्ण करण्याचा कालावधी, बारचार्ट इत्यादि सर्व माहिती सादर करावी.

४. अ) Formula for calculation of fine to be imposed is as below :

Minimum fine to be imposed per day =

Difference in cost of work lagging according to Harchart (as per column No. 33 as per review) X 4
360 days or Work completion period whichever is less.

२००

घ) दंडाची परिगणना करताना, स्वीकृत निविदेची किंमत व निविदेतील कामांची अंदाजित किंमत यापैकी जी किंमत जास्त असेल ती किंमत विचारात घेण्यात यावी.

क) कामाच्या दरवर्षाच्या जानेवारी व जुलै महिन्याच्या आढाव्यानंतर कामाची प्रगती वारचार्टनुसार समाधानकारक नसल्यास, फेब्रुवारी तसेच ऑगस्ट महिन्यामध्ये दंडाची आकारणी होणे आवश्यक आहे.

ड) प्रत्येक आढाव्यानंतर प्रगतीनुरूप उर्वरित प्रलंबित कामांच्या किंमतीवर आधारित नव्याने दंडाची आकारणी करण्यात यावी. उदा.- फेब्रुवारी महिन्यामध्ये दंडाची आकारणी केली असल्यास आणि जुलै महिन्याच्या आढाव्यानंतरही कामाची प्रगती

(7)

इ) वरील अधिकारानुसार, दंड आकारणीचा अधिकार निश्चित करण्यात आला असला तरी योजनेच्या आढाव्या दरम्यान किंवा योजनेच्या क्षेत्रिय पाहणीच्या वेळी कंत्राटदार विलंबाने काम करीत असल्याचे वरिष्ठ अधिकाऱ्यांच्या निदर्शनास आले तर, अशा प्रकरणी दंड लावण्याचा अधिकार संबंधीत वरिष्ठ अधिकाऱ्यास सुध्दा राहिल.

६. भूसंपादन, वनजमीन संपादन, खात्यामार्फत पाईप पुरवठा वेळेवर न होणे, पुढील टप्प्यामधील कामांना मंजूरी प्राप्त नसणे, रोड/रेल्वे क्रॉसिंग इ. परवानग्या प्राप्त करून घेण्यासाठी युध्दपातळीवर पाठपुरावा करण्यात यावा. केलेल्या पाठपुराव्यासंबंधीचा तपशील अभिलेखी ठेवावा.
७. वरील मुद्दा क्र.६ नमूद केल्यानुसार- भूसंपादन, वनजमीन संपादन, खात्यामार्फत पाईपपुरवठा वेळेवर न होणे, पुढील टप्प्यामधील कामांना मंजूरी प्राप्त नसणे, रोड/रेल्वे क्रॉसिंग इ. बाबींची पूर्तता/ परवानग्या प्राप्त झाल्यानंतर, त्या तारखेपासून संबंधीत उपांगे पूर्ण करण्याचा कालावधी परिगणित करून सुधारित बारचार्ट मंजूर करण्यात यावा. अशा उपांगांसाठी सुधारित बारचार्टनुसारच दंडाची परिगणना करणे अनिवार्य राहिल.
८. बारचार्टनुसार काम पूर्ण करण्याचा कालावधी, काम करताना येणाऱ्या अडचणी यांचा विचार करून, काम पूर्ण करण्यासाठीचा सुधारित कालावधी विचारात घेऊन, वेळोवेळी मुदतवाढ देण्याविषयीची कार्यवाही निविदेतील अटी व शर्तीनुसार करण्यात यावी.
९. दंडाची आकारणीबाबतचा सविस्तर तपशील, योजनेच्या मासिक प्रगती अहवालामध्ये न चुकता दर्शविण्यात यावा.
१०. दंडाची आकारणी करण्यात आल्यानंतर, दंड वसूल करण्यात यावा आणि वसूल केलेला दंड मजीप्राच्या डिपॉझिट खात्यात न ठेवता कलेक्शन खात्यामध्ये जमा करण्यात यावा.
११. अ) ठेकेदाराने केलेल्या कामाची किंमत दंडाची रक्कम वसूल करण्याइतपत पुरेशी नसल्यास निविदेतील अटी व शर्तीनुसार, ठेकेदारावर कलम-३(क) नुसार कार्यवाही करण्यात यावी. त्याचप्रमाणे योजनेतर्गत उर्वरित काम पूर्ण करण्यास ठेकेदार टाळाटाळ करत असल्यास, निविदेतील अटी व शर्तीनुसार, ठेकेदारावर कलम-३(क) नुसार कार्यवाही करण्यात यावी.
ब) अशा प्रकरणी उर्वरित कामे करण्यासाठी जास्त रक्कमेची आवश्यकता लागल्यास सदर वाढीव रक्कम दंडाच्या रक्कमेतून व सुरक्षा अनामत रक्कमेतून वसूल करण्यात यावी. त्यानंतरही वसूलीची रक्कम शिल्लक राहिल्यास, त्याच ठेकेदाराच्या इतर निविदेतर्गत कामांच्या देयकातून वसूल करण्याची कार्यवाही करण्यात यावी.
१२. यापूर्वी स्वीकृत निविदेच्या १० टक्के इतकी रक्कम दंड म्हणून वसूल करण्याची तरतूद होती, आता उपांगवार प्रगतीच्या आधारे दंड आकारणीची प्रणाली लागू करण्यात आली असल्याने स्वीकृत निविदा किंमतीच्या जास्तीत जास्त ५ टक्के इतकी रक्कम वसूल करण्यात यावी.

(5)

१३. वरील सर्व सूचनांचा निविदेत अटी व शर्ती म्हणून समावेश करण्यात यावा.
 १४. दंडाची आकारणी तसेच दंडाचा परतावा याबाबत निर्गमित करण्यात आलेले परिपत्रक क्र.१०४, १६३ व २११ अधिक्रमीत करून सदर परिपत्रक निर्गमित करण्यात येत आहे.

सदर परिपत्रकामधील तरतूदी या परिपत्रकाच्या निर्गमित दिनांकापासून लागू राहिल.

या सूचनांचे काटेकोरपणे पालन करण्यात यावे. सूचनांचे पालन न करणाऱ्या अधिकाऱ्यांवर म.ना.से. नियमामधील तरतूदीनुसार प्रशासकीय कार्यवाही करण्यात येईल, याची नोंद घेण्यात यावी.

(पी. वल्लभासू)
सदस्य सचिव

जा.क्र.मजीप्रा/सस/तांशा-२/३५०/७९
दि.१६ जानेवारी, २०२०

प्रत माहिती व कार्यवाहीसाठी :

- संचालक (वित्त), महाराष्ट्र जीवन प्राधिकरण, सिडको भवन, नवी मुंबई
- मुख्य अभियंता, महाराष्ट्र जीवन प्राधिकरण, ठाणे/ पुणे/ नाशिक/ औरंगाबाद/ नागपूर/ अमरावती.
- अधीक्षक अभियंता, महाराष्ट्र जीवन प्राधिकरण, म.नि.सं. व सं. कक्ष, बेलापूर, नवी मुंबई
- अधीक्षक अभियंता, गु.प. व द.प., महाराष्ट्र जीवन प्राधिकरण, ठाणे
- अधीक्षक अभियंता, महाराष्ट्र जीवन प्राधिकरण मंडळ, ठाणे/पनवेल/पुणे/सांगली / औरंगाबाद/लातूर/नांदेड/नाशिक/अहमदनगर/अमरावती/अकोला/नागपूर/ चंद्रपूर.
- अधीक्षक अभियंता (यांत्रिकी), महाराष्ट्र जीवन प्राधिकरण, ठाणे /नागपूर.
- कार्यकारी अभियंता, महाराष्ट्र जीवन प्राधिकरण विभाग, ठाणे / अंबरनाथ (जव्य) / विरार (जव्य)/ पनवेल (जव्य)/ माणगांव/ रत्नागिरी/ सिंधुदुर्गनगरी/ पुणे-१/ पुणे-२/ कराड/ सातारा (जव्य) / सांगली/ कोल्हापूर/ सोलापूर/ औरंगाबाद / बीड/ जालना/ लातूर/ उरभानाबाद/ नांदेड/ परभणी/ जळगाव/ नाशिक/ नाशिक (जव्य)/अहमदनगर/ संगमनेर/ अमरावती/ अमरावती (जव्य)/यवतमाळ/ अकोला/ वाशिम / बुलढाणा/ नागपूर/ नागपूर (जव्य)/ गोंदिया/ चंद्रपूर/ वर्धा.
- तांत्रिक शाखा-१ व ३, मध्यवर्ती कार्यालय, मजीप्रा, मुंबई

(6)

सहपत्र क्र.२:

ठेकेदारस धाव्याच्या दंड आकारणीच्या नोटीशीचा नमुना (सहपत्र-३ला अनुसरून)

दि...../...../२०२०

जा.क्र.मजीप्रा/लेखा/

प्रति,

मे.....

ठेकेदार

विषय : पाणी पुरवठा योजना, ता..... जि.....
 बारचार्टमधील नियोजनानुसार काम न पूर्ण केल्याने, दंडाची आकारणी
 करणेबाबत.

- संदर्भ : १. स्वीकृत निविदा क्र.बी-१/..... सन
२. मजीप्रा/लेखा/..... दि..... अन्वये दिलेले कार्यदेश.
३. या कार्यालयाचे पत्र क्र. मजीप्रा/लेखा/..... दि.....
४. या कार्यालयाचे पत्र क्र. मजीप्रा/लेखा/..... दि.....
५. या कार्यालयाचे पत्र क्र. मजीप्रा/लेखा/..... दि.....

महाराज,

संदर्भित पत्रांचे अवलोकन करावे.

संदर्भित पत्र क्र.२ अन्वये, विषयांकित योजनेच्या कामास कार्यदेश देण्यात आला आहे.
 निविदेनुसार, सदर काम पूर्ण करण्याचा कालावधी १८ महिने आहे. आता माहे जानेवारी २०२०
 अखेर ६ महिन्यांचा कालावधी संपलेला आहे.

संदर्भित पत्र क्र.३ ते ५ अन्वये आपणास बारचार्टमधील नियोजनापेक्षा कामाची प्रगती
 असमाधानकारक असल्याबाबत विलंबामुळे कामाच्या प्रगतीत सुधारणा न झाल्यास दंडाची कार्यवाही
 करण्यात येणार असल्याबाबत आपणास अवगत करण्यात आलेले आहे. तरीदेखील आपल्या
 कामामध्ये प्रगती दिसून येत नाही.

माहे जानेवारी २०२० अखेर सदर योजनेच्या कामाचा आढावा घेतला असता, बारचार्टनुसार
 पूर्ण करावयाच्या कामांचा तपशील, विलंबास ठेकेदार जबाबदार नाही अशा कामांचा तपशील,
 प्रत्यक्षात आपल्या एजेन्सीमार्फत पूर्ण केलेल्या कामांचा तपशील, दंडाच्या आकारणीचा तपशील इ.
 माहिती पुढीलप्रमाणे आहे.

१. खात्याच्या विलंबामुळे खडलेल्या कामांचा तपशील :

- अ) जलशुद्धीकरण केंद्राची जागा प्रत्यक्ष ताब्यात न मिळाल्याने खडलेल्या या कामाची
 किंमत रु.७५,००,०००/-.
- ब) विविध उर्ध्व/गुरुत्व वाहिन्यांच्या कामामधील रोड/रेल्वे क्रॉसिंगची परवानगी अप्राप्त
 असल्याने, पाईपलाईनच्या तेवढ्या भागापुरत्या खडलेल्या या कामाची किंमत
 रु.२,००,०००/-.
- क) धितरण व्यवस्थेकरिता स्थानिक अडचणीमुळे कामाचे लाईनआऊट दिले नाही
 म्हणून तेवढ्या भागापुरत्या खडलेल्या या कामाची किंमत रु.१५,००,०००/-.

वरीलप्रमाणे खात्याच्या अडचणीमुळे, रु.१२,००,०००/- इतक्या किंमतीची कामे
 प्रलंबित आहेत.

२. आढाव्याच्या वेळी बारचार्टनुसार पूर्ण करावयाच्या अपेक्षित कामांची किंमत व प्रत्यक्ष झालेल्या कामांचा तपशील :

क्र.	उपाय	अपेक्षित कामांची किंमत (रुपये)	झालेल्या कामांची किंमत (रुपये)
१.	आरसीसी बॅलन्सिंग टंक	६,००,००,०००/-	५,००,००,०००/-
२.	अशुध्द पाण्याचे संप व पंपगृह	१,००,०००/-	७५,०००/-
३.	अशुध्द पाण्याची डोआय पाईप उध्ववाहिनी	२,००,०००/-	२,००,०००/-
४.	जलशुध्दीकरण केंद्र	७५,००,०००/-	०
५.	शुध्द पाण्याची उध्ववाहिनी	८,००,०००/-	५,००,०००/-
६.	शुध्द पाण्याची डोआय पाईप गुरुत्ववाहिनी	१०,००,०००/-	७,००,०००/-
७.	एमबीआर व उंच जलकुंभ	६०,००,०००/-	४०,००,०००/-
८.	वितरण व्यवस्था	१,००,००,०००/-	७५,००,०००/-
	एकूण	८,५६,००,०००/-	६,२९,७५,०००/-

वरीलप्रमाणे कामांमध्ये झालेला विलंब विचारात घेऊन, पुढीलप्रमाणे प्रतिदिन दंडाची आकारणी करण्यात आलेली आहे.

- स्वीकृत निविदेनुसार, सदर काम पूर्ण करण्याचा कालावधी १८ महिने असून, काम पूर्ण करण्यासाठी उर्वरित कालावधी = १२ महिने.
- Minimum fine to be imposed per day =

$$\frac{\text{Difference in cost of work lagging according to bar chart (as per column No. 2 as per review)} \times 4}{120 \text{ days or Work completion period whichever is less.}} \times 100$$
- प्रतिदिन दंडाची आकारणी =

$$\frac{[(8,56,00,000 - 6,29,75,000 - 92,00,000) \times 4 / 120]}{120} = \text{रु. ३७२९.१६}$$

वरीलप्रमाणे दंडाची आकारणी करण्यास, अधीक्षक अभियंता, मजीप्रा मंडळ..... यांचे पत्र क्र..... दि..... अन्वये मान्यता दिलेली आहे. त्यानुसार दि..... फेब्रुवारी, २०२० पासून प्रतिदिन रु. ३७५०/- इतक्या दंडाची रक्कम वसूल करण्यात येईल.

(.....)

कार्यकारी अभियंता,

मजीप्रा, विभाग, ...

प्रत : मुख्य अभियंता / अधीक्षक अभियंता / उप अभियंता, मजीप्रा, ...

सहपत्र क्र. ३

विषय : पाणी पुरवठा योजना ता. जि.

दंड आकारणी विषयीच्या परिगणनेचा नमुना

१) निविदेतील कामांची अंदाजित किंमत :

१.	आरसीसी वॉलेन्सींग टँक	रु.	१०,००,००,०००/-
२.	अशुद्ध पाण्याचे संप व पंपगृह	रु.	१,५०,०००/-
३.	अशुद्ध पाण्याची डीआय पाईप उर्ध्ववाहिनी	रु.	३,२५,०००/-
४.	अशुद्ध पाण्याची पंपिंग मशिनरी	रु.	२५,००,०००/-
५.	जलशुद्धीकरण केंद्र	रु.	१,२५,००,०००/-
६.	शुद्ध पाण्याची उर्ध्ववाहिनी	रु.	१८,००,०००/-
७.	शुद्ध पाण्याची पंपिंग मशिनरी	रु.	३७,००,०००/-
८.	शुद्ध पाण्याची डीआय पाईप गुरुत्ववाहिनी	रु.	२४,००,०००/-
९.	एमआर व उंच जलकुंभ	रु.	१,४०,००,०००/-
१०.	वितरण व्यवस्था	रु.	४,७५,००,०००/-
११.	तराचे कुंपन इ. किरकोळ कामे	रु.	८०,००,०००/-
१२.	या कामांची चाचणी देणे	रु.	१,५०,०००/-
	निविदेतील कामांची एकूण किंमत	रु.	१९,३०,२५,०००/-

२) योजनेच्या प्रगतीच्या जानेवारी महिन्याच्या आढाव्याच्या वेळी ठेकेदाराच्या कामाची प्रगती कार्टाईमधील नियोजनपेक्षा असमाधानकारक आढळली म्हणून पुढीलप्रमाणे दंडाची कार्यवाही करण्याचे प्रस्तावित करण्यात आले.

i. निविदेतील कामांची एकूण अंदाजित किंमत रु. १९,३०,२५,०००/-

ii. अ. जलशुद्धीकरण केंद्राची जागा प्रत्यक्ष ताब्यात न मिळाल्याने रखडलेल्या या कामाची किंमत रु. ७५,००,०००/-

ब. विविध उर्ध्व/ गुरुत्व वाहिन्यांच्या कामामधील रोड/रेल्वे क्रॉसिंगची परवानगी आता असल्याने, पाईपलाईनच्या तेवढ्या भागापुरत्या रखडलेल्या या कामाची किंमत रु. २,००,०००/-

क. वितरण व्यवस्थेकरिता स्थानिक अडचणीमुळे कामाचे लाईनआऊट दिले नाही म्हणून तेवढ्या भागापुरत्या रखडलेल्या या कामाची किंमत रु. १५,००,०००/-

द. वरीलप्रमाणे खात्याच्या अडचणीमुळे, रु. ९२,००,०००/- इतक्या किंमतीची कामे राहिल आहेत.



महाराष्ट्र जीवन प्राधिकरण

४, शा. मजला, परमप्रेम टॉवर, नरीमन पोईंट, मुंबई - ४०० ०२१.
 दूरध्वनी : ०२२-२२०२६२४९, २२४३५२४७, २२०२५३५४.
 ई-मेल पत्ता : mjs@mjp.gov.in, headquarter@mjp.gov.in, cao@mjp.gov.in
 वेब पत्ता : www.mjp.maharashtra.gov.in

परिपत्रक क्र.२३१ चे शुध्दीपत्रक

विषय: स्वीकृत निविदेतील कलम-२ नुसार, कंत्राटदारास दंडाची आकारणी, दंड कमी करणे, दंड स्थगित करणे, दंडाची रक्कम परत करणे या विषयी सुधारित सूचना निर्गमित करणेबाबत.

महाराष्ट्र जीवन प्राधिकरणाचे परिपत्रक क्र.२३१ अन्वये, स्वीकृत निविदेतील कलम-३ नुसार कंत्राटदारास दंडाची आकारणी, दंड कमी करणे, निर्गमित करण्यात आलेल्या स्वीकृत निविदेतील कलम-३ नुसार कंत्राटदारास दंडाची आकारणी, दंड कमी करणे, दंड स्थगित करणे, दंडाची रक्कम परत करणे इत्यादि सविस्तर सूचना निर्गमित करण्यात आल्या आहेत.

या परिपत्रकामधील मुद्दा क्र.५(ब) नुसार कार्यकारी अभियंता ते मुख्य अभियंता स्तरापर्यंत वरीलप्रमाणे दंडाची आकारणी, दंड कमी करणे, दंड स्थगित करणे, दंडाची रक्कम परत करणे इ. बाबत निर्णय घेण्यास सक्षम अधिकारी हे प्रभारी अधिकारी असल्यास प्रस्ताव पुढील निर्णयासाठी त्यांच्या वरिष्ठ अधिकार्यांकडे सादर करावा, अशी तरतूद आहे.

सद्यःस्थितीत मजीप्रामध्ये सर्व मुख्य अभियंता यांची पदे रिक्त आहेत. त्याचप्रमाणे अनेक अधीक्षक अभियंता, कार्यकारी अभियंता यांची पदे रिक्त आहेत. त्यामुळे बहुतांशी अधिकार्यांकडे वरिष्ठ अधिकार्यांच्या पदाचा अतिरिक्त कार्यभार सोपविण्यात आलेले आहे.

परिपत्रकातील वरील तरतूदीमुळे अधीक्षक अभियंता व मुख्य अभियंता यांच्या स्तरावर निर्णय होणे विषयीचा दंड आकारणी, दंड परत करण्याचा प्रस्ताव तसेच कार्यवाही करून कार्यांतर मान्यता मागविण्याविषयीचा प्रस्ताव कार्यालयाकडे प्राप्त होत आहेत. क्षेत्रीय कार्यालयांकडून प्रस्ताव प्राप्त होणे, त्यावरील छाननी मुद्दे चळविले, त्यांची पूर्तता करून घेणे इ. बाबीमुळे सदर प्रस्तावावरील निर्णय प्रक्रियेस विलंब होतो व त्यामुळे योजनांच्या अंगलवजावणीवर त्याचा परिणाम होतो.

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(महाराष्ट्र शासन उपक्रम)

Scanned with CamScanner

वरील सर्व बाबी विचारात घेऊन, सदर परिपत्रकामधील मुद्दा क्र.५(ब) नुसार, "कार्यकारी अभियंता ते मुख्य अभियंता स्तरापर्यंत वरीलप्रमाणे दंडाची आकारणी, दंड कमी करणे, दंड स्थगित करणे, दंडाची रक्कम परत करणे इ. बाबत निर्णय घेण्यास सक्षम अधिकारी हे प्रभारी अधिकारी असल्यास प्रस्ताव पुढील निर्णयासाठी त्यांच्या वरिष्ठ अधिकाऱ्यांकडे सादर करावा" ही तरतूद वगळण्यात येत आहे.

परिपत्रक क्र.२३१ मधील वरील बदला व्यतिरिक्त इतर कोणत्याही तरतूदींमध्ये बदल करण्यात आलेला नाही.

मा.सदस्य सचिव यांचे मान्यतेने.

(प्रशांत भामरे)
अधीक्षक अभियंता (मु)(प्र)

जा.क्र.मजीप्रा/सस/तांशा-२/३५०/६०६
दि.१६ सप्टेंबर, २०२०

प्रत माहिती व कार्यवाहीसाठी :

- संचालक (वित्त), महाराष्ट्र जीवन प्राधिकरण, सिडको भवन, नवी मुंबई
- मुख्य अभियंता, महाराष्ट्र जीवन प्राधिकरण, ठाणे/ पुणे/ नाशिक/ औरंगाबाद/ नागपूर/ अमरावती.
- अधीक्षक अभियंता, महाराष्ट्र जीवन प्राधिकरण, म.नि.सं. व सं. कक्ष, मुंबई
- अधीक्षक अभियंता, गु.प. व द.प., म.जी.प्रा., सिडको भवन, नवी मुंबई
- अधीक्षक अभियंता, महाराष्ट्र जीवन प्राधिकरण मंडळ, ठाणे/पनवेल/पुणे/सांगली / औरंगाबाद/लातूर/नांदेड/नाशिक/अहमदनगर/अमरावती/अकोला/नागपूर/ चंद्रपूर.
- अधीक्षक अभियंता (यांत्रिकी), महाराष्ट्र जीवन प्राधिकरण, ठाणे /नागपूर.
- कार्यकारी अभियंता, महाराष्ट्र जीवन प्राधिकरण विभाग, ठाणे / अंबरनाथ (जव्य) / विरार (जव्य)/ पनवेल (जव्य)/ माणगांव/ रत्नागिरी/ सिंधुदूर्गनगरी/ पुणे-१/ पुणे-२/ कराड/ सातारा (जव्य) / सांगली/ कोल्हापूर/ सोलापूर/ औरंगाबाद / बीड/ जालना/ लातूर/ उस्मानाबाद/ नांदेड/ परभणी/ जळगाव/ नाशिक/ नाशिक (जव्य)/अहमदनगर/ संगमनेर/ अमरावती/ अमरावती (जव्य)/ यवतमाळ/ अकोला/ वाशिम / बुलढाणा/ नागपूर/ नागपूर (जव्य)/ गोंदिया/ चंद्रपूर/ वर्धा.
- तांत्रिक शाखा-१ व ३, मध्यवर्ती कार्यालय, मजीप्रा, मुंबई

ANNEXURE 18



महाराष्ट्र जीवन प्राधिकरण

राष्ट्रीय महोत्सवी वर्ष
१९७९-२००४

४ था मजला, एक्सप्रेस टोवर्स, नरीमन पॉइंट, मुंबई-४०० ०२१
दूरध्वनी क्र. : २२०२१६२४९, २२८३५२४७ फॅक्स : २२०२१३४८
ई.मेल पत्ता: mstmjnp@rediffmail.com
cromjnp@rediffmail.com
वेब गेट : mahajeevan.com

जा.क्र. मजीप्रा/सस/तांशा-१/३५०/१११७

दिनांक: १५ ऑक्टोबर, २००५

परिपत्रक क्र. १०५

विषय: स्वीकृत निविदेतर्गत ठोक बाबीतील बदलासाठी करावयाच्या कार्यवाहीबाबत.

संदर्भ : मध्यवर्ती कार्यालयाचे दिनांक १४.१.२००५ चे परिपत्रक क्र. १००.

स्वीकृत निविदेतर्गत वाढीव परिमाणांच्या संदर्भात मार्गदर्शनपर सूचना या कार्यालयाच्या संदर्भित परिपत्रक क्र. १०० नुसार निर्गमित केलेल्या आहेत. या परिपत्रकातील मुद्दा क्र. ८ नुसार स्वीकृत निविदेतर्गत Lump sum तरतूद असलेल्या बाबींची वाढीव परिमाणे खंड-३८ अंतर्गत विचारात घेऊ नयेत अशा सूचना दिल्या आहेत. या परिपत्रकाच्या अनुषंगाने अधिकच्या मार्गदर्शनपर सूचना खालील प्रमाणे प्रसूत करण्यात येत आहेत.

- १) जलशुद्धीकरण केंद्राची क्षमता वाढली अथवा कमी झाली तर खंड-३८ अंतर्गत प्रस्ताव न करता, क्षमता वाढल्याने संकल्पन व तत्सम बाबी बदलत असल्याने मूळ बाब वंगळून सक्षम अधिकाऱ्याच्या मान्यतेने अतिरिक्त बाब दरसूची नुसार अदायगी करावी.
- २) जलकुंभाचे बांधकामाच्या पायाचे काम, कॉलम फूटींग ऐवजी राफ्टने करावे लागले तर, झालेल्या बदलानुसार ही वाढ, अतिरिक्त बाब दरसूचीने कौन्ट्रि व रेनफोर्समेंटच्या परिमाणाबरोबरच खोदाई, रिफीलींग इत्यादी मध्ये होणारी वाढही अदा करावी त्याचप्रमाणे जर क्षेत्रीय बदलानुसार राफ्ट फूटींग ऐवजी कॉलम फूटींगने काम करायचे झाल्यास याच परिमाणामध्ये होणारी कपात विचारात घेऊन त्यावेळच्या दरसूचीने अदायगी मध्ये कपात करावी. मात्र अशा प्रस्तावास सक्षम अधिकाऱ्याची मान्यता घ्यावी.

तेव्हा सद्यःस्थितीत प्रगतीपथावर असलेल्या कामांच्या निविदांबाबत वरीलप्रमाणे कार्यवाही करावी तसेच यापुढे कामाच्या निविदा काढताना वरील सर्व बाबीचा उल्लेख निविदेच्या SCHEDULE-B मध्ये तळ टिप (Foot Note) म्हणून करण्यात यावा.

(दीपक भर्तृर्क)
सदस्य सचिव

प्रत माहिती व पुढील कार्यवाहीसाठी :

- १) सर्व मुख्य अभियंता, म.जी.प्रा.
- २) वित्तीय सल्लागार व मुख्य लेखा अधिकारी, म.जी.प्रा., नवी मुंबई.
- ३) सर्व अधीक्षक अभियंता, म.जी.प्रा. मंडळ.
- ४) सर्व कार्यकारी अभियंता, म.जी.प्रा., बांधकाम / प्रकल्प विभाग.

Oct-05/30

(महाराष्ट्र जलसंधारणीय उपक्रम)
पाणी हे जीवन आहे ! पाण्याची वचक करा!

ANNEXURE 19



महाराष्ट्र जीवन प्राधिकरण

४ था मजला, एक्सप्रेस टॉवर्स, नरीमन पॉईंट, मुंबई - ४०० ०२१.

दूरध्वनी : ०२२-२२०२६२४९, २२८३५२४७, २२०२५३५४.

ई-मेल पत्ता : ms@mjp.gov.in, headquarters@mjp.gov.in, cao@mjp.gov.in

वेब पत्ता : www.mjp.maharashtra.gov.in

परिपत्रक क्र.२२३

विषय: ठेकेदाराने कामे उप कंत्राट पद्धतीने (Sublet) करताना पालन करावयाच्या अटी-शर्तीबाबत.

मु. अ. न. जि. प्रा.	
द. अ.	११/२०
स. अ.	२५/०९
वि. अ.	
श. अ.	२५/०९
आ. अ.	२५/०९

महाराष्ट्र जीवन प्राधिकरणाकडील विविध नागरी/ग्रामीण पाणी पुरवठा तसेच मलनिःसारण योजनांतर्गत कामांच्या भौतिक व आर्थिक प्रगतीचा आढावा घेताना असे निदर्शनास आले आहे की, अनेक योजनांच्या निविदेच्या बाबतीत ठेकेदाराने कामे उप कंत्राट पद्धतीने दुसऱ्या ठेकेदारास अंमलबजावणीसाठी दिली आहेत. कामाच्या sublet च्या बाबतीत एकसारखेपणा नसल्याचे आणि मजीप्राचे त्यावर फारसे नियंत्रण नसल्याचेही आढावाच्या वेळी दिसून आले.

उप कंत्राट पद्धतीने कामे देताना एकसारखेपणा रहावा आणि कामे दर्जेदार व विहीत वेळेत व्हावीत या दृष्टीने पुढीलप्रमाणे सूचना निर्गमित करण्यात येत आहेत.

- अ) उप कंत्राट पद्धतीने कामे देताना अनुपालन करावयाच्या अटी-शर्ती :
 - १) रु.५ कोटीपेक्षा जास्त स्वीकृत निविदा किंमतीच्या कामांसाठीच उपकंत्राट पद्धतीने कामे करता येतील.
 - २) कामाचे ठेकेदार स्वीकृत निविदेच्या एकूण किंमतीपेकी फक्त ४० टक्के किंमतीपर्यंतचे काम उपकंत्राट पद्धतीने करू शकतील. सदा ४० टक्के किंमत कामांसाठी लागणाऱ्या पाईप्स, व्हॉल्व्स, स्पेशल्स, स्टील इत्यादि सर्व मटेरिअल्स तसेच मजुरीच्या खर्चासह आहे.
 - ३) ठेकेदाराने उप कंत्राट पद्धतीने काम करण्यापूर्वी रु.२५ कोटी ते रु.५० कोटी स्वीकृत किंमतीच्या निविदांच्या बाबतीत संबंधीत मुख्य अभियंता यांची त्याचप्रमाणे रु.५० कोटीपेक्षा जास्त किंमतीच्या निविदांच्या बाबतीत सदस्य सचिव, मजीप्रा यांची परवानगी घेऊन उपकंत्राट पद्धतीने कामे करणे बंधनकारक राहील. अशा प्रकारचा प्रस्ताव ठेकेदाराने सादर केल्यास मुख्य अभियंता यांच्या कार्यालयाने तो धारिकेच्या स्वरूपात संचालक (वित्त) यांच्यामार्फत सदस्य सचिव कार्यालयाकडे सादर करावा.
 - ४) उप कंत्राट पद्धतीने काम करण्याच्या प्रस्तावास मंजूरी देण्याची कार्यवाही १० दिवसात पूर्ण करण्यात यावी.
 - ५) स्वीकृत निविदेच्या ठेकेदाराने उप कंत्राट पद्धतीने काम करताना, पुढील अनियमितता आढळून आल्यास ठेकेदारास काळ्या यादीत टाकण्याची कार्यवाही प्रस्तावित करण्यात येईल.
 - i. पुढील मुद्दा क्र.१२ नुसार सादर केलेल्या माहितीमधील कर्मचाऱ्यांव्यतिरिक्त इतर कर्मचारी कार्यस्थळी कार्यरत असणे.
 - ii. मजीप्राची परवानगी न घेता, ठेकेदाराने उप कंत्राट पद्धतीने काम चालू ठेवणे, त्याचप्रमाणे स्वीकृत निविदा किंमतीच्या ४० टक्के पेक्षा जास्त किंमतीच्या कामाची उप कंत्राट पद्धतीने अंमलबजावणी करणे.
 - iii. कंत्राटदाराकडून उप कंत्राट पद्धतीने अंमलबजावणीसाठी दिलेले काम उप कंत्राटदाराने अन्य उप कंत्राटदाराकडून करून घेऊ नये.

61/18/2020_CIRCULAR 2020_BNAN_Chennai 223

(महाराष्ट्र शासन उपक्रम)

पाणी हे जीवन आहे ! पाण्याची बचत करा !

- 7) उप कंत्राटदार मजीप्रा किंवा अन्य शासकीय / निमशासकीय यंत्रणेचा नोंदणीकृत ठेकेदार असावा.
- 8) उप कंत्राटदार हा मजीप्रा किंवा अन्य शासकीय / निमशासकीय यंत्रणेचा Defaulter किंवा Black listed नसावा.
- 9) ठेकेदाराने मजीप्राची परवानगी घेऊन एखाद्या उपांगांचे काम उप कंत्राट पद्धतीने दुसऱ्या ठेकेदारास दिले तरी संबंधीत कामाचा दर्जा, काम विहीत मुदतीत पूर्ण करण्याची जबाबदारी, त्या कामासंबंधीचे टॅक्स, न्यायालयीन प्रकरणे इ. सर्व जबाबदाऱ्या स्वीकृत निविदेच्या ठेकेदाराचीच राहिल. या बाबतीत मजीप्रा मूळ ठेकेदारासच जबाबदार धरेल.
- 10) उप कंत्राट पद्धतीने काम हाती घेण्यापूर्वी मूळ ठेकेदाराने उप कंत्राटदारासोबत करारनामा करणे आवश्यक राहिल. सदर करारनाम्याची प्रत संबंधीत विभागीय कार्यालयाकडे सादर करण्यात येईल.
- 11) रु.५ कोटीपेक्षा जास्त किमतीच्या कामांच्या बाबतीत जलशुद्धीकरण केंद्र, मलशुद्धीकरण केंद्र, उंच जलकुंभ, भुस्तर जलकुंभ, संप इत्यादि महत्वाच्या उपांगांच्या कार्यस्थळावर सीसीटिव्ही कॅमेरा लावण्याची व्यवस्था ठेकेदारामार्फत करण्यात यावी. ठेकेदाराने सीसीटिव्ही कॅमेरा लावण्याचे काम स्वखर्चाने करावयाचे आहे. तथापि, सीसीटिव्ही कॅमेरा व्यवस्थेचे नियंत्रण मजीप्राकडे राहिल.
- 12) कार्यादेश दिल्यानंतर, ठेकेदाराने स्वीकृत निविदेच्या सर्व कामांसाठी कार्यस्थळावर उपस्थित राहणाऱ्या ठेकेदारांच्या वेतन देयकांमध्ये असलेल्या सुपरवायझर/ इंजिनियर/ व्यवस्थापक इत्यादींची नावे, त्यांची शैक्षणिक पात्रता, त्यांच्या कामाचा अनुभव, ओळखपत्र, आधारकार्ड, पॅनकार्ड इ. सर्व माहिती इंजिनियर-इन-चार्ज यांच्याकडे काम करण्यापूर्वी सादर करणे बंधनकारक राहिल. उप कंत्राट पद्धतीने किंवा ठेकेदार स्वतः काम करणार असले तरीही सदर माहिती सादर करणे ठेकेदारास बंधनकारक राहिल.
- 13) काम चालू असताना, उप कंत्राट पद्धतीच्या बाबतीतील मेटेरिअल व्हॉऊचर्स, टॅक्स, कर्मचारी विमा, भविष्य निर्वाह निधी इत्यादि सर्व कागदपत्रे इंजिनियर-इन-चार्ज यांच्याकडे सादर करणे बंधनकारक राहिल.
- 14) मजीप्राकडील अधिकाऱ्यांच्या किंवा गुणवत्ता परिक्षण व दक्षता पथकाच्या योजनेवरील पाहणीच्या वेळी वरील मुद्दा क्र.१२ नुसार नमूद केलेल्या कर्मचाऱ्यांच्या तपशीलाची मागणी केल्यास सदर माहिती उपलब्ध करून ठेकेदारास बंधनकारक राहिल.
- 15) कंत्राटदारास काम पूर्ण केल्यानंतर अनुभव प्रमाणपत्र देताना त्याने स्वतः केलेल्या कामाचे प्रमाणपत्र देण्यात यावे. सबलेटींग केलेल्या कामाच्या बाबतीत जे काम उप कंत्राट पद्धतीने केले आहे. त्याबाबत उप कंत्राटदाराच्या कंपनीचे नाव व केलेल्या कामाचा उल्लेख करून प्रमाणपत्र देण्यात येईल. प्रमाणपत्राची प्रत संबंधीत उप कंत्राटदारास देण्यात येईल.
- 16) काही विशेष कारणास्तव जसे कामाची व्याप्ती मोठी असणे अथवा कालमर्यादेत काम पूर्ण करणे अशा परिस्थितीत स्वीकृत निविदेच्या किमतीच्या ४० टक्केपेक्षा जास्त काम उप कंत्राट पद्धतीने करावयाचे असल्यास त्यानुसार काम हाती घेण्याच्या आधी विशेष बाब म्हणून सदस्य सचिव, मजीप्रा यांची परवानगी घेणे आवश्यक राहिल.
- 17) मुख्य अभियंता यांनी प्रस्ताव आवश्यक कारणांचा उल्लेख करून कागदपत्रांसह व शिफारशीसह संचालक (वित्त) यांच्यामार्फत सदस्य सचिव यांच्या कार्यालयास सादर करण्यात येईल.
- 18) प्रगतीपथावरील योजनांची तपासणी करताना, गुणवत्ता परिक्षण व दक्षता पथकाने कामावरील ठेकेदाराच्या पर्यवेक्षकांचे नाव इत्यादि तपशील वरील मुद्दा क्र.१२ नुसार असल्याची खात्री करून घेण्यात येईल.

Contractor

No of Corrections

Executive Engineer



महाराष्ट्र जीवन प्राधिकरण

४ था मजला, एक्सप्रेस टॉवर्स, नरिपन पॉइंट, मुंबई - ४०० ०२१.

दूरध्वनी : ०२२-२२०२६२४९, २२८३५२४७, २२०२५३५४

ई-मेल पत्ता : ms@mjp.gov.in, headquarters@mjp.gov.in, cao@mjp.gov.in

वेब पत्ता : https://mjp.maharashtra.gov.in

परिपत्रक क्र.२२३ चे शुध्दीपत्रक क्र.२

विषय : ठेकेदाराने कामे उप कंत्राट पद्धतीने (Sublet) करताना पालन करावयाच्या अटी-शर्तीबाबत.

- संदर्भ : १. मजीप्रा परिपत्रक क्र.२२३ जा.क्र.मजीप्रा/सस/तांशा-२/३५०/५६, दि.१६.१.२०२०
२. मजीप्रा परिपत्रक क्र.२२३ चे शुध्दीपत्रक जा.क्र.मजीप्रा/सस/तांशा-१/५८५, दि.१४.११.२०२२
३. मजीप्रा परिपत्रक क्र.२६३ जा.क्र.मजीप्रा/सस/तांशा-२/३५०/३९५, दि.१३.३.२०२३

मु. अ. म. जि. प्रा.	ठपे
मु.अ.	
स.मु.अ.	
वि.अ.	२८/०५/२०२४
शारदा	
आ.प्र.	२४२८
दिनांक	२०/०६/२४

महाराष्ट्र जीवन प्राधिकरणाकडील विविध नागरी/ग्रामीण पाणी पुरवठा तसेच मलनिःसारण योजनेतर्गत उप कंत्राट पद्धतीने कामे देताना एकसारखेपणा रहावा आणि कामे दर्जेदार व विहीत वेळेत व्हावीत या दृष्टीने संदर्भित परिपत्रकान्वये, सविस्तर सूचना निर्गमित करण्यात आल्या आहेत.

परिपत्रक क्र.२२३ मधील अट क्र.३ मध्ये पुढीलप्रमाणे नमूद करण्यात आले आहे.

“ठेकेदाराने उप कंत्राट पद्धतीने काम करण्यापूर्वी रु.२५ कोटी ते रु.५० कोटी स्वीकृत किंमतीच्या निविदांच्या बाबतीत संबंधीत मुख्य अभियंता यांची त्याचप्रमाणे रु.५० कोटीपेक्षा जास्त किंमतीच्या निविदांच्या बाबतीत सदस्य सचिव, मजीप्रा यांची परवानगी घेऊन उपकंत्राट पद्धतीने कामे करणे बंधनकारक राहील.”

याप्रकरणी, क्षेत्रिय स्तरावरून रु.५ कोटी ते रु.२५ कोटी स्वीकृत किंमतीच्या निविदांच्या बाबतीत उप कंत्राट पद्धतीने कामे करण्याविषयी काय कार्यवाही करावी याविषयी विचारणा करण्यात येत आहे. त्यानुषंगाने पुढीलप्रमाणे सुधारीत सूचना निर्गमित करण्यात येत आहेत.

SL/2023/Circular/2023/MSCL/ENR/223

1

(महाराष्ट्र शासन उपक्रम)

पाणी हे जीवन आहे ! पाण्याची बचत करा !

या सूचनांचे काटेकोरपणे पालन करण्यात यावे.

(अभिषेक कृष्णा)
सदस्य सचिव

दि २५/९/२०२४

प्रत माहिती व कार्यवाहीसाठी :

- संचालक (वित्त), महाराष्ट्र जीवन प्राधिकरण, सिडको भवन, नवी मुंबई
- मुख्य अभियंता, महाराष्ट्र जीवन प्राधिकरण, ठाणे / पुणे / नाशिक / छत्रपती संभाजीनगर/ नागपूर / अमरावती.
- अधीक्षक अभियंता, महाराष्ट्र जीवन प्राधिकरण, म.नि.सं. व सं. कक्ष, मुंबई
- अधीक्षक अभियंता, गु.प. व द.प., महाराष्ट्र जीवन प्राधिकरण, बेलापूर, नवी मुंबई.
- अधीक्षक अभियंता, महाराष्ट्र जीवन प्राधिकरण मंडळ, ठाणे / पनवेल / पुणे / सांगली / छत्रपती संभाजीनगर / लातूर/ नांदेड/ नाशिक/ अहमदनगर/ अमरावती/ अकोला / नागपूर / चंद्रपूर.
- अधीक्षक अभियंता (यांत्रिकी), महाराष्ट्र जीवन प्राधिकरण, बेलापूर/नागपूर.
- कार्यकारी अभियंता, महाराष्ट्र जीवन प्राधिकरण विभाग, ठाणे / अंबरनाथ (जव्य) / विरार (जव्य)/ पनवेल (जव्य)/ माणगांव/ रत्नागिरी/ सिंधुदूर्गनगरी/ पुणे-१/ पुणे-२/ कराड/ सातारा (जव्य) / सांगली/ कोल्हापूर/ सोलापूर/ छत्रपती संभाजीनगर / बीड/ जालना/ लातूर/ धाराशिव/ नांदेड/ परभणी/ जळगाव/ नाशिक/ नाशिक (जव्य)/अहमदनगर/ संगमनेर/ अमरावती/ अमरावती (जव्य)/ यवतमाळ/ अकोला/ वाशिम / बुलढाणा/ नागपूर/ नागपूर (जव्य)/ गोंदिया/ चंद्रपूर/ वर्धा.
- तांत्रिक शाखा-१, २, ३, ४, मध्यवर्ती कार्यालय, मजीप्रा, मुंबई

ANNEXURE 20

Name of work :- **AUGUMENTATION OF KULGAON BADLAPUR WATER SUPPLY SCHEME, AMBERNATH, DIST.-THANE**

Date :-

Draft Affidavit Regarding

The work in hand & work where bids have been submitted

I / _____ We hereby declare that, I / We have bided 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

Executive 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 21

DECLARATION/AUTHORITY LETTER FOR SITE VISIT AND GEO TAGGING

Name of work :- _____ Scheme
 Tq: _____ Dist: _____

Name of Contractor / Agency :- _____

I Myself ----- hereby declare / authorize my
 authorized representative ----- to carry out site visit and inspect
 / visit other important location on site of above mentioned work.

Date :

Place :

Time :

Signature with Stamp of the
 Contractor / Agency

I Myself / authorized representative have personally inspected the work site on the date -----
 ----- time -----PM/AM and have made myself / our self-acquainted. Satisfied with the site
 condition. The details of Geo-Tagging as mentioned in the tender will be uploaded in envelope
 No.1 of the tender.

Date :

Place :

Time :

Signature with Stamp of the
 Contractor / Agency

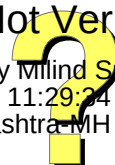
Note:-

The contractor intending to submit the tender must visit the site of the proposed work along with the concerned MJP officers and submit a self-declaration of geo-tagging in the prescribed format at the time of tender submission.

DRAWINGS

Signature Not Verified

Digitally signed by Milind Suresh Deshpande
Date: 2026.02.20 11:29:24 IST
Location: Maharashtra MH



Contractor

No. of correction

Executive Engineer