

RURAL WATER SUPPLY DIVISION NANDURBAR



E-TENDER NOTICE NO- FOR 2024-25

NAME OF WORK : **Water Supply Scheme At- - -----**

TENDER DOCUMENTS

Rural Water Supply Division - Zilla Parishad Nandurbar

SAVE WATER EVERY DROP COUNTS

WS service provision does not end with the construction of infrastructure . Service delivery involves providing for the operation and maintenance of assets, financial management and for consumer service on an ongoing basis

Contractor

No. of corrections

Executive Engineer

Rural water Supply Division Nandurbar

Name of work : **Water Supply Scheme At - -----**
Taluka- -----

TENDER NOTICE NO. ---- FOR -----

I N D E X

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Executive Engineer

Rural water Supply Division Nandurbar /

.....

e-Tender Notice No. for 2022-23

Rural water Supply Division Z.P Nandurbar/..... invites e-Tender for
the work of **Water Supply Scheme At - ----- -Taluka- -----**

Nandurbar Distrit the State of Maharashtra, valued at Rs.-----

Please visit website

www.mahatender.gov.in for detailed information.

Date: / /2021

**Executive Engineer,
Rural water Supply Division
Z.P Nandurbar**

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1. DETAILED TENDER NOTICE

Rural water Supply Division Nandurbar

.- SCHEME

DETAILED TENDER NOTICE NO.- OF **2022-23**

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/ZP/PWD Registration those fulfill the Tender Condition on gov. appropriate class of(civil), by the Authority of , Government of Maharashtra e-Tendering Portal : <http://.mahatenders.gov.in>

- a) **NAME OF WORK** :
- b) **ESTIMATED TENDER COST** : `-----/-
- c) **EARNEST MONEY DEPOSIT**----- / of the cost put to tender)
- d) **DOWNLOADING COST OF TENDER DOCUMENTS:-** `-----/-
(Including GST)
- e) **CLASS OF CONTRACTOR** : appropriate class of..... (civil)

1. EARNEST MONEY DEPOSIT/TENDER FEES :

Tender fee and EMD shall be paid by

1. SBI Net Banking or
2. Other Bank Internet Bank MOPS.

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

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The online payment procedure can be seen on <https://mahatendergov.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 ZP. The mandate for EMD refunds / forfeit / adjustment against security deposit shall trigger from e-tender application of NIC portal.”

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

2. SECURITY DEPOSIT

- 5 % of the Estimated cost or Accepted Tender cost whichever is higher
- **Initial Security Deposit.**

5 % 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, Rural water Supply Division Zilla Parishad Nandurbar for initial minimum period of months (time limit) or will be deducted from RA Bill and shall be extended suitably if the work is not completed within the time limit.

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- **Additional Security Deposit.**

- **Details of amount of performance security shall be as below-**
- 1) for bids, if the tender offer quoted as 1 to 10 % below than the estimated cost put to tender, performance security shall be 1% of estimated cost put to tender.
- **(Refer GR No. BDG 2018/ case No.08/ 02 /Bldg-2 Dtd 27.9.2018) Bid Capacity Certificate certified From CA Should be Attached Along With Tender Document Without Fail.(This Clause is Exempted to MJP Educated Unemployed Engineer as per MJP circular No.614 dated 20.08.2021)**
- **All tenderer Should Submit Uploaded Tender Document (Hard Copy) In Division Office on/before the Date Of Completion Tender Period.**
- **All Tenderer Should Submit Information regarding Work Status (No. Of Works Completed/ In Progress in Percentage) of Schemes whose Work Order Are Issued By this division under JJM.**
- In case of submission of false documents/ Bank Guarantee, action shall be taken against the contractor as stipulated in above mentioned GR.
- Scanned Copy from original of details of work a Three similar type of work of 40% magnitude of each or b] Two similar type of work of 50% magnitude of each or One similar type of work of 80% magnitude of work and price level 2020 2021 commenced and completed by the contractor during last Five years i e 2016 2017 2017 2018 2018 2019 2019 2020 2020 2021.

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 (**Annexure-1**) in the name of "Executive Engineer,, and shall be for a minimum period of months (time limit) and shall be extended suitably if the work is not completed within the time limit. The tenderer shall have to furnish this security deposit with initial security deposit.

3. **STAMP DUTY**

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

4. **TIME OF COMPLETION**

6 Months & 12 Months (in words) calendar months, including Monsoon. This will be counted from the date of issue of the work order.

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5. DETAILED TENDER SCHEDULE

Sr. No.	Activities	Date & Time
1	Tender publishing date	/ /2022
2	Documents download start date	/ /2022 from 11.00 Hrs
3	Documents download end date	/ /2022 up to 17.00Hrs
4	Tender submission closing date	/ /2022 up to 17.00Hrs
5	Tender opening date (Technical)	/ /2022 up to 18.00 Hrs
6	Tender opening date (Commercial)	/ /2022 up to 18.00 Hrs (As per Conivient)

6. PRE QUALIFICATION CRITERIA

- The firm / contractor should registered with MJP/ZP/PWD With Registered in class V & above in Appropriate class '-----'of (Civil)(class of MJP). The validity of registration should be at least upto the last date for submission of tender, then only pre-qualification will be considered. It is necessary to renew the registration before issue of work order. Bidder need to submit online copy of registration.
- The firm shall have valid PAN No.

7. ISSUE OF BLANK TENDER FORM

The blank tender forms will have to be downloaded, from the website <http://mahatende.gov.in> as per online schedule.

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

/ /2022 up to 17.00Hrs

9. DATE & TIME OF ONLINE OPENING OF TENDER

/ /2022 up to Hrs in the office of the Executive Engineer, ZP
Nandurbar

10. SUBMISSION OF TENDER

Bids must be accompanied with:

- a) Scanned copy of all documents, certificates specified in Pre-qualification Criteria in Point No.6.
- b) Scanned copy of duly signed Declaration of contractor in prescribed format filled in agency's letter head attached with the tender.
(Annexure-4)
- c) Scanned copy of duly signed undertaking for guarantee in prescribed format filled in agency's letter head attached with the tender.
(Annexure-5)
- d) collaboration and Joint Venture will not be entertained.

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://mahatender.gov.in>".

The two envelopes No. 1 & 2 shall be digitally sealed and signed and submitted online as per the online tender schedule.

The date and time for online submission of envelopes shall strictly apply in all cases. The tenderers should ensure that their tender is prepared online before the expiry of the scheduled date and time and then submitted online before the expiry of the scheduled date and time. Offers not submitted online will not be entertained.

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.

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BOQ All Item Given separately in PDF Formate with Tender.

सदर योजने मध्ये समाविष्ट कामाचे स्वतंत्र BOQ PDF Format मध्ये जोडण्यात आलेला आहे. सदर कामाची निविदा भरतानी पिरपुण² BOQ चे अवलोकन करूनच निविदेमध्ये सहभाग नोंदविण्यात यावा.

11. OPENING OF TENDER

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

Envelope No. 1 (Technical Bid)

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

- a. Scanned copy of all documents, certificates specified in Pre-qualification Criteria in Point No.6.
- b. Scanned copy of duly signed declaration of contractor in prescribed format filled in agency's letter head attached with the tender.
- c. Scanned copy of duly signed undertaking for guarantee in prescribed format filled in agency's letter head attached with the tender.
- d. Scanned copy of experience successfully completion and commissioning of the same works with Construction Minimum 25000 Liters ESR & PVC /HDPE Pipe Line 3 KM Minimum listed above with any Govt/Semi Govt.Organisation/ Government local body or equivalent organization.
With Experience Certificateis. Scan copy of Work in handreport/certificate also attached.
- e. **Technical Staff with their Qualification Certificate** If the various documents contained in this Envelope do not meet the requirements as stated above, a note will be recorded accordingly by the

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tender opening authority and the envelope No. II of such tenderers will not be considered for further action. Decision of ZP on interpretation of the documents submitted by the bidder in support of prequalification requirements is final. 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 & ZP/Corporation/council. The tendered rate shall then be read out by the tender opening authority.

12. RIGHT RESERVED

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

Sd/-
Executive Engineer/

Contractor

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ANNEXURE-1**FORM OF BANK GUARANTEE****BANK GUARANTEE****(Security for Performance)**

In consideration of the Chief Engineer (hereinafter called "MJP & ZP 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 MJP & ZP and the said contractor for the Security Deposit for the due fulfillment by the said contractor of the terms and conditions contained in the said Agreement, on production of the Bank Guarantee for Rs _____ (In _____ words Rs _____) we, (hereinafter referred to as "the Bank" at the request of the said contractor do hereby undertake to pay to the MJP & ZP 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 & ZP 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 & ZP stating that the amount claimed is due by way of loss or damage caused to or would be to or suffered by the MJP & ZP/...MC 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 & ZP any money so demanded not withstanding 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

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

5. We _____
 further agree with the MJP & ZP that the MJP & ZP shall have the fullest liberty without our consent and without affecting in any manner our obligations here under to vary any 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 & ZP 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 & ZP any indulgence by the MJP & ZP 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 & ZP in writing.

Dated the _____ ***day of*** _____ ***2021-22***

For _____
 (Indicate the name of the Bank)

Note: However, these forms will be as per the current practices of MJP & ZP/...MC and Banks

Contractor

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Executive Engineer

ANNEXURE-4

DECLARATION BY CONTRACTOR

Name of work :- -----**Ta.**-----
----- **Dist.**-----,

DECLARATION

I/we have visited the site of work before quoting the tender and get myself /ourself acquainted with the site conditions and site site requirements for the work.

I/we hereby declare that I have made myself thoroughly conversant with the local conditions regarding all materials, such as stones, murum, sand, their leads, availability of water and labour on which I have quoted my bid for this work.

The specifications , conditions and clauses of 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 Chief Engineer /Engineer in charge of the work or his duly authorized representative, before starting the work and also to abide by his decision.

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

Contractor's
Signature

Contractor

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ANNEXURE-5

UNDERTAKING FOR GUARANTEE

I/We Guarantee that :

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

DATE :

CONTRACTOR

Contractor

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Executive Engineer

3. GENERAL CONDITIONS OF CONTRACT

1. DEFINITIONS

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

- a) "WSSD "means Water Supply and Sanitation department
- b) "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.
- c) "The Contract Price" means the price payable to the contractor under the contract for the full and proper performance of its contractual obligations.
- d) "The Goods" means all of the equipments, machinery and/or other materials which the contractor is required to supply to the owner under the contract.
- f) "Services" means services ancillary to the contract such as transportation and insurance and any other incidental services, such as Provision of Technical Assistance, Trial Runs, Commissioning, Training to staff and other such obligations of the contractor covered under the contract.
- g) "The Owner" means, the Member Secretary Rural water Supply Division Nandurbar, MJP & ZP 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 issued on 10.03.1997.
- j) "M. J. P." means, Rural water Supply Division Nandurbar.
- k) ""The **Executive Engineer RWS ZP .** " shall mean **Executive Engineer RWS ZP.**, the person, for the time being holding that Office and also his successors and shall include any Engineer authorized

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by him.

- l) "The Superintending Engineer, Maharashtra Jeevan Pradhikaran ----
----- Circle, -----" 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.
 - m) "Tender" means the proposal of the contractor submitted in
prescribed form setting-forth the prices for the goods to be
supplied and other related services to be rendered and setting
forth his acceptance of the terms and obligations of the conditions of
contract and specifications.
 - n) "Contract Time" means period specified in the document for the
entire execution of contracted works and other services to be
rendered commencing from the date of notification of award
including monsoon period.
 - o) "Month" means calendar month.
 - p) "Site" means location at which the contractor will have to execute
the contracted work.
 - q) "The Engineer or Engineer-in-charge" shall mean the
2. The contractor shall erect temporary sheds for storage for material supplied
by MJP & ZP 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
Balancing Tank, Intake well, Jack well, Pump House, Water Treatment Plant.
(Hydraulic and structural), Sump, ESR, GSR, Thrust blocks/anchor blocks,
Pumping machinery and its layout, all allied electrical and mechanical
equipments as directed by Executive Engineer .This designs and drawings
shall be got checked from Government Engineering College or IIT at
contractors own cost.
 6. The contractor shall maintain the record of these materials in the prescribed

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Performa and registers as directed by the Executive Engineer. 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. 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 for minor works.
12. Contractor shall have Cube Testing machine on site. Test cubes shall be tested in front of Executive Engineer or his representative and a register for it shall also be maintained.

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

The MJP & ZP/....., an Government undertaking of Government of Maharashtra, has proposed to execute the following work under sanctioned scheme ", Tal....., Dist.

This tender includes-

.....
.....
.....
.....
.....

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.

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

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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. 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 ISCode. 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 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 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 & ZP does not take any responsibility for supply of water to

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contractor for construction or testing purposes during the entire work. If water is supplied by MJP & ZP, 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 & ZP 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 & ZP 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 & ZP 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 before the award of the contract a progress schedule or work implementation 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 MS project with details of milestones of physical stages of each sub work. Simultaneously with the execution of the Contract Agreement, the Contractor shall submit to The Engineer his item-wise monthly programme, which shall be nothing but detailing of the programme,
- ii. The programme shall also state the milestones of part commissioning and part completion of the sub-work included in the tender. The programme shall also provide the information as to required approvals to drawings, samples, materials, equipments and their time of submissions to the MJP & ZP. The progress shall be submitted by the Contractor visa-a-vis programme every month. The works team of the Contractor shall be so motivated to know the balance work at the end of each week and the rate required in the balance period to complete the work and therefore, shall endeavor to complete the task

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assigned for each week timely. In case, where the updated and revised schedule is required, the same shall be submitted to the owner for approval.

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

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

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 :

It is mandatory to the successful bidder to get the labour insurance done, on account of risk involved within a month from the date of work order. In case of failure, MJP & ZP will recover the Insurance premium and Rs 50000 extra as penalty from the R. A. bills of the work and will pay the premium and purchase the insurance policy on behalf of the contractor.

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 & ZP Mumbai shall be final and remain binding on

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both parties.

29. INTENT AND INTERPRETATION OF CONTRACT DOCUMENTS

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.

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.

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.

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

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drawing is an authority for work in the contract.

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.

30. LANDS, CONDITION AND LAYOUT

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.

Contractor's Verification

The Contractor will establish at the work site a substantial Benchmarks. and connect it to a permanent Benchmarks. 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.

Site Office

The Contractor shall construct at his cost a semi-permanent nature site office with minimum of 20 Sq.m area and shall be provided with minimum two tables, two almaries, six Nos of chai` The office and the furniture shall

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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 & ZP/IRMA/any other inspection committee/agency appointed by the Government of India/Maharashtra/Collector 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.

31. SECURITY DEPOSIT AND INDEMNITY BOND

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.

Loss or Damage Indemnity Bond

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

32. SUPERVISION AND SUPERINTENDENCE

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

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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.

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

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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

- a) 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.
- b) 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

- a. 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

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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.

- b. 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.

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.

39. 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.

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.

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.

40. 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.

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

41. 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

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Engineer's approval is given after receipt of tenders`

42. LAWS AND REGULATIONS

43. 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.

44. Resolving the disputes:

In case of disputes, between a Contractor and MJP & ZP, the decision of the Member Secretary MJP & ZP shall be final and binding. In case of any further dispute, the decision of Member Secretary MJP & ZP or any other person appointed by the Member Secretary, MJP & ZP will be final.

45. 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.

46. SAFETY PRECAUTIONS AND EMERGENCIES

- a. Contractor's Responsibility for Safety
- b. 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`
- c. 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

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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.

- d. 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.

47. WARNINGS AND BARRICADES

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

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48. 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.

- a. 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.

- b. 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

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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.

49. DUTIES OF ENGINEER'S REPRESENTATIVE

- a. 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.
- b. 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.
- c. 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 lagging or lead` in the progress than the programme.

50. DEFECTS AND RECTIFICATION

- a. 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

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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.

- b. 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 & ZP 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

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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.

51. 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.

52. FINAL INSPECTION AND ACCEPTANCE

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

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- b. 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.

53. 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.

54. TAXES TO BE DEDUCTED AT SOURCE

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

55. RECORDS AND MEASUREMENTS

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

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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.

- d. 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.
- e. 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.
- f. 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.
- g. The Contractor shall, without any extra charge, provide assistance with every appliance and other things necessary for measurements, such as leveling instruments (Auto setting), tapes, staffs, camera, paints, brushes and required labour.
- h. 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.
- i. The dated photographs, in two copies, shall be submitted to the Engineer-in-charge every time. No extra cost will be paid for this.

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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 and shall not be used for campaigning, advertising without permission of the Pradhikaran.

56. 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.

57. 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.

58. 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

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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.

59. 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.

60. 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.

61. 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

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this act, by him.

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

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

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

62. STATUTORY INCREASE IN DUTIES, TAXES ETC.

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

63. INSPECTION, TESTING & FEES.

All material & equipment, irrespective whether specified or not, shall

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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.

64. 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.

65. WORK ORDER BOOK

A well bound work order book shall be maintained on site and it shall be the property of MJP & ZP and the Contractor/ his agent shall promptly sign orders given therein by the Engineer in charge of Rural water Supply Division Nandurbar. 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 & ZP free of charge for this purpose. The Contractor will be allowed to copy out the instruction therein from time to time. He will not record any remarks in the order book but may take up the matter recorded therein.

66. 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.

67. PRICE VARIATION - AUTHORITY

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Price variation is not applicable to this tender.

68. NO INTEREST ON DUES

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

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

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

70. Mobilization Advance will not be granted.

- 71.** 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.

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4.SPECIAL CONDITIONS OF CONTRACT

1) **Payment against Excess quantities of various items:**

Before making payment of excess quantities as per rules, the concerned Executive Engineer of Rural water Supply Division Nandurbar 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 Rural water Supply Division Nandurbar 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 of Rural water Supply Division Nandurbar in writing.

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

2) **General :**

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

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

Specifications of item stipulated for other sub works shall be made

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applicable, where relevant.

3) Outline of works :

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

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

4) Unit :

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

5) Site conditions :

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

6) Extras, Omissions and Discrepancies:

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

7) Supply of material by the contractor.

The contractor should supply all the material mentioned in Schedule "B". This shall be conforming to relevant IS & approved MJP & ZP vendo`. All types of pipes, valve and specials will be accepted only after due third party

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inspection and satisfactory inspection by the third party inspection agencies appointed by the MJP & ZP. (List of third party inspection agencies appointed is periodically circulated by the MJP & ZP central office). The charges for the same shall be borne by the contractor.

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.

In case of item of supply of pipes, valves, specials etc, 60% amount of supplied item will be paid to the contractor on receipt of material (after satisfactory third party inspection), 25% amount will be released after lowering, laying, jointing and remaining 15% amount will be released after satisfactory hydraulic testing.

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.

The Executive Engineer, Rural water Supply Division Nandurbar 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, Rural water Supply Division Nandurbar , in this behalf.

The contractor shall further at all times satisfy the Executive Engineer, Rural water Supply Division Nandurbar 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, Rural water Supply Division Nandurbar.

8 Time of completion of work:

If at any stage of work, it is found that the execution of work is not as per the planning (As mentioned in Programme & Progress Schedule) a fine shall be imposed on the contractor as mentioned in clause No.2 of conditions of contract.

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9. 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 & ZP shall be held as valid and final. If the contractor files a case in appropriate court, the action of withdrawing the work and allotting it to any other agency shall be deemed to be continued as per the practice in vogue in the larger interest of implementation of work in time and as per original time schedule.

10. Strata :

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

11. Change in site:

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

12. Tools and plants:

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

13. Excavated material:

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

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14. Damages to above/under ground utilities

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

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

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

17. Scheme execution phase:

The Execution of work shall be carried out in phases as follows :

Phase-1 : Development of source.

Phase-2 : Pump House, Pumping Machinery, Rising main, Gravity main and WTP

Phase-3 : ESR/GSR, Distribution system and House Connection.

Phase-4 : Operation and Maintenance of scheme for one year.

18. Online Monitoring :

The progress of this project and works will be monitored through online

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monitoring system. During the execution of the work, contractor will have to enter and upload periodically, financial and physical progress of the work, on online monitoring and assessment system developed by the Department of Water Supply and Sanitation.

19. Operation and Maintenance :

After the physical completion of the scheme, contractor will have to do Operation & Maintenance of water supply scheme for 3 years. This 3-years' O&M period is in addition of 3/6/12 months (As applicable for the scheme) for Trial Run. After the completion of abovesaid Trial Run, the contractor will have to do O&M of the scheme. During this period to the contractor on account of O&M including cost of Establishment Charges, Electricity Bill and Chemical Charges etc. shall be from recovery of water bill.

- 20.** 100%of security deposit of total tender cost shall be refunded along with payment of final bill. However, the contractor will have to submit Bank Guarantee of 50% of security deposit amount from Nationalised Bank for aperiod of 5 year i.e. defect liability period.

Original Security Deposit (to be refunded along with the payment of final bill) shall be released only after the due verification of above mentioned bank guarantee from the concerned bank.

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5. 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 :

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.

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

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

- i) The Tender is not submitted on E-tendering portal specified in the Tender Notice.
- ii) The bidder proposes any conditions and alterations in the obligatory conditions of the tender.
- iii) Any of the pages of the tender is removed/replaced or spoiled badly.
- iv) if the offer in words and in figures is not filled in appropriate place of B.1 Form.
- v) If the specified Earnest Money in specified form is not paid.
- vi) Any erasures are made in the tender documents.
- vii) The bidder or in case of firm or company authorized person does not sign the tender documents in the place provided for

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the purpose, in B.1 Tender form.

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.

Rules and conditions of the contract are subject to amendment till the time of acceptance of tender.

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 BIDDER**

The bidder 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

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accompanying the Tender documents. The contractor may construct and maintains additional roads as required at his own expenses.

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

- a) The contractor shall provide an adequate supply of pure and wholesome water for the use of labourers on works and in camps.
- b) The contractor shall construct trenches, semi permanent latrines for the use of labourers , Separate latrine shall be provided for men and women.
- c) The contractor shall construct sufficient number of huts on a suitable plot of land for use of the labourers according to the following specifications.
 - i) Hut of Bamboos and Grass may be constructed.
 - ii) A good site not liable to submergence shall be selected on high ground remote from jungle but well provided with trees shall be chosen wherever it is available. The neighborhood of land, jungle s trees or woods should be particularly avoided . Camp should not be established close to large cutting of earth work.
 - iii) The lines of huts shall have open space of at least 10 meters between rows. When a good natural site is not available in this case. Particular attention should be given to the drainage.
 - iv) There should be no over crowding , floor space at the rate of 3 sqm. (30 sq.ft) per head shall be provided . Care should be taken to see that the huts are kept clean and in good order.
 - v) The contractor must find his own land and if he wants Govt. land he should apply for it. Assessment for it if demanded will be payable by contractor. However the department does not bind itself for making available the required land.
 - d) The contractor shall construct a sufficient number of bathing places. Washing places should also be provided for the purpose of washing clothes.
 - e) The contractor shall make sufficient arrangement for draining away the surface and sullage water as well as water from the bathing and washing places and shall dispose off this waste water in such a way as not to cause any nuisance.

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- f) The contractor shall engage a medical officer with a traveling dispensary for a camp containing 500 or more persons, If there is no Govt. Or other private dispensary situated within 8 kilometers from the camp. In case of emergency the contractor shall arrange at his cost free transport for quick medical help to his sick worke`
- g) The contractor shall provide the necessary staff for erecting the satisfactory conservancy and cleanliness of the camp to the satisfaction of the Engineer-In-Charge. At least one sweeper per 200 persons should be engaged.
- h) The Assistant Director of Public Health shall be consulted before opening a labour camp and his instructions on matters such as Water Supply, sanitary, convenience for the camp site accommodation and food supply be followed by the contractor etc.
- i) The contractor shall make arrangement for all antimalarials measures to be provided for the labours employed on the work. The anti measures shall be as directed by Assistant Director of public health.
- j) In addition to above all provisions of the relevant labour Act pertaining to basic amenities to be provided to the labourer shall be applicable which will be arranged by the contractor.

7. MISCELLANEOUS :

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.

In case it becomes necessary for the due fulfillment of contractor for the contractor to occupy land outside the department, limits the contractor will have to make his own arrangements with the land owners and pay such rents if any, which are payable as mutually/agreed between them.

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.

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

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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.

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.

The stacking and storage of building materials at site shall be in such a manner as to prevent deterioration or inclusion of foreign material and to ensure the preservation of the quality. Properties and fitness of the work. Suitable precautions shall be taken by contractor to protect the materials against atmospheric action, fire and other hazards. The materials likely to be carried away by wind shall be stored, in suitable stores or with suitable barricades and where there is likelihood of subsidence of soil, heavy ,materials shall be stored on paved platforms. Suitable separation barricades and enclosure as directed shall be provided to separate materials brought by contractor and material issued by Govt. (To contractor under Schedule- A.)Same applies for the materials obtained from different source of supply.

8.0 HANDING OVER OF WORK

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

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6. ACQUAINTANCE WITH SITE AND WORK CONDITIONS

1. The Contractor shall study the site conditions, general conditions and data included in the tender papers and get it verified from actual inspection of the site etc. before submitting the tender. In case of doubts about any items or data included in this tender or otherwise, it shall be brought into the notice in writing to the Executive Engineer/Engineer in charge, before Pre-bid meeting. These points or queries shall be clarified by MJP & ZP in pre bid meeting and informed to all bidder. Once the tender is submitted, it shall be considered that the Contractor has verified and made himself conversant with all the details as required for quoting the rates and completing the work as per tender conditions and specifications.
2. Contractor shall not sell or otherwise dispose off or remove except for the purpose of this contract, the rubble, stone metal, sand or other material which may be obtained from any excavation made for the purpose of the contract. All such materials shall be MJP & ZP property and shall be disposed off in the manner and at place as may be directed by the Engineer-in-charge. Contractor may with the permission of the Engineer-in-charge in writing and when directed by him, use any of the materials free of cost.
3. Other unforeseen items to be done in the course of work will have to be done by the Contractor as per specifications in P.W.D. Hand book volume I and II and will be paid at mutually agreed rates, ISS and standard practice in vogue.
Extra charge of claims in respect of extra work shall not be allowed unless the work to which they relate are in the spirit and meaning of the specifications or unless such works are ordered in writing by the Engineer-in-charge and claimed for in the specified manner before the work is taken in hand.
4. **MATERIAL:** The Contractor shall make his own arrangements for obtaining rubble, khandki, headers, metal, sand, murum etc. from MJP & ZP 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.

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

5. The Contractor shall provide all labour, skilled as well as unskilled, pages, lime, strings, site-rails (wooden as well as Steel etc.) as and when required as per approved design and make available such other materials for surveying, lining out, setting out, checking of work, taking measurements, testing of hydraulic and other structures, without any payment by the MJP & ZP to him. He will also provide proper approach and access to all his works and stores without any extra cost over tendered rates for the items to be inspected.
6. Rates quoted include clearance of site (prior to commencement of work and its closure) in all respects and hold good for work under all conditions of sites, moisture, weather etc.
7. Failure to comply with any of the above instructions will result in the Pradhikaran's doing the needful at the risk and cost of the contractor. These conditions are for all items and as such no extra payment shall be made for observing these conditions.
8. The contractor shall make his own arrangements for quarrying of rubble, stone, murum, sand, lime, metal etc.
9. Overburden in a quarry will have to be removed by the contractor at his owncost.
10. Unless a separate item is provided in Schedule 'B' minor dewatering of foundations in excavation and during the construction of foundation Masonry if required shall be done by the Contractor without claiming extra cost.
11. Masonry shall be kept wet for atleast 15 days and concrete work shall be

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kept wet for atleast 21 days commencing from the date of its final laying in position. In case during execution curing is found inadequate it will be carried out MJP & ZP's and the cost thereof shall be recovered from the contractor. The contractor shall make his own arrangements for getting water at site at his own cost.

- 12.** The proportions of cement concrete specified in the Schedule 'B' are nominal and are only an indication of approximate proportion of cement, fine aggregate and coarse aggregate which may have to be altered suitably at site to obtain the desired strength and workability. However quantity of cement shall not be less than the one specified below.

NOMINAL MIX:

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

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

13. DAMAGE BY FLOODS OR ACCIDENT:

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

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

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

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15. WATER REQUIRED FOR CONSTRUCTION :-

The Contractor has to make his own arrangements at his cost for water required for construction, testing, filling, structures, etc. either from local bodies or from else where, 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 & ZP from his bills. In case MJP & ZP'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 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.

16. LEADS AND LIFTS :-

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

- 17.** Unless otherwise specifically provided for in the tender or a separate item is provided in Schedule 'B', all the sides of excavated trenches after the work is completed or in progress are to be filled by the Contractor to the original ground level from excavated stuff at no extra cost to the Pradhikaran.
- 18.** Unless otherwise specifically mentioned in tender items, the net dimensions of RCC or CC members actually cast are only admissible for payment under RCC or Plain CC items. No increase in dimensions due to plastering or finishing shall be admissible for payment under RCC or plain CC items.
- 19.** No claims for any desilting of trenches, foundation etc. filled due to floods, untimely rains, or any other reasons whatsoever shall be entertained and Contractor shall have to do this desilting operation together with dewatering

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operations entirely at his cost.

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

7. FORM B-1

GENERAL RULES AND DIRECTIONS FOR THE GUIDANCE OF CONTRACTORS

1. All works proposed to be executed by contractor shall be notified in a form of invitation to tender pasted on a Board hung up in the office of the Executive Engineer.

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 hou`

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 Rural water Supply Division Nandurbar, such specification with designs drawings shall form part of the accepted tender.

2. In the event of the tender being submitted by a firm, it must be signed separately by each partner thereof, and in the event of the absence of any partner, it shall be signed on his behalf by a person holding a power – of - attorney authorizing him to do so.

i) The contractor shall pay along with the tender the sum, of (` -----) (` ----- only) as and by way of earnest money. The EMD shall be

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paid by Net Banking. The said amount of earnest money shall not carry any interest whatsoever.

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

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

i) 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.

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

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

Contractor

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for more works, shall submit a separate tender for each work. Tenders shall have the name and the number of work to which they refer, written outside the envelopes.

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

Contractor

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13. The measurements of work will be taken according to the usual methods in use in the PWD/MJP & ZP 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.
14. A tendering contractor shall furnish a declaration along with the tender showing all works for which he has already entered into contract, and the value of work that remains to be executed in each case on the date of submitting the tender. Such certificate shall be in the proforma attached in the tender documents.
15. In view of the difficult position regarding the availability of foreign exchange no foreign exchange would be released by the MJP & ZP for the purchase of plant and machinery or any other purpose for the execution of the work contracted for.
16. The contractor will have to construct shed, for storing controlled and valuable material issued to him under Schedule "A" of the agreement or brought him on work site, at work site having double locking arrangement. The materials will be taken for use in the presence of the department person. No. materials will be allowed to be removed from the site of works without written permission of the Engineer-in-charge.
17. The tenderer will have to produce to the satisfaction of the accepting authority a valid and current license issued in his favour under the provision of Contractor Labour Regulation and Abolition Act. 1973 before starting work, failing with acceptance of the tender will be liable for withdrawal and Earnest money / Security Deposit will be forfeited to the Corporation.
18. The contractor shall comply with the provision of the Apprentices Act. 1961 and the rules and orders issued there under from time to time. The contract shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the Act.
19. In this tender ----- sub-works 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

Contractor

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for each phase. If he fails, action as per clause 2 will be initiated against the contractor.

20. As per clause 6 of B-1 form, extension of time limit will be governed. If contractor fails to apply for extension of time limit as per clause 6 to keep the tender alive, MJP & ZP will grant the extension considering the progress of work and in the light of clause 2.
21. As per Government Resolution Price Variation Clause is not applicable to tender.
22. The tender Rates are inclusive of all taxes such as VAT, 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 duly 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 (hereinbefore and hereinafter referred to as MJP & ZP) for the work specified in the underwritten memorandum within the time specified in such memorandum at-----% above/below (in figures -----)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 Pradhikaran such materials are at the rates to be paid for them shall be as provided in schedule "A" here to.

Memorandum

Contractor

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a) General description : -----

Tal.-----, **Dist.** -----

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

b) Estimated Cost. `-----

c) Earnest Money. `-----

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

d) **Security Deposit.**
 Total 4% of estimated cost put to tender or accepted tender cost whichever is higher

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

i)	Initial Security Deposit 2% of estimated cost put to tender or accepted tender cost whichever is higher shall be in form of FDR from any Nationalized / Scheduled Bank or BankGuarante
ii)	Balance 2% amount of Security deposit, will be recoveredthrough each Running Bill at The rate of 5% of the gross amount of running bill till the required total amount of Security Deposit is recovered

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

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

5% (Five) Percent

f) Additional Security Deposit.

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

Contractor

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- 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 tenderor tendered cost whichever is higher)

g)Time allowed for the work from date of written order to commence.-----(-----) Calendar Months. (Including monsoon)

I/We agree that the offer shall remain open for acceptance for a minimum period of 120 days from the date fixed for opening for the same and thereafter until it is withdrawn by me/ us notice in writing duly addressed to the authority opening the tenders and sent by registered post A.D. or otherwise delivered at the office of such authority. Term deposit Receipt No./Demand draft No. dated and date in respect of the sum of(in wards `.....) is herewith forwrdded. The amount of earnest money shall not bear interest and shall be liable to be forfeited to the Pradhikaran should I/We fail to (i) abide by the stipulation to keep the offer open for the period mentioned above of (ii) sign and complete the contract documents as required by the Engineer and furnish the security deposit as specified in item. (d) of the memorandum contained in paragraph (1) above within the time limit laid down in clause (1) of the annexed General Conditions of contract, the amount of earnest money may be adjusted towards the security deposit or refunded to me/us in writing unless the same or any part thereof has been forfeited as aforesaid.

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

Should this tender be accepted I/We hereby agree to abide by and fulfill all the terms and provisions of the conditions of contract annexed hereto so far as applicable and in default thereof to forfeit and pay Pradhikaran the sum of money mentioned in the said conditions. Term Deposit Receipt No. Dated from The Bank..... at in respect of sum of ` Is herewith forwarded representing the earnest money (a) the full value which is to be absolutely forfeited to the Pradhikaran 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

Contractor

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before submission of tender.

Address

date of 2016

Witness

Signature of witness to

contractor's signature.

The above tender is hereby accepted by me for and
one behalf of the MJP & ZP/.....

Dated

Executive Engineer MJP & ZP

Contractor

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8. CONDITIONS OF CONTRACT

Clause 1 : The person / person whose tender may be accepted (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 EE 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 Pradhikaran 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 Pradhikaran 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 Pradhikaran 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 Pradhikaran under the terms of his contract may be deducted from or paid by the sale of sufficient part of his security deposit or from the interest arising there from, or from any sums which may become due by Pradhikaran 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

**Security
Deposit**

Contractor

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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. 100% of security deposit of total tender cost shall be refunded along with payment of final bill. However, the contractor will have to submit Bank Guarantee of 50% of security deposit amount from Nationalised Bank for a period of 5 year i.e. defect liability period. Original Security Deposit (to be refunded along with the payment of final bill) shall be released only after the due verification of bank guarantee from the concerned bank. 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 Pradhikaran shall be adjusted towards the excess cost incurred by the Pradhikaran on rectification work.

Clause 2 : The time allowed for carrying out the work as entered in the agreement shall be strictly observed by the Contractor and shall be reckoned from the date on which the order to commence work is given to the Contractor. The work shall throughout the stipulated period of the contract be proceeded with, all due diligence (time being deemed to be essence of the contract on the part of the Contractor) and the Contractor shall pay as compensation an amount equal to one percent or such smaller amount as the Chief Engineer (whose decision in writing shall be final) may decide of the amount of the estimated cost of the whole work as shown by the tender for everyday that the work remains uncommenced or unfinished after the proper dates. And further to ensure good progress during execution of the work, the Contractor shall be bound in all cases in which the time allowed for any work

***Compensati
on Delay***

Contractor

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exceeds one month to complete, for complete minimum quantum of work as compared to accepted tender cost as stated below.

¼ of the work in ¼ of the time.

½ of the work in ½ of the time.

¾ of the work in ¾ of the time.

Full work in.....months including monsoon

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

In the event of the contractor failing to comply with these conditions he shall be liable to pay as compensation an amount equal to one percent or such smaller amount as Chief Engineer (whose decision in writing shall be final) may decide of the said estimated cost of the whole work for everyday that the due quantity of work remains incomplete provided always that the total amount of compensation to be paid under the provisions of this clause shall not exceed 10% of the estimated cost of the work as shown in the tender. Chief Engineer should be the final authority

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

Action when whole of security deposit is forfeited.

a) To rescind the contract (for which rescission notice in writing to the Contractor under the hands of Engineer in-charge shall be conclusive evidence) and in that case the security deposit of the Contractor shall stand forfeited and be absolutely at the disposal of the Pradhikaran

Contractor

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

In case the contract 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

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contractors, the amount of excess shall be deducted from any money due to the contractor by Pradhikaran 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 & ZP 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 & ZP, 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 & ZP 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 & ZP 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 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 & ZP 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

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

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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 & ZP whose certificate thereof shall be final. In the alternative the MJP & ZP 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 & ZP 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 & ZP as to the expenses of any such removal and the amount of the proceeds and expense of any such shall be final and conclusive against the contractor

Clause 6 : If the contractor shall desire an extension of the time for completion of work on the ground of his having been unavoidably hindered in its execution or on any other ground, he shall apply in writing to the MJP & ZP 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 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 MJP & ZP in this matter shall be final.

*Extension of
time*

Clause 7 : On the completion of the work the contractor shall be furnished with a certificate by the MJP & ZP (hereinafter and hereinbefore called the Engineer-in-charge) of such completion but neither such certificate shall be given nor shall the work be considered to be complete until the contractor shall have removed from the premises on which the work shall have been executed, all scaffolding surplus materials and rubbish , tools, plants and equipments and shall have cleaned off the dirt from all woodwork, doors, windows, walls, floor or other parts of any building in or upon which the work has been executed or of which he may have had

*Final
Certificate.*

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

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

Payment on intermediate certificate to be regarded as advance.

Contractor

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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 & ZP 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

Stores supplied by MJP & ZP

Contractor

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contractor but not so as in 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 & ZP and shall not be removed from the site of the work and shall at all times be open to inspection by the Engineer-in-charge. Any such materials issued at cost but remained unused and in perfectly good condition at the time of completion or termination of the contract shall be returned to the MJP & ZP, store if the Engineer-in-charge so required by a notice in writing given under his hand, but the contractor shall not be entitled to return any such material supplied to him as aforesaid but remaining unused by him or for any wastage in or, damage to any such materials. The contractor shall, however return all unused material at the time of completion, which was issued to him free of cost by the Engineer in charge and which has remained surplus with the contractor after accounting for the actual utilization of such material from the total quantity that was issued by the Engineer in charge. Cost of any material issued free of cost by the engineer and which has remained surplus with the Engineer from the contractor as mentioned in Schedule – ‘A’

Clause 12 (A) : All stores of materials such as cement, steel etc. supplied to the contractor by MJP & ZP 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 & ZP 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

Works to be executed in accordance with

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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 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 hour. 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 Rs 5000/- per set of contract drawings and 500/- per working drawing except where otherwise specified.

specifications drawings.

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 & ZP 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 & ZP 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

Alteration in specifications & designs not to invalidate

Contractor

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before the rates are agreed upon then the contractor shall within seven days of the date of receipt by him of the order to carry out the work, inform the Engineer-in-charge of the rate which it is his intention to charge for such class of work, and if the Engineer-in-charge does not agree to this rate he shall by notice in writing be at liberty to cancel his order carry out such class of work and arrange to carry out in such manner as he may consider advisable provided always that if the contractor shall commence the work or incur any expenditure in regard thereto before the rates shall have been determined as lastly hereinbefore mentioned then in such case he shall only be entitled to be paid in respect of the work or incur any expenditure in regard there to before the rates shall have been determined as lastly hereinbefore mentioned then in such case he shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of the determination of the rate as aforesaid according to such rate or rates as shall be fixed by the Engineer-in-charge. In the event of a dispute the decision of the Member Secretary MJP & ZP will be final.

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

Extension of time in consequences additions or alterations

Clause 15 :

- i) If at any time after the execution of the contract documents the engineer shall for any reason what so ever (other than default on the of the contractor for which the MJP & ZP 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

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

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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.

- ii) Where the total suspension of work ordered as aforesaid continued for a continuous period exceeding 90 days the contractor shall be at liberty to withdraw from the contractual, obligations under the contract so far as it pertains to the unexecuted part of the work by giving a 10days prior notice in writing to the Engineer within 30days of the expiry of the said period of 90 days of such intention and requiring the Engineer to record the final measurements of the work already done and to pay final bill. Upon giving such notice the Contractor shall be deemed to have been discharged from his obligation to complete the remaining unexecuted work under his contract. On receipt of such notice the Engineer shall proceed to complete the measurement and make such payment as may be finally due to the Contractor within a period of 90 days from the receipt of such notice in respect of the work already done by the Contractor. Such payment shall not in any manner prejudice the right of the Contractor to any further compensation under the remaining provisions of this clause.
- iii) Where the Engineer in-charge requires the Contractor to suspend the work for a period in excess of 30 days at any time or 60 days in the aggregate, the contractor shall be entitled to apply to the Engineer within 30 days of the resumption of work after such suspension for payment of compensation to the extent of peculiarly 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

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30 days whether consecutive or in the aggregate of any suspension whatsoever occasioned by unsatisfactory work or other default on his part. The decision of the Engineer- in -charge in this regard shall be final and conclusive against the Contractor.

iv) In the event of :

- a) any total stoppage of work on notice from the Engineer under sub-clause (1) in that behalf.
- b) Withdrawal by the Contractor from the contractual obligation to complete the remaining un-executed work under sub-clause (2) on account of continued suspension of work for a period exceeding 90 days.
- c) Curtailment in the quantity of item or items originally tendered on account of any alteration, omission or substitutions in the specifications, drawings, designs or instructions under Clause 14 where such curtailment exceeds 25% in quantity and the value of the quantity curtailed beyond 25% at the rates for the item specified in the tender is more than 5,000/-

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

- i) the notice of stoppage of work or
- ii) the notice of withdrawal from the contractual obligations under the contract on account of the continued suspension of work or
- iii) notice under Clause 14(i) resulting in such curtailment to produce to the Engineer satisfactory documentary evidence that he had purchased or agreed to purchase material for use in the contracted work before receipt by him of the notice of stoppage, suspension or curtailment and required the Corporation/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 & ZP/Corporation/Council shall thereafter take over the

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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 & ZP for the loss suffered by him on account of delay by MJP & ZP in the supply of materials entered in Schedule 'A' where such delay is caused by.

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

No. claim to compensation on account of loss due to delay in supply of material by MJP & ZP.

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

Clause 16 : Under no circumstances whatsoever shall the Contractor be entitled to any compensation from MJP & ZP 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

Action and compensation payable in case of bad work.

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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.

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

Work to be open to inspection.

Contractor or responsible agent to be present

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

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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 & ZP, 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 & ZP. 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 & ZP 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 & ZP the amount of such costs, charges and expenses sustained or incurred by the MJP & ZP of which the certification of the MJP & ZP 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 neglecting to pay the same no demand as aforesaid without prejudice to any other rights and remedies of the MJP & ZP, the same may be recovered from the Contractor as arrears of land revenue. The MJP & ZP, 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 & ZP 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 & ZP. 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. Contractor will have to submit Bank Guarantee of 50% of security deposit amount from Nationalised Bank for a period of 5 year till the defect liability period is over.

*Contractor
liable for
damage done
and for
imperfections*

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1. Pumping Machinery.
- a) Pumping machinery and other allied mechanical, electrical installation (excluding those in the treatment plant contract), surge arrestors, water hammer control devices, chlorinators (excluding those provided in the treatment plant contract) Five Years
- Repairs to the works at (a) above. Five Years

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

- a) Based on Contractor's own design. Five 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

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 & ZP 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

And is liable for damages arising from non-provisions

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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.

*of lights,
fencing, etc*

List of machinery in contractors possession and which he proposes to use on the work should be submitted along with the tender.

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

- a) Suitable scaffolds shall be provided for workmen for all works that cannot be safely done from a ladder or by other means.
- b) A scaffolds shall not be constructed, taken down or substantially allowed except
 - i) Under the supervision of a competent and responsible person, and
 - ii) As far as possible by competent workers possessing adequate experience in this kind of work.
- c) All scaffolds and appliances connected herewith and ladders shall.
 - i) be of sound material
 - ii) Be of adequate strength having regard to the loads and strains to which they will be subjected, and
 - iii) Be maintained in proper condition.
- d) Scaffolds shall be so constructed that no part thereof can

Contractor

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- be displaced in consequence of normal use.
- e Scaffolds shall not be over – loaded and so far as practicable the load in consequence of normal use
 - f Before installing lifting gear on scaffolds special precautions shall be taken to ensure the strength and stability of the scaffolds.
 - g Scaffolds shall be periodically inspected by a competent person.
 - h Before allowing a scaffold to be used by his workmen the Contractor shall whether the scaffold has been erected by his workmen or not, take steps to ensure that it complies fully with the regulations herein specified.
 - i Working platform, gangway, stairways shall:-
 - 1) be so constructed that no part thereof can sag unduly or unequally.
 - 2) be so constructed and maintained, having regard to the prevailing conditions as to reduce as far as practicable risks of persons tripping or slipping, and
 - 3) kept free from any unnecessary obstruction.
 - j) In the case of working platform, gangways, working places and stairways at a height exceeding 2 meters (to be specified).
 - a) every working platform, gangways shall be closely boarded unless other adequate measures are taken to ensure safety,
 - b) every working platform, gangway shall have adequate width, and
 - c) every working platform, gangway, working place and stairway shall be provided with railing/ barricading
 - k) Every opening in the floor of a building or in a working platform shall except for the time and to the extent required to allow the excess of persons or the transport or shifting of material be provided with suitable means to prevent the fall of persons or material.
 - l) When persons are employed on a roof where there is a danger of falling from the height exceeding 3 meters (to be specified) suitable precautions shall be taken to prevent the fall of persons or material

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- m) Suitable precautions shall be taken to prevent persons being struck by articles, which might fall from scaffolds or other working places.
- n) Safe means of access shall be provided to all working platforms and other working places.
- o) The Contractor will have to make payments to laborers as per Minimum Wages Act.

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

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

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

Employment of female labor work on Sunday

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

Clause 22 : The Contractor shall not set fire to any standing jungle, trees, brushwood or grass without a written permission from the MJP & ZP. 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

Liability of Contractor

Contractor

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unintentionally by Contractor's labour whether in or beyond the limits of the MJP & ZP 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 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 & ZP to Contractor under this contract or otherwise.

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 8 : 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 & ZP 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

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.

Contractor

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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 & ZP and the same consequences shall ensue 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.

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 & ZP without reference to the actual loss or damage sustained, and whether any damage has or has not been sustained

Sum payable by way of compensation to be considered as reasonable without reference to actual loss

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

Changes in the constitution of the firm to be notified.

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

Directions and control of the Engineer in charge

Clause 30.1 : Except where otherwise specified in the contract and subject to the powers delegated to him by MJP & ZP 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

Directions and control of the Engineer in charge .

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same, whether arising during the progress of work, or after the completion or abandonment thereof.

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 & ZP with the contract work or project provided that.

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

Clause 30.3 : If the contractor is not satisfied with the order passed by the Chief Engineer as aforesaid, the contractor may, within thirty days of receipt by him of any such order, appeal against it to the Member Secretary, MJP & ZP who if convinced that prima facie, the contractor's claim rejected by Chief Engineer 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 Member Secretary MJP & ZP for suitable decision

Clause 31 : Deleted

Clause 32 : When the estimate on which a tender is made *Lump sums in estimates* 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.

Clause 33 : In the case of any class of work for which there is no *Action where no*

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such specification as is mentioned in Rule I of Form B-1, such *specifications* 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.

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 & ZP. (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 & ZP 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 & ZP from the Contractor under the sub-section (2) of the said section. Such compensation shall be recovered in the manner laid down in Clause 1 above. *Compensation under Workmen's Compensation Act.*

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

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expenses are incurred by MJP & ZP, the same shall be recoverable from the Contractor forthwith and be deducted without prejudice to any other remedy of the MJP & ZP from any amount due or that may become due to the Contractor.

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

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

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

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

Quantities put to tender are approximate.

Excess quantity beyond quantity put to tender will be governed as per

Cl.38

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not more than `5,000/- (Whichever is more)

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

a) derived from the rates entered in Current Schedule of Rates and in the absence of such rates

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

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

iii) This clause is not applicable to extra items.

iv) Claims arising out of reduction in the tendered quantity of any item beyond 25% will be governed by the provision of Clause 15 only when the amount of such reduction beyond 25% at the rate of the item specified in the tender is more than `5,000/- This reduction is exclusively the reduction in Clause Nos. 14 & 15 of the work and site conditions.

v) There is no change in the rate if the excess is less than or equal to 25%. Also there is no change in the rate if the quantity of work done is more than 25% of the tendered quantity, but the value of the excess work at the tendered rates does not exceed `5,000/-

vi) The quantities to be paid at the tendered rates shall include,
a) tendered quantity plus 25% excess of tendered quantity or

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the excess quantity of the value of Rs. 5,000/- at tendered rate whichever is more

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

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

Clause 39 : The Contractor shall employ any famine, convict or *Employment of famine*

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other labour of a particular kind or class if ordered in writing to do so by the Engineer-in-charge. *labour, etc*

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

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

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

Clause 43 :

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

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

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

iv) The Engineer-in-charge or his agent is authorized to remove from the work, any person or animal found working which does not satisfy these conditions and no responsibility shall be accepted by the MJP & ZP 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.*

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v) The Contractor shall pay fair and reasonable wages to the workmen employed by him in the contract undertaken by him, In the event of the dispute arising between the Contractor and his workmen on the grounds that the wages paid are not fair and reasonable, the dispute shall be referred without delay to the Engineer in charge who shall decide the same. The decision of the 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 & ZP at the sanctioned tender rates.

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

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

Clause 44: Payment to Contractors shall be made by cheque drawn on Executive Engineer / Engineer in charge's account provided the amount exceeds ` 1000/- Amounts not exceeding `1000/- will be paid in cash. *Method of payment*

Clause 45: Any Contractor who does not accept these conditions shall not be allowed to tender for work. *Acceptance of conditions compulsory before tendering for work.*

Clause 46 : If Government declares a site of scarcity or famine to exist in any village situated within 16 Kms of the work, the Contractor shall employ upon such parts of the work, as are suitable for unskilled labour, any person certified to him by the Executive Engineer/Engineer in charge, or by any person to whom the Executive Engineer/Engineer in 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 *Employment of scarcity labour*

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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.

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 : The tender rates are inclusive of all taxes, rates, cess and are also inclusive of the livable tax in respect of sale by transfer of property in goods involved in the execution of work contract under the provision of Rule 58 of Maharashtra Value Added Tax, ACT 2005 for the purpose of levy of tax. The rates to be quoted by the contractor must be inclusive of all taxes including VAT or other taxes levied by government. No extra payment on this account will be made to the contractor.

Rate inclusive of all taxes

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 Sales Tax and the Sales Tax will be recovered on such date.

Sale tax on surplus material

Clause 49 : The Contractor shall employ at least 80 percent of the

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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.

Clause 50 : 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 51 : All amounts whatsoever which the Contractor is liable to pay to the MJP & ZP 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,

ii) Hire charges in respect of heavy plant, machinery and equipment given on hire by the MJP & ZP to the Contractor for execution by him of the work and/ or for which advances have been given by the MJP & ZP to the Contractor.

Clause 52 : The successful tenderer will be required to produce to the satisfaction of the specified concerned authority valid and consequent license issued in favour of the Contractor under the

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provision of the Contract Labour (Regulation and Abolition) Act 1970 before starting the work. On failure to do so, the acceptance of the tender shall be liable to be withdrawn and also the earnest money.

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 & ZP 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 & ZP to such workers shall be deemed to be debt payable by the Contractor and the MJP & ZP shall be entitled to recover the same as such from the contractor or deduct same from the amount payable by the MJP & ZP to the contractor hereunder or from any other amounts payable to him by the MJP & ZP/Corporation/Council.

Clause 53 : Where the workers 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 54 : The Contractor shall comply with the provisions of 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 a breach of contract and the Superintending Engineer may in his discretion cancel the contract. 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.

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Clause 55 : 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 56 :Price variation clause: Deleted

Clause 57 (A) : Conditions of Malaria Eradication.

Anti-Malaria and other health measures.

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

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 57 (B) : The successful contractor will have to enter into agreement in form specified by MJP & ZP on a stamp of required

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amount as per rules in force. The stamp charges shall be borne by the contractor

- 1) Receipt for payment 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 having authority to give effectual receipts of the firm.
- 2) All work shall be measured net by the standard measure and according to the rules and customs of the MJP & ZP, and in absence of such rules and customs in MJP & ZP then as per rules and customs of P.W.D. of Govt. of Maharashtra without reference to any local customs.
- 3) The measurement of work will be taken according to the usual methods in use in the MJP & ZP and no proposals to adopt alternative methods will be accepted. The Executive Engineers decision as to what is the usual method in use in the MJP & ZP will be final.
- 4) The Contractor will have to construct shed for storing controlled and valuable materials issued to him under Schedule-A of the agreement. The materials will be taken for use in the presence of the departmental person. No materials will be allowed to be removed from the site of works.
- 5) The tendered rate shall be inclusive of all taxes, duties, levies, cess (including sale tax) as amended from time to time. No extra payment on this account shall be made to the contractor.

Clause 58 : 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

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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 59 :

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.

- a Loss of or damage to the Civil and Mechanical and Electrical equipments supplied/installed including the materials such as pipes, valves, specials etc. brought on site
- b Loss of or damage to contractor's equipments including his vehicles.
- c Loss of or damage to property (except the works, Plant material and Equipment) in connection with the contractor, and
- d 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 & ZP staff or to any other person not connected with MJP & ZP/ Contractor

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Clause 59.1 :

Policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the date of actual starting of work. All such insurance shall provide for compensation to be payable in the types of proportions of currencies required to rectify the loss or damage incurred

Clause 59.2 :

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.

Clause 59.3 :

Alterations to the terms of an insurance shall not be made without the approval of the Engineer

Clause 59.4 :

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

Clause 59.5 :

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 60: (CSMC)

In case MJP & ZP decides to appoint a construction, supervision and Management Consultant for supervising / monitoring works under this contract, the civil/ mechanical/ electrical contractor shall be liable to execute the work under the supervision of C.S.M.C. All decisions regarding the works in such cases shall be taken by the CSMC on behalf of MJP & ZP and will be binding on the contractor.

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In such cases the contractor will have to sign the agreement between the MJP & ZP of CSMC in token of acceptance of the CSMC as the sole supervisor of the works under the agreement.

Clause 61: 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.

9. 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
1	D I Pipes with jointing material (Rubber ring) mm dia		Free of cost	At site of work

Condition For 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.

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to 05.00 P.M. with at least week's intimation in advance.

3. The contractor shall maintain proper account of consumption of all material supplied to him by the MJP & ZP as per Schedule 'A' in the register which may be if required, modified as prescribed by MJP & ZP 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 responsible for proper handling and safe custody of material issued to him by MJP & ZP, 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

4. The contractor shall at his own cost make arrangement for storing cement brought by him by constructing a pakka shed and platform, etc. with double locking arrangements. Any damage to the cement due to inadequate provision of store theft, etc. will to the account of the contractor.
5. If there is delay in supplying the materials due to reasons outside the control of the Department or due to the materials being out of stock, no claim for compensation will be considered on the ground of delay in the supply of materials.
6. All the materials mentioned in Schedule 'A' required for the work shall be obtained from the Department's store only where otherwise provided. The material obtained from other sources shall not be allowed to be used except under written permission of the Engineer-in-charge and after producing necessary test certificate.
7. The contractor shall inspect the material thoroughly before taking delivery of the same and shall take the delivery in good and sound condition and sign

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the unstamped receipt in token of receipt. Damages to the material noticed afterwards will be to the account of the contractor.

8. Quantities in Schedule 'A' are approximate and shall vary according to actual and bonafied use.
9. All the materials remaining unused after the completion of the work are to be returned to MJP & ZPat their store at the cost of the contractor and the credit if due will be given as per rules enforce.
10. Once the materials are issued to the contractor at theMJP & ZP'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.
11. 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.
12. The contractor will have to provide the manufacturer test report from Government Laboratory regarding steel to be provided by the contractor.
13. 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.
14. 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.
15. 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 & ZP.
16. 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

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payment of such charges to MJP & ZP.

10. SCHEDULE-B

(To be attached by Executive Engineer the schedule of items to be executed under this contract for the civil and Pumping machinery works as per Sanctioned scheme)

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11. GENERAL SPECIFICATION

1. GENERAL

- i. 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.
- ii. 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.
- iii. 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.
- iv. The contractor shall be responsible and liable to pay for the damages caused by him to public property etc.
- v. 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.
- vi. Water of good quality for labour, construction, washing and such other

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purposes shall be provided by the contractor without any claim for extra cost.

- vii. 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 Rural water Supply Division Nandurbar 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.
- viii. 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.
- ix. The contractor will have to pay the royalties and municipal taxes, if charged by the Rural water Supply Division Nandurbar. The same will not be refunded.
- x. 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.
- xi. The contractor shall be responsible for obtaining permission from Government local bodies, private party for storing, stacking of materials required for execution of work.
- xii. Necessary sign board, danger flags, red lamps shall be provided by the contractor to avoid accidents. Necessary guarding will also have to be provided.
- xiii. 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.
- xiv. 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.

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- xv. 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.

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.

3. MOTIVE POWER :

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

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.

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

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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.

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.

7. DISPOSAL OF EXCAVATED STUFF :

All materials obtained from any excavation carried out under this contract will be the property of Rural water Supply Division Nandurbar 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.

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. 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

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the contractor in the name of 'TRADE SECRET' for not furnishing the requisite details called for the Rural water Supply Division Nandurbar. The design get approved from Govt. Engineering College structural consultants approved inlisted in MJP & ZP 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.

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 Mixe`

- a) The contractor will make his own arrangement for receiving all materials, tools, etc. required for the work.
- b) No extra charges for the carriages of water will be allowed.
- c) The rates for all items are inclusive of all charges such as carting, lifting etc. No extra payment for any lead and lifts will be paid for any item.
- d) The contractor should not be subletted without written permission of the Engineer-In-Charge.

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- e) The conditions in the tender notice will be binding on the contractor and the Tender Notice will form a part of agreement.
- f) The material required for carrying out the work for which the tender is offered shall be brought by the tenderer.

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.

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

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11. DETAILED SPECIFICATION

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

1. EXCAVATION IN ALL SOFT AND HARD STRATA MATERIAL

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.

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.

Dewatering

No distinction shall be made as to whether the materials being excavated is

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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.

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.

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.

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.

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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.

Width Of Trenches

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

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

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14.	750 mm	1.40 M	In soft and hard material
15.	More than 750 mm	OD + 0.60 M	In soft and hard material

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

Pressing And Consolidating Of The Trenches

The bed of the trenches shall be well rammed before laying of the murum or 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.

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 for the purpose of excess quantity provided under Clause-38 A of tender. In case of any, dispute regarding classification of strata, the decision of Engineer-in-Charge shall be final and binding.

Excavation By Chiselling Mechanical Means (In Hard Strata)

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

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 meter. 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.

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2. PLAIN/REINFORCED CEMENT CONCRETE

- (a) Proportions of concrete for types of work
 - i) M-100 – For leveling course and foundation of chairs and thrust blocks etc
 - ii) M-150 PCC with temperature nominal 0.15% reinforcement for footing thrust blocks, anchor blocks, chairs and encasing of pipes etc.
 - iii) M-200 PCC for water retaining structure
 - iv) M-300 for Construction of Jack well, Pump House & Water Retaining Structure. Such as ESR, WTP, MBR, BPT.
 - v) M-250 Pump house and bridges (excluding sub-merged portion)
- b) General specifications of this work shall be as per standard specification of Public Works Department, latest edition, for PCC Bd.- E1 to E-7 and for RCC Bd.F2 to F16.
- c) Whenever concrete is to be laid in trenches, the trench shall be cleaned, and watered before placing. The sub-soil water which is met shall be removed and the trench shall be kept dry during and after 2 hours of placing concrete.
- d) Pedestal pier shall be perpendiculars to center line of pipe.
- e) Proper seat shall be left on top of pedestal pier to construct saddle. Seat shall be strictly done within 8 hours, failing which MJP & ZP will not accept it for payment
- f) RCC saddle shall be constructed as per detailed drawing. The top of saddle where pipe rests shall be provided with wearing plate fixed in CM 1.3 smoothly and CM grouting may be done after pipe is placed and no extra payment will be made for this.

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

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shuttering securing etc. all leads and lifts.

Mixing of concrete shall be done with concrete mixer.

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

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

Cement concrete 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 number. 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.

Frequency Of Sampling(IS:456:2000 (Clause 15.2)

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

Quantity of concrete in Cum No. of samples

01 to 05	1
06 to 15	2
16 to 30	3
31 to 50	4

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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.

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

The strength of one or more samples, though less the characteristic value is in each case, not less then the greater of following

i) The characteristic strength minus 1.35 times the standard deviation.

and

ii) 0.80 times the characteristics strength.

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

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

c) However, it should be noted that individual variation should not be more than the percent of average.

STANDARD DEVIATION VALUES

Grade of Concrete	Assumed Standard deviation in Kg/Cm ²
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M-100	35.00
M-200	46.00
M-250	53.00
M-300	80.00

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 8 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 8 hours, stored in clean water at temperature of 8° 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 8 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.

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 8 hours before taken for testing. The dimensions of the specimens to the nearest 0.2 mm and also weight shall be noted before testing.

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.

Mix Design

The following instructions shall be followed as regards preliminary design of mix and methods of batching of plain cement and reinforced cement

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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 weightment, the cost of extra cement required to make up the under weight bags shall be borne by the contractor.

For the items of concrete of grades lower than M-200 and other items in the agreement where cement is not to be used by weightment the cement bags

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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

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.

Mild steel and tor steel bars shall confirm to Specification A-10 of Standard Specification of Public Works Department, Latest Edition.

The binding wire shall confirm to Specification A-15 of Standard Specification of Public Works Department, Latest Edition.

During contractor's supply, if any, the steel bars shall be supplied directly to the site of work.

Bending reinforcement confirm accurately to the dimensions and shapes in the details drawings (approved) or as directed by the Engineer-in-charge.

Bars shall be bend cold only. In no way bending by heat will be allowed.

Bars with kinks, bends or cracks shall not be used.

Details of length, size, laps and bending diagram shall be got approved by the Engineer-in-charge.

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

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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.

Welding, if permitted shall conform to specification B.10.7 of Standard Specification of Public Works Department.

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.

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.

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.

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This item includes,....

- a) Cost of labour, materials, use of tools, plant and tackle and other incidental items to complete the work satisfactorily.
- b) Supplying, conveying, cleaning, cutting, bending, binding with (1.63 mm or 1.22 mm diameter – 16 to 18 gauge) wire on spot, welding and placing reinforcement in position and maintaining it clean and in position till the concrete is laid.
- c) Cost of sampling and testing, as required.

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.

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.

The lengths of the bars shall be measured correct to 2 places of decimals of metre. 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**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.

Materials

Bricks : Bricks shall be first class and shall conform IS:1077-1992.

Mortar

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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.

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.

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

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with 1:3 cement mortar or 1:3:6 cement concrete. Hold fasts for frames of doors and windows shall be accommodated in the joints of the brick which laying. The joints in the courses where reinforcements is places shall admit of a mortar cover at least 5 mm for the brick work with 15 bricks and not more than 12 mm for conventional brick work. A set of mason's tools shall be maintained on work for each group of 3 masons or less for frequent use and checking. The ends of walls shall be bonded into the side walls where necessary.

The joints shall be raked out to depth not less than the thickness of the joints.

This item shall include :

- a) Providing and fixing mild steel reinforcement bars or hoop iron strips as mentioned above.
- b) Leaving holes for fixtures or pipes and making them good after completion of the work.
- c) Building in frames, hold fasts etc. and forming chassis and grooves.

Mode of measurement

The contract rate shall be for a unit of one Square meter and quantities shall be worked out correct upto three places of decimal of a Sqmt..

5. CEMENT PLASTER : Internal Neeru finish

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.

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

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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.

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

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 BdL-1.7 on square meter basis

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.

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.

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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.

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.

Cost all scaffolding is included in the tender rate.

6. SAND FACED CEMENT PLASTER**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.

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Sand Faced Treatment : The cement mortar for sand faced plaster shall have washed Kharsalia or Kasaba or similar type of approved sand with slightly larger proportion of coarse material. The proportion of cement to sand shall be 1:4. The water is added gradually to make the mixture homogeneous. The thickness of finishing coat shall not exceed 8 mm. After applications the surface should be finished with a wooden float lined with cork and tapped gently to retain a coarse surface texture. When the finishing coat has hardened the surface shall be kept moist continuously for 14 days.

Item to include relevant portion of Bd.L 1.6. It shall also include the base coat and sand face treatment of above.

Mode of Measurement and payment per Bd.L 1.7 on square meter basis

The specification lays down the requirements of applying sand faced plaster in specified thickness with cement mortar to concrete or masonry surface in specified coats. This shall conform to specification for ordinary cement plaster where ever it is not irrelevant and in addition following shall also be applicable.

Tools and accessories used in plastering work be thoroughly cleaned before plastering is done.

The programming of other building operations before during and after plastering shall be according to the instructions contained in Clause 4 of IS:1661-1960 or its latest revision. The item shall be executed as per Red book specification BdL-7 to 7.50 page No. 351)

Care shall be taken that other parts of work of adjacent work are not damaged while plastering.

The base coat plaster shall be of cement mortar of specified proportion 1:4 and thickness as mentioned in the item or otherwise, it shall be of cement mortar 1:3 and thickness 15 mm to 20 mm. The base coat shall be laid in a similar manner as stipulated in. However,

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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 PROOF CEMENT PAINTING

General

This specification lays down the requirement of applying cement based paint in specified coats to concrete or masonry surface.

Materials

Cement paint with a base of white portland cement of approved manufacture. Colour and shade shall be used. Approved quality cement based paint shall be brought to site in original air tight containers with seal intact.

Scaffolding wherever necessary shall be provided to the entire satisfaction of the Engineer-in-Charge.

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.

Application Of Paint

Mixing of paint and procedure of painting shall be as specified by the

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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.

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.

Mode Of Measurement And Payment

The item includes,

- a) All materials and labour for painting.
- b) All equipment and scaffolding.
- c) Curing as per specification
- d) Non uniform colour or shade shall be rectified without any extra cost.

The item shall measured and paid in per Sqmt basis of area painted.

10. STEEL ROLLING SUTTERS

The specifications lays down requirements of providing and fixing steel rolling shutters with accessories locking arrangement top hood cover and painting in three coats of synthetic enamel paint of approved quality and shade

The specification for this work as per standard specification of Red Book - and as directed by Engineer-in-Charge.

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Materials

The rolling shutters shall conform to IS:688:1979. Rolling shutter shall be supplied of specified type with accessories. The size of the rolling shutters shall be as specified in the drawings. The shutters shall be constructed with interlocking lathe sections foamed from cold rolled steel strips not less than 0.9 mm thick and 80 mm wide for shutters upto 3.5 m width and not less than 1.25 mm thick and 80 mm wide for shutters 3.5 m width and above unless otherwise specified. Guide channels shall be of mild steel deep channel section and or rolled pressed or built up (fabricated) jointless construction. The thickness of sheet used shall not be less than 3.15 mm.

Head cover shall be made of M.S. sheet not less than 0.9 mm thick for shutters upto 3.5 m width. For shutters having width 3.5 mm and above the thickness of M.S. sheet for the hood cover shall not be less than 1.25 mm.

The spring shall be of best quality and shall be manufactured from tested high tensile spring steel wire or strip of adequate strength to balance the shutters in all positions. The spring pipe shaft etc. shall be supported on stron M.S. or Malleable C.I. brackets the brackets shall be fixed on or under the lintel as specified with raw plugs and screws bolts etc.

The rolling shutters shall be self rolling type upto 8 Sq.mt clear area without ball bearing and upto 12 Sqm.. Clear area with ball bearing. If the rolling shutters are of larger size, then gear operated type shutters shall be used.

The locking arrangement shall be provided at the bottom of shutters at bottom ends. The shutters shall be opened from outside.

The shutters shall be complete with door suspension shafts, locking arrangements, pulling hooks, handless and other accessories.

Workmanship

Rolling shutters and top hood with all accessories shall be supplied of

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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.

Mode Of Measurement And Payment

The item shall include –

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

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

11. PROVIDING, FIXING RSJ AND OTHER STRUCTURAL STEEL WORK 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

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riveted or welded joints or fixing with nuts are included in the tendered rates. The specifications for this item given in Standard Specification (Red Book) published by B&C Department will be followed.

12. STRUCTURAL STEEL WORK (for pipe line, outlet arrangement and weir work only)

Requirements specified in this section will form a part of detailed specifications for items of works falling under this category. Indian Standard shall apply as if included herein. Design of structure shall be compliance with Indian Standard (IS) viz. Rivet IS:1148-1964 for bolts IS:1148-1964 and IS:800-1962 for structural fabrication IS:800-1962, etc.

Principal Items

- 1) Structural steel members
- 2) Steel joints
- 3) Plates and connection
- 4) Steel chair assembly
- 5) Pipe supports and hangers for piping in all locations
- 6) Pipe railing
- 7) Ladders and stairs
- 8) Misc. metal work for water supply and sewerage disposal installations.

Quality Assurance

Unless otherwise specified all work specified herein and shown on the drawings shall conform to the applicable requirements of the following specifications and codes.

- A) Fabrication and erection of structural steel shall be in accordance with IS:800-1962. (latest edition)
- B) WELDING INSPECTION
The contractor shall perform all structural field welding under continuous inspection of a representative of the Pradhikaran. Notice will be given at least 8 hours in advance of needed inspection.

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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.

Shop Fabrication**General**

- A) The maximum possible fabrication on structural steel work shall be manufactured off-site in a fabrication shop.
- B) Shop connections shall be welded or bolted, unless otherwise indicated.
- C) In so far as possible all work shall be fitted and assembled in shop ready for erection.

Members

- A) All members shall be free from twists, kinks, buckness or open joints.
- B) All members, holes and their spacing shall be so accurately made that when assembled the parts shall cone together and bolt without distortion.
- C) Parts assembled with bolts shall be in close contact, except where separators are required where unlike metals are in contact, to insulate as necessary to prevent corrosion.
- D) Bolt holes will be provided to secure special items, if any, to structural member.
- E) Bearing surface shall be planned to true beds. Abutting surface shall be closely fitted. Steel requiring accurate alignment shall be provided with slotted holes and/or washers for aligning the steel.
- F) All materials shall delivered in the order, in which they will be required so as to avoid all delay in completion of the project.

Welding

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- A) Welding in shop and field shall be done by qualified operators who have experience of similar work. The standard for welders will be as required by IS:817-1966.
- B) All steel before being fabricated shall be thoroughly wire brushed, cleaned of all scale and rust and thoroughly straightened by approved methods, that will not injure the materials being worked on. Welding shall be continuous along the entire line of contact except where tack or intermittent welding is permitted. Where exposed welds shall be cleaned of flux and slag and ground smooth.

Erection

- A) Erection shall include the installation and erection of all steel as called for in this section. The contractor shall verify correctness before starting erection.
- B) As erection progresses, the work shall be securely bolted up to take care of all dead-load, wind and erection stresses.
- C) No final bolting or welding shall be done until each portion of the structure has been properly aligned and plumbed.
- D) Bolts shall be drawn up tight and threads set so that nuts cannot become loose.

E) Damaged Members

During erection, members which are bent, twisted or damaged shall be straightened or replaced as directed. If heating is required in straightening, a heat method shall be used, which will ensure uniform temperature throughout the entire member. 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 member.

F) Anchor Bolts And Anchors

Anchor bolts and anchors shall be properly located and built into connection work. Bolts and nuts shall be preset by the use of templates or such other methods as may be required

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to locate the anchors and anchor bolts accurately. Embedded anchor bolts that are submerged in process, water or pump room floors, or are in enclosed tanks or spaces exposed to process gas or moisture shall be of stainless steel with nuts of same material. To such stainless steel bolts, a non-oxidizing lubricant grease will be applied before bolting.

G) Bearing Plates

Bearing plates shall be provided under beams and columns resting on walls or footings. Bearing plates may be attached or loose and aligned on steel wedges or shims. After the supported members have been plumbed and properly positioned and the anchor nuts tightened, the entire bearing area under the plate shall be dry packed solidly with bedding mortar. Wedges and shims shall be cut off flush with edge of bearing plate and shall be left in place.

H) Substitutions

Unless otherwise directed, the exact sections, shapes, thickness, sizes, weights and the details of construction shown for the structural steel work, shall be furnished. However the contractor, because of his stock or shop practices, may suggest change of the net area of section is not thereby reduced, if the section properties are at least equivalent and if the overall dimensions are not exceeded. All substitutions or otherwise deviations from drawings and/or specifications shall be specifically noted or 'clouded' on the shop drawing submittals.

I) Flame Cutting

Flame cutting by the use of a gas cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing. The use of a flame cutting torch will be permitted only on minor members, when the members is not under stress, and only after the approval of the Pradhikaran has been obtained.

J) Storage Of Materials

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Structural materials, either plain or fabricated shall be stored above ground upon platforms, skids, or other supports. Materials shall be kept free from dirt, grease and other foreign matter and shall be protected for corrosion.

K) Test Reports

Certified physical and chemical mill test reports for material used for major structural members shall be furnished. All tests shall be performed in accordance with applicable Indian Specification Standards.

Materials And Workmanship

A) Structural Steel And Miscellaneous Metal Works

I) General

This work shall include the furnishing and installation of all structural steel and miscellaneous metal work and related work including grating and grating supports, pipe hangers and supports, tanks, manhole steps, equipment guards, anchors and other appurtenances and any other shown on the drawings or herein specified. All materials shall be new, sound and of the best quality available.

ii) Material

Steel rolled sections, plates and bars shall conform to the latest editions of IS:226, 808, 1730, 1731, 1732 and 3954. Pipe used for columns or other structural purposes shall conform to IS:1161-1968. Iron for castings shall conform to IS:210.

B) Steel Joints

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

C) Common Bolts

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

D) Welding Electrodes

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

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E) Shop Painting

Structural steel not designated to be galvanized shall be shop coated, using priming coat of red lead as specified in painting section, of these specifications. The portion of steel to be embedded in concrete shall not be painted.

F) Galvanizing

All metal work shown or specified to be galvanized, shall be zinc coated, as per IS:2629-1966. The zinc coating should be free from defects and shall have uniform thickness of coating.

Galvanizing coating marred or damaged during erection or fabrication shall be repaired by any approved process as directed by the Engineer.

G) Shop Painting

Before leaving the shop all steel not shown or specified to be galvanized shall be given one coat of primer red lead. Final painting shall be in specified coats of approved and approved brand oil paint. The portion of steel to be embedded in concrete shall not be painted.

H) Test Reports

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

I) Shop Drawings

Five sets of shop drawings shall be submitted to the Engineer, for approval before fabrications of any of the work. In approving shop drawings, the Engineer does not assume responsibility for accuracy of the work relative to other plant components, as constructed.

J) Anchor Bolts

Anchor bolts shall be galvanized and shall be fabricated as shown or as specified by the equipment manufacturer.

Suitable expansion bolts may be used in lieu of anchor bolts, at certain locations. It shall be the responsibility of the contractor to request the substitution and obtain the Engineer's approval, regarding type and location of expansion

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and bolts proposed to be used prior to pouring concrete.

K) Steel Grating

Seat angles and anchors shall be of steel, grating and support shall be galvanized. Gratings to be supplied and installed as detailed in the drawings.

L) Mechanical Equipment Guards

All rotating belts, pulleys and shafting shall be covered and guarded in conformity with applicable safety requirements or as directed by the Engineer.

Mode Of Measurement

This item will be calculated as per Metric Tone basis.

13. CHEQUERED PLATE

Plate shall be of regular quality carbon steel of the thickness shown on the drawings. The raised lugs shall be diamond shaped and have an angled and opposed pattern.

This item will be calculated as per Square meter basis.

14. PROVIDING & FIXING SLUICE VALVES & BUTTERFLY VALVES, AIR VALVES SPECIFICATION FOR MANUFACTURE, SUPPLY AND DELIVERY OF SLUICE VALVES, BUTTERFLY VALVES

Sluice Valves

These specifications cover general provisions and requirements and are supplementary to the General conditions of contract.

General

The Sluice Valves proposed to be procured through this tender are to be used for drinking water supply schemes under execution.

Work Under This Contract

The work entitled manufacture, supply and delivery of Sluice valves for transmission mains shall comprise the manufacture, supply and delivery of the goods as mentioned in the Bill of Quantities.

- a) Sluice Valves PN 1.0 of IS: 2906:1984. of various sizes, ranging from 350 mm to 1200 mm.

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- 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 MJP & ZPs 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 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 / crate 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

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The contractor shall use proper handling equipment or follow suitable handling method as approved by the Engineer to unload the materials at the delivery site to prevent damage to the goods and equipments.

Third party inspection from agency approved by MJP & ZP should be carried out at contractor's cost only.

The contractor should produce manufacturer's test certificate conforming that the valves have been tested in accordance with I.S. specifications, stating the actual pressure and the medium used in the test. The design workmanship, material, strength and dimensions of all parts shall be as per I.S.S. The product shall be of proven quality rendering reliable service during maintenance and requirement.

Third Party Inspection

Third party inspection shall be carried from 1) M/s Central Institute of Plastic Engineering & Technology, Aurangabad. 2) M/s Dr.Amin Controler Pvt.Ltd, Mumbai 3) M/s WAPCOS Ltd., Gandhi Nagar

The valve shall be tested in factory by third party in presence of Rural water Supply Division Nandurbar representative at least for

- a. Review of martial of construction
- b Overall dimension of all component
- c. Hydraulic testing.

Mode of Measurement

This item will be measured and paid as per unit basis. 10% and 10 %amount of this item will be withheld for laying and hydraulic testing respectively and will be released after satisfactory laying and hydraulic test.

Providing Air Valves Of All Classes And Diameter

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% and 10 %amount

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of this item will be withheld for laying and hydraulic testing respectively and will be released after satisfactory laying and hydraulic test.

15. HYDRAULIC TESTING OF PIPELINE :

After the work of laying pipeline is completed and before it is commissioned, the pipeline shall be tested in the field both for its strength and leakage in the following manner. Whether stated specifically elsewhere or not, the testing in section of 1 km shall have to be completed within 3 months of laying and jointing.

The pipeline laid length will be divided into sections specified by Engineer-in-Charge. The contractor shall recheck pipe and valves for cleanliness and shall recheck operations of the valves. The open ends of the pipeline or sections thereof shall normally be stopped off by blank flanges or cap ends additionally secured where necessary by temporary struts and wedges. All anchor and thrust blocks must have been completed and all pipe straps and other devices intended to prevent movement of pipe must have been securely fastened. The contractor shall clean out the whole pipeline and flush it with water, so as to remove dust, dirt and any foreign matter laying in the pipeline. No separate payment for the work of cleaning will be made and the rates under various items of work include thereof.

Each valves section of the pipeline shall be subjected to hydraulic test in section. For this test, the pipe shall be slowly filled with clean water by opening cross connection with the existing mains or otherwise by pumping water into the line (water and pumping arrangement is to be arranged by contractor) as directed and all air shall be expelled from the pipeline through hydrants, air valves and blow off fixed on the pipeline. Once the pipe is full, the cross connection or pumping shall be closed. The pressure in the pipeline should then be raised in stages and built up and maintained by means of suitable approved pumps, to the specified test pressure based on the elevation of the lowest point on the line or per section under test.

The pipe line should be tested hydraulically upto required pressure as per IS specification or as per detailed specification for the Sub-Work. Before starting the pressure test, the expansion joint shall be tightened the test pressure shall be maintained for at least 8 hou` The drop in pressure shall

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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 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 water main will be carried out for entire length as directed by Engineer-in-Charge. If any leakages are observed even during defects liability period due to defective workmanship, the same shall be rectified immediately. The charges of repairs if done departmentally will be recovered from the amount of retention money. Repairs on live water mains are to be carried out immediately to avoid wastage of water and other problems such as disruption of water supply and traffic etc. In view of this, it will be very difficult to give prior intimation to concerned contractor. As such the cost of repairs, being the expenditure will be recovered from the contractor's retention money withheld in deposit without giving any prior intimation. The contractor will not challenge or claim any extra for such action on the part of the Department.

Generally the contractor shall be required to test the pipe line sections of 2 km using necessary equipment. However, if the Engineer-in-Charge directs, to test full pipeline lengths in further suitable sections in the interest of the work, the tenderers will have to carry out the test in such sections as directed by Engineer-in-Charge.

Mode of Measurement

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This item will be measured and paid as per km basis measured up to 3 digits

16. REFILLING OF TRENCHES OF PIPELINE

(Sub Work No , Item No),

After lowering, laying, jointing and welding of pipe line, site gunnitting and concreting work, refilling of trenches with available excavated stuff shall be done.

The available excavated stuff shall be laid in layers of 15 cm to 20 cm. Each layer shall be watered and compacted before the upper layer is laid till the required level is reached. First 2 layers of 15 to 20 cms shall be free from stones or chips or any harmful material, to protect the pipe from damage.

Only soil or soft murum shall be used for filling.

Originally filling shall be done 30 to 40 cms above natural ground or road level.

Sinking below the road or ground level, if noticed till the completion of work, the contractor shall have to make it level at his cost.

This item includes,..

- a) Clearing useful excavated material of rubbish bracking clods, stone, etc.
- b) Conveying the useful excavated material upto 500 M and filling in layers, watering and compacting.
- c) All labour, equipment and other arrangements necessary for the satisfactory completion and completion of the item.

Mode of measurement and payment of the rate shall be for a unit of 1 Cum of compacted trench filling with approved excavated material. The measurement shall be net for the compacted filing and no deduction for shrinkage or voids shall be made. However, deduction for pipe volume will be made. Depth of filling for measurement will be limited from natural ground level only. No payment will be made for filling for 30 to 40 cms above natural ground level, if so insisted by the Engineer-in-charge.

Surplus excavated material is the property of Pradhikaran. So contractor is

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not empowered to sell this excavated material to any other agency.

This disposal will not be considered for initial 50 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.

15% amount will be withheld till satisfactory hydraulic testing of pipe line.

17. DEWATERING

(Sub Work No Item No.)

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

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safety designed and constructed with suitable dimensions and protections and shall be made enough water tight for facility of construction inside it. The coffer dam shall leave sufficient clearance for construction and inspection facility and permit installation of pumping machinery as required.

The item includes the entire dewatering operation from start of work till its completion in all respect.

The measurement under RCC works for net dimension cast as directed without allowance for rendering finishing etc.

MODE OF PAYMENT

The provision for this item is made in lump sum basis. There shall not be excess in any case for all season till completion of work.

After completion of construction of jack well	80%
After satisfactory completion of all work	20%

18. PROVIDING AND FILLING BAGS FOR COFFER DAM

(Sub Work No , Item No),

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.

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Lands

The contractor shall be allowed if possible and convenient to the Department, to make use of the Department land free or royalties, rents, etc. complete.

Construction

The cofferdam shall be constructed to the satisfaction of the Engineer on the approved alignment with an eye to the safety and convenience for the construction at all times and shall,....

- a. not have a gradient
- b. have a specified width and specified height.
- c. have a two lane of filled empty cement bags of murum and in between black cotton soil for stopping seepage of flow for construction purpose.

The Engineer may permit in writing deviation in the above, if circumstances justify.

The coffer dam shall be formed in layers as directed. Two lane of filled empty cement bags by murum or sand shall be used as directed and then in between the lane of bags of hearting material should be laid and should be consolidated to required strength and condition or as directed by the Engineer.

Maintenance

The contractor shall maintain the coffer dam in a reasonable good condition till the work is over. He shall also be responsible to reconstruct it or parts of it if damaged due to floods, or any other cause without extra claims for the same.

If the contractor fails to repair the coffer dam in a satisfactory manner, even after being required by the Engineer to do so within a specified period in writing, the Engineer will be free thereafter to repair and keep the coffer dam in satisfactory condition at the cost of the contractor.

Special points

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The Contractor shall be responsible thus for,

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

Item to Include

- i) All the labour, material use of equipments, tools and plants necessary for lighting constructing, maintaining the coffer dam satisfactory.
- ii) All sorts of compensation and responsibilities arising out of the coffer dam.
- iii) After completion of work the constructed coffer dam will be dismantled and all material should be lifted from river bridge.

Mode Of Measurement And Payment

The cofferdam shall be measured in cubic meter only. Dimensions shall be measured correct to two decimal of meter and quantity shall be calculated to two places of decimal of cubic meter.

Break-up of payment

- 50% on physical completion of coffer dam as per approved design and drawing
- 40% proportionate to progress of civil works affected by the coffer dam
- 10% on removal and disposal of coffer dam material as directed by Engineer-in-Charge

19. G.I. HAND RAILING

(Sub Work No....., Item No)

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

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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 MJP & ZPs type design in force. The rate shall also include two coats of approved shade oil paint. Cost of all the materials which shall be procured by the Contractor, labor involved for executing this item is included in tender item. The measurements and the payment shall be on the basis of lengths in running meters occupied by the complete railing assembly in plan.

The agency should provide G.I. pipe railing having one meter height consisting 50 x 50 x 6 mm thick MS angles and vertical at 1.50 m c/c and additional post at every corner bends or curved point with three rows of 25 mm G.I. pipe of medium class variety of horizontal at 3 coats of oil paints over one coat of anti corrosive paint approved colour including cost of labour, transport, materials etc. complete

Mode of payment

The payment shall be made on running meter basis

20. ONE YEAR OPERATION AND MAINTENANCE OF WATER SUPPLY SCHEMES

This item includes operation and maintenance of the scheme to supply water to the consumers at minimum 70 litres per day. It includes daily operation of all the components of the scheme so as to enable smooth functioning of the scheme, including operation of pumping machinery, running water treatment plant, operation of valves of Elevated Service Reservoirs and distribution system, distribution of bills, collection of water cess and remittance of amounts received in to the account of GP within 2 days of receipt. It also includes the repairs of any leakages, replacement of spare parts free of cost within 7 days being within Defect Liability Period, maintaining stock of chemicals & consumables, Water Sample testing as prescribed by Government of Maharashtra/ India, etc. complete so as to maintain the Service Level Benchmarks as under:

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Sr. No.	Service Level Benchmarks	Criteria
1.	Minimum Water Supply	70 lpcd
2.	Min. supply hours/ day	8 hours
3.	Minimum Residual; Head	7 M
4.	Closure of water supply	Max. 2 days/ calendar month
5.	Water Quality	As per BIS 10500:2012

After the physical completion of the scheme, Contractor will have to perform the Operation and Maintenance of the scheme for One year to its present rated capacity, Contractor will have to do O&M in following manner:

1. Operation And Maintenance

The operation refers to the art of handling the plant and equipment optimally so that the designed quantity and quality of water can be produced. The operation of a water works refers to hourly and daily operation .of certain component parts of the water works such as plants, equipments, valves, machinery. etc., which are required to be attended to by an operator or his assistant. It is an important though routine work. Operators have to be trained properly before they are entrusted with the task of operation of specific plant, equipment, valves, machinery etc.

The maintenance of a water works may refer to up keeping the civil, mechanical and electrical components of a plant through normal repairs, so that they are able to function at designed capacity for their design period. It may further refer to such routine repairs as are necessary to prevent the components from malfunctioning.

Common Features Of Operation And Maintenance

In the operation and maintenance of water works, following common features need to be addressed. These are briefly stated below:

Availability Of Detailed Plans, Drawings And Operation And Maintenance Manuals

The Contractor should keep at least four to five sets of the detailed

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drawings, maps of each of the component of the water works along with catalogue of all equipments, machinery supplied by the contractor .One of the sets should be handed over to Engineer In-Charge of work. The other sets may be distributed to GP and Sub-division in charge of scheme.

Schedule Of Inspection Of Machinery

A regular schedule of inspection of machinery, equipment their lubrication and servicing program must be prepared and circulated. Appropriate supervisory control should be exercised to see that these inspections, lubrications and servicing are being regularly carried out.

Records

For each piece of equipment and machinery a record register should be maintained in which all records of the equipment such as servicing, lubricating, replacement of parts, operating hours (including cumulative) and other important data is entered.

Records Of Quality Of Water

Complete records of bacteriological and chemical analysis of water from source to the consumers tap should be maintained and reviewed. Charts could also be prepared for the important characteristics of the water and any changes in these characteristics as compared to the standards must be taken note of.

Inventory Of Stores

A reasonable assessment of the stores and spare parts of machinery required over a period of O&M should be made quarterly and an inventory of the same prepared. The aim should be that any material required for replacement is available at any time for the maintenance.

Maintenance Of Pumps & Pumping Machinery

Daily Observations

- A log-book should be maintained to record the observations, which should cover the following items.
- Timings when the pump was run during the previous 8 hours,
- At the time of observation, whether there is any leakage through the stuffing box

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- Bearing temperature/ s,
- Whether any undue noise or vibration,
- Readings of pressure, voltage and current

Semi Annual Inspection

- Free movement of the gland of the stuffing box,
- Cleaning and oiling of the gland bolts,
- Inspection of the packing and repacking, if necessary,
- Alignment of the pump and the drive.
- Maintenance And Repairs Of Electrical Equipment

Consumables

- Adequate stock of lubricating oil and transformer oil should be maintained.

Replacement spares

To avoid downtime, stock of fast moving spares and of spares likely to be damaged by short circuit should be maintained. A set of recommended spares for trouble free operation should be ordered along with the equipments.

Preventive Maintenance

As preventive maintenance, it is advisable to follow a schedule for the maintenance of the equipments. The schedule covers recommendations for checks and remedial actions, to be observed at different periodicities such as daily, monthly, quarterly, semi annually.

Maintenance of transmission mains

The transmission mains include raw/treated water pumping as well as gravity mains from source to treatment works, treatment works to master balancing reservoirs (M.B.R.) and from M.B.Rs to service reservoirs in the distribution' system. The maintenance problems to be attended to for various types of pipes used in the system:

All Pipes

Sufficient stock of spare pipes and specials should be maintained for replacement of damaged ones.

Regular leak detection surveys should be undertaken particularly for bursting

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of pipes and leaking joints.

A detailed record of break downs and leaks observed and repaired should be maintained section-wise so that more vulnerable lengths could be identified and special measures to repair/replace them could be undertaken.

A regular schedule of inspection and attendance to all valves including air and scour valves should be drawn up and the same followed scrupulously. Special attention should be given to air valves.

Operationa and Maintenance Of Water Treatment Plants

The person in charge of the maintenance and operation of water treatment plants should have a thorough knowledge of the functions of the several units under his control. Problems which are to be tackled at the operational stage are mainly those which arise out of:

Fluctuation in the quality of the water;

Fluctuation ,in the quantity and changes in the flow pattern;

Mechanical and electrical equipment.

Aeration Fountain

Aerators are required to be maintained in a clean condition so that maximum water surface and agitation are provided.

Slime and algae growth on the surface would require cleaning and periodic treatment.

Flow Measuring Devices

Float sump should be periodically cleaned to see that silt does not accumulate which may affect the proper functioning of the float. Charts and pen recorders should be stocked adequately. Annual or more frequent calibration of these devices is necessary. Annual servicing and checking of the instruments is imperative.

Chemical Feeding Unit

V-notch/ Rectangular Notch weirs and floats and floating arrangements should be cleaned daily. Enough spares for the mixing device in the chemical preparation should be stocked. Setting of the V-notch/ Rectangular Notch should be checked periodically.

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The optimum dosing of alum and coagulant aids should be based on a proper and detailed laboratory study including Jar Test. The chemical feeding rate should be controlled, depending upon the needs from time to time.

Rapid Mixer

Adequate spares should be kept ready in stock for timely replacement when necessary.

Slow Mixer

Mechanical devices should be properly lubricated and worn out parts replaced. In non-mechanical type of flocculators like baffle and tangential flow tanks, de-sludging at least once in three months is necessary.

Clarifier Or Sedimentation Tank

Annual overhauling and repainting of the unit should be done a month or two prior to monsoon.

The traction wheels should be checked for alignment and rubber wheels replaced, if required.

The unit should be worked continuously to protect the mechanical parts from ill-effects of corrosion, malfunctioning etc., as well as problems from sludge build-up. Outlet weirs should be kept cleaned at all times. Algicide or bleaching powder may be used for controlling biological growth on weirs.

The important features in the operation of a clarifier are:

The introduction of water into the tank with a minimum turbulence;

The prevention of short-circuiting between inlet and outlet; and

The removal of the effluent with the minimum of disturbance to avoid settled material being carried out of the tank.

Algal growth, if any, should be controlled.

Rapid Gravity Filters

The common problems encountered are:

The operator should be conversant with the working of gauges and should be able to handle minor repairs. Necessary spares should be stocked.

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Chlorinators

The chlorine demand of filtered water is to be satisfied and a free chlorine residual maintained to make it completely safe. Hence the operator should be careful in administering calculated doses accurately.

Clear Water Sump & Reservoir

Roofing should be checked to ensure that no leakages are there so that pollution can be prevented. Ventilator outlets should be regularly checked and cleaned to guard against mosquito breeding and bird droppings. Cleaning of the sump and reservoir should be done regularly. Level recorder should be kept in working order at all times.

Treated Water

The water to be supplied to the consumers shall meet the relevant Water Quality standards specified as per BIS 10500:2012. Water samples shall be tested regularly as specified by BIS standards. Periodical analysis of the water can also indicate if there is any biological growth in the main and if any further chlorination is needed to check it. The samples of water collected from several points should be routinely examined for residual chlorine and other chemical and bacteriological parameters

Chemicals And Consumables

The contractor shall be responsible for maintaining stock of Chemicals and Consumables required for one month as per relevant BIS standards. Test Reports shall be submitted to MJP & ZP for each batch of supplies.

Master balancing reservoir and elevated service reservoir

Important aspects to be considered during maintenance are:

Measurement of inflows & outflows : It should be seen that discharge at inlets and outlets fairly tally. It should be seen that water level indicators and recorders are in .proper working order.

General cleanliness in and around the reservoirs should be maintained and observed. A garden around the reservoir structure may be provided.

A programme for periodical cleaning of the, reservoirs at least once in six months should be undertaken; During such cleaning process there should be

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facility to by pass the supply to distribution system.

Distribution System

Important aspects of operation and maintenance of distribution system are detection and prevention of wastage due to leakage. The object is to control the waste within reasonable limits.

In a distribution system complaints are received frequently from consumers about

Non-availability of required quantity of water

Low pressure at the supply point

Leakages & wastages through valves and pipe lines

Unauthorised connections.

Control Of Quality Of Water

Ensuring an appropriate quality of water to the consumer is Contractor's primary responsibility. Quality control is, therefore, required at every step in the O&M of water supply scheme. The physical, chemical and bacteriological tests of water samples need to be carried out at as frequent intervals as required. The results of these tests should be studied and remedial measures taken promptly as and when required.

These tests are usually needed at

Source-to determine the raw water quality; it should be tested quarterly.

Treatment Plants-to determine whether the treatment is in conformity with raw-water quality; physical parameters like turbidity, pH should be checked daily. The Bacteriological and Chemical parameters should be tested from Govt. laboratory monthly.

Distribution system-to determine whether adequate residual chlorine is present in the water supply to consumers. It should be tested daily at consumers' end and at pure water sump at WTP.

Staff Pattern

Sufficient staff should be deployed for efficient Operations & Maintenance of Water supply scheme, so as to carry out the functions mentioned above. The suggestive structure of staff is as under:

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Sr. No.	Population of village	Suggested Staff Strength
1	Upto 5000	1 Pump Operator, 1 Filter Operator, 1 Recovery Person, 1 Helper
2	More than 5000	2 Pump Operators, 2 Filter Operators, 1 Recovery Person, 2 Helpers

Distribution Of Water Bills & Collection Of Cess

The Contractor shall be responsible for collecting printed Monthly Water Bills from MJP & ZP office, distributing the same to the consumers and collecting the cess monthly. The collected amount shall be deposited in the separate account of GP, meant for O&M of water supply scheme.

Payment To The Contractor

The Contractor shall raise Monthly Bills to MJP & ZP which shall include expenditure on account of salary to the staff and chemicals. *Any repairs/ replacement of defective parts of the sub-works executed by the Contractor, shall be responsibility of the Contractor as per Defect Liability Clause and no amount shall be payable to the Contractor on that account.*

The Contractor's bill against . shall be paid taking into consideration, the percentage of recovery against the assessment. If recovery of water bill is 80%, and all the service requirement of water supply are satisfied, contractor shall be eligible for 100% of the monthly . bill payable to him. However, if contractor fails to recover 80% of the water bill of the month and fails to maintain required service level during that month, proportionate amount will be deducted from the monthly payment payable to him against ..

If the recovery by the contractor is less than 80% of assessed amount, the contractor shall be paid proportionate bill of O&M as per percentage of recovery of water bill.

Energy Charges and Raw Water Charges shall be paid by MJP & ZP.

21. M.S. ROSE PIECES

(Sub Work No....., Item No)

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

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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 basis.

22. 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.

23. LIGHTING Sub Work No. Item No. CONDUCTOR

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.

8. 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 from 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.

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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 number basis.

25. PROVIDING AND SUPPLYING DI/CI/MS SPECIALS

(Sub-work No..... item No.....),

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 form manufacture's works to site stores, stacking them properly and protecting till commissioning of work. **General:** The specials shall confirm to relevant I.S.S. **Materials:** The specials shall be manufactured form cast iron conforming to IS 210 Gr. 20.

Coating: The specials shall be coated by bitumen by not dipping process.

Tests: The specials shall be tested at factory for 25 kg/sq/cm/ Pressure.

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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.

Dismantling Joints

Providing and fixing Dismantling joints

Providing dismantling joints of appropriate diameter of M.S.as per detailed drawing suitable for PCCP pipes or other pipes including epoxy coating of approved make from inside, outside, transportation, loading, unloading octroi, inspection charges as per directions from Engineer-in-charge etc.

Mode Of Measurement

Diameter wise on No basis.

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.

Mode Of Measurement

On No. basis

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..

Mode Of Measurement

On running metre basis

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 8). The Supply at departmental stores shall be of various diameters as specified. The specials shall be free from any defects. It should

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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.

Manufacture :

The dimensions of flanged sockets and flanged spigots shall be as per Tables 7 & 8 of IS 1538-1993, respectively. Supply and Stacking at Departmental Store or Work Site : As specified under the agreement.

Markings :

Each fitting shall have cast stamped or indelibly painted on it the following markings :

1. Manufacturer's Name or trademark or identification mark.
2. The nominal diameter,
3. Mass of fitting,
4. Last 2 digits of year of manufacture,
5. Any other mark required by the purchaser.

Item to Include:

The item includes the supply of Cast Iron detachable joints, including all taxes, levies excluding octroi, transporting, loading, unloading and stacking at departmental store or work site as directed. The necessary test certificate also shall be provided along with the supply. Octroi paid shall be reimbursed on producing documentary evidence for the payment made.

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

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

Material

All Cast iron specials such as C.I. mechanical compression collar coupling shall confirm to I.S. 1538- 1993 (Part 1 to 8). The Supply at departmental

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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.

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.

Flat rubber gaskets.

The item provides to supply at departmental store the flat rubber gaskets for

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flanged joints. Following two types of rubber gaskets, depending upon the hardness of rubber ay be supplied as specified in the supply order:

1. Type A: 50 to 65 Hardness in IRHD and
2. Type B: 65 to 80 Hardness in IRHD.

In each of two types, 2 Grades, Grade 1 & 2 are again prescribed.

Material:

The rubber gaskets shall be manufactured from either a) Sheet Rubber or b) Sheet Rubber reinforced with fabric (Rubber insertion jointing). For manufacturing rubber gaskets, natural rubber or synthetic rubber or a blend thereof, shall be used, with suitable composition and vulcanization to attain the required degree of hardness.

The fabric for rubber insertion jointing shall have a minimum breaking strength of 120 N/mm², under test conditions according to IS: 1969- 1968.

Manufacture:

The rubber gaskets shall be free from porosity, grit and surface defects such as pitting and irregularities. The rubber shall be homogeneous. The manufacturing of sheet rubber and rubber insertion jointing shall be in accordance with the IS: 638-1979. The thickness and number of fabric plies shall be as per the IS. Unless mentioned in the supply order the size of each rubber sheet shall have suitable bolt holes conforming to IS 1538-1993, for the pipe diameter specified in the order.

Supply and Stacking at Departmental Store:

As specified under agreement.

Markings:

Each piece of rubber sheet jointing or rubber insertion jointing shall be marked with the following:

1. The name of manufacturer or the Trade Mark,
2. Type, Grade and Thickness,
3. Month and Year of manufacture,
4. Any other Marking as specified in the purchase order Item to

Include:

The item includes the supply of flat rubber gasket at departmental store, suitable for flanged joints (3/6 mm thick) with bolt holes and nominal bore, pitch circle diameter as per IS: 1538- 1993 and gasket

as per IS: 638-1979, including all taxes, levies except octroi, transporting, loading, unloading and stacking at departmental store as directed. The necessary test certificate also shall be provided along with the supply. Octroi paid shall be reimbursed on producing documentary evidence for the payment made.

Mode of Measurement and Payment: shall be per No.basis

26. LOWERING, LAYING AND JOINTING DI PIPES

(Sub-work No..... Item No),

Contractor shall take delivery of pipes from the stores and shall convey them upto work site for use after checking and testing for soundness of the pipes and shall be held responsible for replacement of such materials of cracked or damaged materials are in advertantly fixed and jointed.

The Department will issue pipes in available lengths and specials. Damages to departmental materials due to carelessness of the contractor during loading, unloading, transport, lowering, laying, cutting to required size, jointing, testing, etc. shall be at contractor's accounts and shall be recovered from him at the rates decided by the Executive Engineer.

During laying the pipe line some time it may be necessary to cut the pipe suit the site condition or to put in some special or valve or to have exact length of the section etc. The contractor at his cost shall do this cutting only. No claims for extra amount due to any particular type or individual length of cut pipes and specials being supplied or joints having been increased due to small lengths shall be entertained.

The payment for this item shall be admissible on the basis of actually laid at site including length occupied by all types of specials and incidental small pipe pieces or other types.

All the pipes and specials and valves to be taken into use shall be cleaned and brushed clear 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 leveled with the help of cross sight rails and boning staff

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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.

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The above murum cushioning of a depth of 150 mm thick or as specified shall always be provided in all formation within the rate of laying pipe line unless an item for murum bedding is provided for separately in the tender.

The murum bedding shall be of the full width of the trench. Murum bedding will be necessary in rock formation boulder formation and soft soils and black cotton soil but not in murum formation itself.

No brickbats or hard stone metal bigger than 20 mm gauge shall be allowed beneath the pipe line directly in touch with the pipe as in the murum bedding.

All stakes such as electric wires, water and sewer mains, manhole, natural drainage, culverts, storm water drains, gutters, poles, etc. coming in the way shall carefully be looked after and any damage be prevented to the same. Any work of removing repairing and reducing such structures or obstacles in the process of laying, jointing and testing pipe line etc. should be carried out by the contractor wherever directed, without any claims for extra to the satisfaction of the Engineer-in-charge. Contractor shall foresee all such situation and make necessary arrangement to overcome those in advance.

The contractor shall not be allowed, any wastage and breakage in pipes brought by him for pipes issued departmentally, the total length of pipes laid and that returned to stores in cracked or unused conditions shall coincide with total length is used. The cost of pipes etc. cracked due to fault of contractor beyond the above permissible limit shall be recovered from him. All waste and broken pipe pieces shall be returned by the contractor to the store of issue at no extra cost. The contractor shall keep an upto date account of pipes, specials and valves etc. issued him free of cost showing quantity received vide unstamped receipt No. and date, quantity used giving chainages as and balance at hand and returned (supported by acknowledgements signed by the Sub-Divisional Officer) failing which the Engineer-in-charge shall reserve the right to keep final bill pending till this account is finalized and contractor shall not claim any compensation in that case for delay in settlement of final bill.

Pipes shall be laid in reasonably dry trenches. Under no circumstances pipes shall be laid in slushy, marshy or water logged and filled up or yielding strata before getting it inspected from Engineer-in-charge and providing proper foundations.

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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 Owner

For crossing obstacles natural or built up such as culverts, drains, gutters, cables, pipeline, poles etc. contractor shall approach respective authorities obtain permission for crossing them immediately at the time limit of acceptance of the tender and shall take into consideration all such difficulties for the time limit allowed for execution and completion of the work. Any such work left remaining to be carried out due to want of the tender without any claim for extra cost or compensation due to non receipt of permission or any other natural or unforced and until the date of completion of the work shall be treated as incomplete. contractor shall also not claim compensation if work is delayed on account of permission for road crossing etc. not being received in time.

Before the work of laying pipe line is started the contractor shall see that all pipes are stacked length wise above the trench between road fencing in sufficient number and without causing any construction to the traffic.

Necessary road diversion as directed shall be provided without any extra claims by the contractor for excavation the roads till completion of work, so that the traffic shall not be hampered. Necessary guide stones duly painted with white wash shall be provided on both sides of temporary diversions. Necessary sign boards, indicating diversions and road closed etc. shall be provided at prominent places alongwith red flags and red letters at night time and maintained till the crossing work is over and road opened for traffic. The diversion shall be removed after road surfaces are brought to original condition. Necessary storing planks for crossing the trenches shall be provided on the open trenches in the towns and wherever required without claiming extra cost.

The contractor shall take utmost care in laying the pipe line alongwith roads and in towns in order to avoid accidents to human life and animal.

Jointing Of Pipes

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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

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preferably by means of standard pipe cutter or hacksaw unless cutting by chisel and hammer is allowed by the Engineer-in-charge. The end of pipe to be used for gasket joint shall be chamfered by means of file and made perfectly true or like original chamfered and if portion of pipe or specials is damaged rendered use less due to careless cutting of the contractor the cost of the damaged portion as decided by the 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 spigot 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

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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.

Hydraulic Testing

The pipeline and valves should be tested hydraulically upto the required pressure as per IS satisfactorily and all the leakages if any should be repaired at the time of hydraulic esting. The 10% amount of the lowering, laying and jointing of pipeline shall be released after satisfactory hydraulic testing. Contractor should make his own arrangements at his own cost for water for hydraulic testing of pipeline. He should not rely upon completion of any other sub-works for such testing.

Mode Of Measurement

The item will be measured and paid on the Running Meter basis. The 10% payment will be with held for till satisfactory hydraulic testing is given.

27. HDPE PIPES

(Subwork No....., Item No)

The specifications for HDPE pipes of various diameters are confirming to I.S.4984 – 1995.

Grade of Raw Material

Raw material used to manufacture the HDPE pipes shall be pre compounded at manufacturing stage. PE 100 is resin proposed to be used for manufacturing of the pipes.

General :-

- 1) The material used for the manufacturer of pipe should not constitute toxic hazard, should not support microbial growth and should not give rise to unpleasant taste and odour or discoloration of water. Pipe manufacturer shall obtain a certificate to this effect from the

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manufacturer of raw material.

- 2) High density polyethylene (HDPE) used for the manufacture to designation PEEWA – 45 – T – 006 of IS 7328 : 1992. HDPE conforming PEEWA – 45 – T012 of IS 7328 : 1992 may also be used with exception that met flow rating (MTR) shall not exceed 1.10 g/10 minutes – In addition the material shall also conform to 5.6.2 of IS 7328 : 1992.
- 3) The specified base density shall be 946.5 Kg/m³ and 946.4 Kg/m³ (Both inclusive) when determined at 27⁰ C according to procedure prescribed in IS 7328 : 1992. The value of the density shall also not differ than 3 Kg/m³
- 4) The melting flow rating (MFR) shall be between 0.41 and 1.10 (both inclusive) when tested at 190⁰ C with nominal load of 5 Kg & as determined by method prescribed in 7 of IS 2530 : 1963. The MFR of the material shall also be within 20% of the value declared by the manufacturer.
- 5) The resin shall be compounded with carbon black. The carbon black content in the material shall be within 2.5 0.5% and dispersion of carbon black shall be satisfactory when tested according to the procedure described in IS 2530 : 1963.
- 6) The percentage of the antioxidant used shall not be more than 0.3 percent by mass of finished resin.

Quality Assurance Certificate

Quality assurance certificate for the raw material proposed to be used for the project, from one of the certifying agencies such as Bodycoat or Slevan or Advantica or any other internationally reputed organization shall be submitted along with the supply.

The manufacturer should submit the above raw material certificates for proposed grade of material PE – 100 at time of supply of pipe.

Contractor shall submit the following Certificates from the manufacturer.

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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

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length of the pipe shall be clearly marked in inedible ink/paint the following information shall be marked.

- a. ISI stamping with marking of IS 4984(or IS 14333)
- b. The manufacturer's name and /trade mark.
- c. Designation of the pipe as per IS 4984 (or 14333)
- d. Lot number /Batch number

BIS License

The pipe manufacturer who is going to supply the pipes for the project has to have a valid BIS license.

Bid without these licenses may be treated as non-responsive

Fittings/Specials

All HDPE fittings/specials shall be fabricated in accordance with IS : 8360 (Part I & III). PE Injection moulded fittings shall be in accordance with IS : 8008 (Part I to IX). All fittings /specials shall be fabricated or injection moulded at factory only. No fabrication or moulding will be allowed at site, unless specifically permitted by the Engineer.

Fittings will be butt welded on to the pipes or other fittings by use of heat fusion.

Bends

HDPE Bends shall be plain square ended as per IS : 8360 part I & III specifications. Bend may be moulded shall be manufactured or fabricated from pipes elements.

Tees

HDPE Tees shall be plain square ended as per IS : 8360 Part I & II specifications. Tees may be equal tees or reduced bench off tees. Tees may be moulded or fabricated from pipes elements.

Reducers

HDPE Reducers shall be plain square ended as per IS : 8008 Part - I & VII Specifications.

Flanged HDPE Pipe Ends.

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HDPE Stub ends shall be square ended as per IS : 8008 Part & VII Specifications. Stub ends will be welded on the pipe. Flange will be of slip on flange type as described below.

Slip on Flanged

Slip-on-flanges shall be metallic flanges covered by epoxycoating or plastic powder coating. Slip on flanges shall be conforming to standard mating relevant flange of valves, pipes etc. Nominal pressure rating of flanges will be PN 10.

Welding

Procedure

Jointing between HDPE pipes and specials shall be done as per the latest IS : 7634 Part II. Method of jointing between the pipes to pipes and pipes to specials shall be with butt fusion welding using semi automatic, hydraulically operated, superior quality butt fusion machines which will ensure good quality butt fusion welding of HDPE pipes.

Normally butt fusion welding shall include following activities.

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

Installation and Commissioning of HDPE PIPES

Installation

- a. Supplying, laying, jointing, testing and commissioning of pipes shall conform to relevant IS codes, as applicable.
- b. The alignment of pipelines shown in drawings of the tender documents is only indicative and the exact alignment will be as per drawings and /or as directed by the Engineer or his representative.
- c. The HDPE pipes shall be laid in accordance with the latest IS 7634 Part -2.

Hydraulic Testing of HDPE Pipe Line

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

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sufficient to prevent floatation

- b. Each length of the pipeline to be tested shall be capped or blanked off at each end and securely strutted or restrained to withstand the forces which will be exerted when the test pressure is applied.
- c. Proposals for testing where thrusts on structures are involved even where thrust flanges on the piping are installed, shall be with the prior approval of the Engineer.
- d. The proper method of filling the pipeline with water shall be used. The length under test shall be filled making certain that all air is displaced through an air valve or any other appropriate mechanism. The test length shall then remain under constant moderate pressure as per testing method given in the IS 7634.
- e. As per IS code water required to built up allowable drop in pressure during test will be treated as a make up water.
- f. Notwithstanding the satisfactory completion of the hydraulic test, if there is any discernible leakage of water from any pipe or joint, the Contractor shall, have to be repaired at his own cost, replace the pipe or repair the pipe or remake the joint and repeat the hydraulic test is the responsibility of the contractor. The additional payment will not be made.
- g. Test pressures are to be measured in kg/cm² at the centre of the bank flange situated at the lowest end of the pipeline under test.
HDPE pipes and Fittings

All the pipes specials and fitting of HDPE shall be supplied and shall be tested along pipeline as per relevant IS codes and specifications.

- h. Daily . of HDPE pipeline should be done & maintained by contractor for two years free of cost. No extra payment will be done by MJP & ZP for this.

The Following code shall be used for:

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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 & ZP 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 & ZP to do the refilling the reopening of trenches at the risk and cost of the contractor. If the trenches are filled due to any reason whatsoever before testing the contractor shall have to open for testing at no extra cost.

Satisfactory hydraulic test shall be recorded when the section under test shall withstand the pressure as specified by the Engineer in charge for about 15 minutes without operating the test pump. The test pressure being maintained at the specified figures during that 15 minutes interval.

The field pressure to be imposed should be not less than the maximum of following

- a) 1.5 times the maximum sustained operating pressure.
- b) 1.5 times the maximum static pressure in the pipe line.
- c) Sum of maximum sustained operating pressure and maximum surge pressure.
- d) Sum of maximum pipe line static pressure and maximum surge pressure. Subject to the maximum equal to the work test pressure to any pipe fitting incorporated.
- e) The field test pressure should wherever possible be not less than $\frac{2}{3}$ rd work test pressure and should be applied and maintained for atleast 15 minutes.

The test pressure shall be gradually raised at the rate of 1 Kg/ cm²/min. If the pressure measurement are not made at the lowest point of the section, an allowance should be made for the difference in static head between the

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lowest point and point of measurement to ensure that the maximum pressure is not exceeded at the lowest point. If a drop in pressure occurs, the quantity of water added in order to re-establish the test pressure should be carefully measured. This should not exceed 0.1 lit/ mm of pipe dia. per Km. of pipeline per day for each 30 cm. head of pressure applied.

During testing if any joints are found leaking they shall be repaired and /or redone by the contractor at his cost till the test is found satisfactory. Similarly, any pipes, collars, specials, show hair cracks, leaks etc. during testing the contractor shall replace them with sound pipes and specials etc. free of cost. The hydraulic test shall be given in presence of the Engineer in charge.

15% payment of total subwork of pipe line work shall be withheld till hydraulic test is given which shall be released only on giving satisfactory test.

Mode of Payment :

60% payment shall be released against providing HDPE pipes, after submitting third party inspection certificate from 1) M/s Central Institute of Plastic Engineering & Technology, Aurangabad. 2) M/s Dr.Amin Controler Pvt.Ltd, Mumbai 3) M/s WAPCOS Ltd., Gandhi Nagar 25% payment will be made after lowering, laying, jointing of pipes. 15% payment will be released after satisfactory hydraulic testing is given by contractor. The cost all types specials required as per site conditions is on Lum-Sum basis.

28. LAYING AND JOINTING OF PIPE LINE

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).

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.

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Mode of Measurement and payment shall be on running meter basis and 15 % payment will be withheld for hydraulic testing

29. VALVES/PEN STOCKS/SLUICE GATES

(Sub Work No....., Item No)

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

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that area dewatering and restoring the water supply etc. complete as directed by Engineer-in-charge.

The payment will be done on No. basis.

30. ROAD BOX

(Sub Work No...., Item No....)

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.

31. 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.

32. COLOUR WASH

General

It item refers to providing and applying of approved colour wash to surfaces which are not given any finishing. 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 finge`

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

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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

33. POLISHED SHAHABAD/TANDUR/KOTAH STONE FLOORING

The specification for this item shall be same as for item No. B.M.1

1. All the stone slabs shall be square in shape. The dimensions shall be 0.60 x 0.60 m or other dimensions as specified in the special provisions or as directed by Engineer-in-Charge. Tolerance in thickness ± 3 mm
2. The exposed surface of the specified stone flags shall be machine polished to a smooth, even and true plane and the edges machine 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.
3. The thickness of joints shall not exceed 1.5 mm
4. Joints shall be grouted with neat cement slurry
5. When the bedding and joints of the flooring have completely set, the surface shall be machine polished to give a smooth, even and true plane to the floor and thoroughly cleaned.

Mode of measurement : Per sq meter

34. 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

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skirting is to be fixed as per specification No. B.11. The proportion of mortar shall be as mentioned in the item.

Fixing tiles : Dado or skirting work shall be done only after fixing tiles on the floor. The white glazed tiles shall be soaked in water for at least 2 hours before being used for skirting or dado work. Tiles shall be fixed when the cushioning mortar is still plastic and before it gets very stiff. The back of tiles shall be covered with a thin layer of neat cement plaster and the tile shall then be pressed in the mortar and gently tapped against the wall with a wooden mallet. The fixing shall be done from the bottom of wall upwards without any hollows in the bed or joints. Each tile shall be fixed as close as possible to the one adjoining. The tiles shall be joined with white cement slurry. Any difference in the thickness of tiles shall be evened out in cushioning mortar 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.

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Mode of measurement and payment : Per square Metre Basis

35. CONSUMER SERVICE CONNECTION

Providing and making MDPE pipe consumer service connection on HDPE pipe with the help of electrofusion machine or Ratchet and dye drill including all labour and material charges etc complete.

The item includes providing necessary material for service connection such as MDPE pipe 10 m length, MDPE specials like electrofusion tee, double compression elbow, female threaded adopter with metal insert, UPVC compression end ball valve, Ferrule (flow control valve) of appropriate size, G.I. casing pipe of 40/50 mm for road crossing, MDPE pipe PH-16 (SDR -9) conforming to IS: 4427-1996 including cost of testing, all materials, taxes, transportation. This item shall be executed as per drawing attached.

Mode of Measurement-

The measurement of this item shall be taken as per number basis of completed work as per description of item, specification and drawing. Payment will be made per number of service connections made. Unit Price includes labour required, excavation, fitting, refilling, closing the water supply in that area, dewatering and restarting the water supply, transportation. 15% amount shall be withheld till satisfactory hydraulic testing.

36. PUSHING M.S. PIPE BY PUSH THROUGH METHOD

The pipes pushed through the Railway / Road embankment should have minimum cushion of 2.0 m (As shown in the Railway's approved Drawing) above the pipes. The cautionary boards should be kept at sufficient distance from the point of crossing. The pushing should be done with the use of hydraulic jacks / winch machine as per the standard procedure of the Railways. Every precaution should be taken that while pushing no settlement takes place in the track / road the embankment should be protected with sand bags to avoid any slippage during working. The temporary thrust bed / thrust walls constructed for pushing should be dismantled after completion of pushing work. The M.S. pipe barrels shall be field welded with electric arc welding machine. The entire work should be carried as per the latest specifications of the Railway Department for pushing of pipe work. Jacking of the M.S. Pipes to form the opening

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under the Railway track under running traffic condition maximum allowable deviations from the theoretical alignment will be limited to 200 mm horizontally and 100 mm vertically. Any deviation beyond this tolerance will be rectified by the tenderer at his own cost. Any temporary structures such as thrust walls etc shall be dismantled immediately after completion of the pushing work. Minor seepage water which can be dewatered manually by bucket etc shall be done by the contractor and no extra payment will be paid for this however if the subsoil water is heavy and needs dewatering by pumps than it will be paid as per regular practice of MJP & ZP.

Mode of Payment

Payment shall be made on item wise basis.

37. STAINLESS STEEL 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 stainless steel piping in it or welding to fix the stainless steel pipes to stainless steel 50 mm dia Pipe supports together. cleats, etc. are included in this item. The stainless steel piping shall be provided along with required specials, fixtures, fastening, etc. and stainless steel piping shall be bent in circular or spiral railing pipes and shall be jointed by stainless steel collar or welded as per necessity. The diameter of stainless steel 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 MJP & ZP's type design in force. 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.

38. ALUMINIUM DOORS & WINDOW

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)

39. PLASTIC EMULSION PAINT

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Bd.P.6.:- Bd. P.6. Providing and applying plastic emulsion paint of approved quality, colour and shade to old and new surfaces in 2/3 coats, including scaffolding, preparing the surface to receive the paint and applying putty complete.

Bd. P.6.1. General:- The item refers to painting the old and new plastered surfaces, with plastic emulsion paint.

Bd.P.6.2. Plastic Emulsion:- Plastic emulsion shall be of the approved manufacture like that of Jenson Nicholson, Asian Paints, Shalimar Paints, etc or of equivalent quality. The Colour and shade of the emulsion shall be as approved by the Engineer.

Bd.P.6.3:- Scaffolding:- As for Bd.P.1.

Bd.P.6.4:- Preparing the surface:- This shall be done as per manufacturer's specification. If no specifications are furnished by manufacturer then instructions in Bd. P.4.3. shall be followed.

Painting:- Procedure of painting with plastic emulsion shall be as specified by the manufacturer. When no specifications are furnished, following specifications, shall generally apply. Add about 50 per cent water to plastic emulsion paint. Mix thoroughly and then strain through a cloth. Brush the paint on wall. Allow to dry properly. On this, putty prepared by mixing whiting and plastic emulsion paint shall be filled whenever necessary in holes and depressions and rubbed dry and touched up with plastic emulsion paint. For the second coat add about 15-20 per cent water and give a coat by brush. For the third coat if and when specified, the same procedure shall be followed. No brush marks shall be seen.

Bd. P.6.6. Item to include:- The rate shall include all labour, material and tools, required to carry out following operations:-

1. Providing the plastic emulsion paint and whiting.
2. Scaffolding
3. Preparing the surface to receive the paint.
4. Applying the paint as specified above.

Bd.P.6.7. Mode of measurement and payment:- As per Bd. P.1.

40. WATER PROOF CEMENT PAINTING

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General

This specification lays down the requirement of applying cement based paint in specified coats to concrete or masonry surface.

Materials

Cement paint with a base of white portland cement of approved manufacture. Colour and shade shall be used. Approved quality cement based paint shall be brought to site in original air tight containers with seal intact. Scaffolding wherever necessary shall be provided to the entire satisfaction of the Engineer-in-Charge.

Preparation

The surface to be painted shall be cleaned of all loose dust, and dirt 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.

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.

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.

Mode Of Measurement And Payment

The item includes,

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- a) All materials and labour for painting.
- b) All equipment and scaffolding.
- c) Curing as per specification
- d) Non uniform colour or shade shall be rectified without any extra cost. The item shall be measured and paid in per Sqmt basis of area ainted.

41. RCC BANDHARA

Designing, providing and constructing R C C bandhara across river near jack well including excavation for foundation in all type of soil, murum, soft rock, hard rock by chiseling, wedging, line drilling, by mechanical means or by any other means other than blasting including trimming and leveling the bed, removing the excavated material upto a distance of 50 meters beyond the area and all lifts including backfilling, etc. as per approved design and drawing. Providing and laying in situ Cement concrete for RCC work in RCC M-300 including M.S./Tor reinforcement (fusion bonded epoxy coated) (design in M-250 and construction in M-300).Item includes providing and fixing M.S.sluce gate in position as per detailed drawing and including cost of all material. Necessary provision for constructing cofferdam in river basin including excavation ,filling the middle portion with B.C.soil (in gunny bags if required) Item include dismantling of cofferdam after completion of work including required dewatering as per direction of Engineer-in-charge. The design is to be got approved from Government recognized Engineering college. Scope of work as below.

1. Design of RCC bandhara .
2. Length of bandhara - m .
3. Average height of bandharam.
4. Section arrived as per approved design.
5. Excavation in all type strata for required depth (including backfilling) as per design.
6. RCC for stem, toe, heal in M-300 including with anchoring steel Dowell bars at specific distance and to a safe depth.
7. Cofferdam as required to complete the whole work.
8. Dewatering as and when required from starting to finishing of work.
9. M.S. sluice gate-.... m x.....m - Nos. The weight of sluice gate should not be less thankg.

The R.C.C. bandhara is to be constructed as according to contractor's own design and drawing . The scope of work includes survey at site of work of Bandhara ,collection of other allied data from Irrigation department, preparation of design

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and drawings from reputed R.C.C consultant and got it checked from any recognized Engineering college. The charges for the same are to be borne by the agency. The detailed specifications for items operated for construction of R C C bandhara i.e. excavation,R.C.C.,etc.will be governed by the specifications of relevant items given under various sub works in the tender.

The obligatory data is as below.

G.L. R.L.	m (Average)
R.L. at top of Bandhara	m
H.F.L. at Bandhara site	m

In addition to above ,all other relevant and necessary requirements for construction of R.C.C. Bandhara are to be fulfilled by the agency without any extra claim.

Break up of payment

1.	Approval of Design and drawing	-	2 %
2.	Cofferdam	a) Construction	- 15 %
		b) Dismantling	- 5 %
3.	Excavation	-	15 %
4.	RCC work below GL	-	20 %
5.	RCC work above GL (Half height)	-	20 %
6.	RCC work above GL (Full height)	-	20 %
7.	Providing and fixing sluice gate and all misc. work	-	3 %
	Total	-	100 %

The breakup of payment given for this item is tentative. However the agency is to submit his own break up and get it approved from S. E. if required

42. PROVIDING AND FIXING M.S. LADER

Ladder shall be manufactured as per the details provided in the tender item. All the materials and labour required for executing the item are to be provided by the Contractor at his cost. The ladder shall be properly fixed at site

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as directed and the bottom and top shall be properly embedded in 1:2:4 CC block as directed at Contractor's cost. In order to have stiffness to the ladder, cross supports or stiffeners at suitable intervals as directed, shall be provided of suitable M.S. flats duly embedded in walls or welded to the ladder. The specification for this item as given in the Standard Specification Book (Red Book) published by PWD Department shall be followed.

Mode of Measurement & Payment & Payments

The item shall be measured and paid in Rmt basis.

43. RUBBLE STONE SOLING

(Sub-work No.....,item no.....)

GENERAL

After the structural foundation, plinth construction and filling are completed, rubble soling of specified thickness shall be laid over the consolidated plinth filling, hand packed and compacted. The specification of the work as per Standard Specification Bd.A-12)

MATERIALS

The stones to be used shall be broken rubble with fairly regular shape and free from weathered, soft and decayed portion. The rubble shall be of sound stones of the type mentioned in the item and selected for their larger size. Stones shall be of the full height of the soling and the length and width shall not generally exceed 2 times the height. The stones to be used for wedging in the joints between larger stones, shall be chips of the largest size possible to fit in the interstices. All sound and suitable rubble obtained from the foundation excavation and approved by the Engineer shall be necessarily made use of first unless otherwise directed.

CONSTRUCTION

The bed on which rubble filling is to be laid shall be cleared of all loose materials, leveled, watered and compacted and got approved by the Engineer before laying rubble soling.

Rubble soling shall be laid to the specified thickness closely packed by hand and firmly with their broadest face downwards. The interstices between adjacent stones shall be wedged in with stones of the proper size and shape and well driven in with wooden mallets to ensure a tightly packed layer. Such

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wedging shall closely follow the placing of the larger stones. After hand packing and wedging, compaction of the soling shall be done thoroughly with logramme` Adequate care shall be taken by the contractor while laying and compacting the rubble soling to see that the masonry or any part of the structure is not damaged. Rubble soling shall be started only after the masonry is fully cured.

BROKEN RUBBLE

- a) Supplying broken rubble of approved of approved quality and size at site.
- b) All labour, material, tools and equipment for handling, laying, hand packing and compacting the rubble.

Any other incidental charges to complete the work as per sanctioned plan.

MODE OF MEASUREMENT & PAYMENT

Rubble soling shall be measured and paid in cubic meters limiting the dimensions to those shown on the drawings or as directed by the Engineer. The dimensions shall be measured correct to 2 places of decimals of a meter and quantities worked out correct to 2 places of decimals of a cubic meter. No deduction shall be made for voids. The correct rate shall be for a unit of 1 cum

44. PROVIDING AND APPLYING WASHABLE OIL BOUND DISTEPER

(Sub-Work No. Item No.)

The surface to be distempered shall be cleaned and all cracks, boles and surface defects shall be repaired with gypsum and allowed to set hard. All irregularities shall be sand papered smooth and wiped clean. The surface so prepared must be completely dry and free from dust before distempering is commenced. In the case of walls newly plastered, special care shall be taken to see that it is completely dry before any treatment is attempted.

The washable oil bound distemper of the approved shade of colour conforming to IS:428:1969, shall be used after applying priming coat of petrifying liquid or other primer as may be recommended by the manufacturers of the distemper.

The rate shall include all labour, material, equipments and tools for carrying

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out the following operations.

- Providing the primer and distemper and mixing the distemper.
- Scaffolding
- Preparing the surface to receive the primer and finishing coats.
- Applying the priming coat
- Applying the distemper as specified above in the number of coats, mentioned in the item.
-

Mode of Measurement & Payment

This item will be measured and paid in Sqm basis.

45. PROVIDING PRESSURE GROUTING

(Sub Work No., Item No.....)

Providing pressure grouting at a pressure of 0.56 kg/sqcm in required row /zigzag fashion as specified at 1.50 m interval as per site condition to stop leakages through water retaining structures to the entire satisfaction of the Engineer-in-charge including material compound ,hardening materials, compressor equipment including scaffolding smooth finishing etc. complete.

MODE OF MEASUREMENT

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

46. DESILTING THE SUPPLY WELL

(Sub Work No., Item No.)

Desilting the Supply Well, Intake Well / Head Works, sump of water supply/ sewerage works etc. in wet or dry condition including lifts upto 9 M and lead upto 150 M as required beyond the work site, stacking, spreading, including necessary guarding, etc. complete, as directed by Engineer-in-charge.

MODE OF MEASUREMENT

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

47. LOWERING AND FIXING OF SLUICE VALVES/KINETIC AIR VALVES

(Sub-work No., Item No.)

This item includes fixing of valves at work site including cost of transportation, loading, unloading, etc. all materials and labours required for fixing, including testing. The size of nuts, bolts and packing shall be as per IS specifications and suitable for the type of valves and as per the directions of

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the Engineer-in-charge. The location of the valves shall be decided by the Engineer-in-charge. Before any of these valves are fixed at the pre-determined position, these shall be cleaned, greased and it shall be checked that these are in proper working condition. Sluice valves shall be properly supported on wooden sleepers till the anchor blocks sets.

Sluice valve - PN..... mm dia.
 mm dia
 mm dia
 Air valve (Double Ball)mm dia
 Kinetic Air valve PN mm dia

Hydraulic Testing

The pipeline and valves should be hydraulically tested upto the required pressure as per IS, satisfactorily and leakages if any should be repaired at the time of hydraulic testing. The 10% amount of the lowering, laying and jointing the pipe 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 the any other sub-works for such testing.

MODE OF MEASUREMENT

The item will be measured and paid on the No. basis. 90% payment will be made after lowering and fixing and remaining 10% will be released after satisfactory hydraulic test.

48. M.S. ROSE PIECES

(Sub-Work No...., Item No....),

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 mm diameter at 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 and provide closing plate. 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.

Mode of Measurement & Payment

This item shall be measured and paid in weight per Kg. basis.

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49. PROVIDING FUSION BONDED EPOXY COATING

(Sub-work No, Item No.),)

Providing fusion bonded epoxy coating to reinforcement bars as per ASTM-755 specification for a thickness of 175 (+50) microns including extra cost on account of careful handling, extra cost on account of using PVC coated binding wire instead of G. I. wire, extra cost on account of touch-up material supplied by coating agency and repair work extra cost account of transportation to and fro from steel yard at ----- toplant at Daman and Plant at Daman to work site by trailer, loading, unloading, including all taxes (Central and Local), etc. complete

MODE OF MEASUREMENT AND PAYMENT

The item shall be measured and paid in weight per MT basis.

50. PROVIDING AND LAYING C.C.FLOORING

(Sub-work No., Item No.)

Providing and laying cement concrete flooring 40 mm thick with cement concrete M-25 laid to proper line, level and slope in alternate days including compaction, filling joints marking lines to give appearance of tiles 30cm x 30cm or other approved design, finishing smooth (with extra cement) in approved colour as directed and curing etc. complete.

MODE OF MEASUREMENT AND PAYMENT

The item shall be measured and paid in weight per Sqm. basis.

51. REFILLING OF TRENCHES OF PIPELINE

(Sub-work No., ItemNo.),

After lowering, laying, jointing and welding of pipe line, site gunitting and concreting work, refilling of trenches with available excavated stuff shall be done.

The available excavated stuff shall be laid in layers of 15 cm to 20 cm. Each layer shall be watered and compacted before the upper layer is laid till the required level is reached. First 2 layers of 15 to 20 cms shall be free from stones or chips or any harmful material, to protect the pipe from damage.

Only soil or soft murum shall be used for filling.

Originally filling shall be done 30 to 40 cms above natural ground or road level.

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Sinking below the road or ground level, if noticed till the completion of work, the contractor shall have to make it level at his cost.

This item includes,..

- a) Clearing useful excavated material of rubbish bracking clods, stone, etc.
- b) Conveying the useful excavated material upto 500 M and filling in layers, watering and compacting.
- c) All labour, equipment and other arrangements necessary for the satisfactory completion and completion of the item.

Mode of measurement and payment

The payment shall be made 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.

90 % payment s made after completion of lowering ,laying and remaining 10% amount will be withheld till satisfactory hydraulic testing of pipe line is given.

52. MURUM BEDDING

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(Sub-Work No, Item No.),

The specification contained in the Standard Specification Volume-II published by Public Works and Housing Department, Govt. of Maharashtra, Chapter Bd.A-10, Page 263 shall apply. In addition to above, following specifications shall govern.

Murum bedding shall be done with approved quality of soft murum, selected from excavated stuff and approved by the Engineer-in-Charge. The murum shall be collected from available excavates stuff and to be utilized if murum is not available from selected excavated stuff, it should be brought from outside and rates payable will be as stipulated in the tender item. Thickness of murum bedding will be 15 cm.. The contractor shall be paid for one Cubic Meter of the filling laid and compacted and will be paid upto two place of decimal of Cum.

Murum bedding shall be laid in exact 15 cm thickness for full width of excavation, it shall be well rammed with hand rammers so that pipe line is laid on firm bedding. Collection of murum from excavated stuff and carting upto the work site is included in the item and contractor shall make his own arrangement for procurement and carting of murum at his cost.

Mode of Measurement and Payment

Quantity shall be measured in Cubic Meter. The dimensions shall be measured upto two Decimal of Cubic meters and quantity shall be calculated upto two places of Decimal of Cubic meter. Payment for murum bedding will be made after lowering, laying and jointing of the pipe.

53. B.B. MASONRY CHAMBER

(Sub-Work No. , Item No),

Providing and constructing B.B. masonry valve chambers of internal size x and x m or as size as per Schedule-B and as per approved drawing for ESR/MBR/WTP etc.

The work is to be carried out as per type design or drawing of the department and as per detailed description of the item in Schedule-B of the tender. Sizes of chamber mentioned in the item are the clear internal dimensions of the chamber after completion of plastering. Unless otherwise mentioned in the wording of item in Schedule-B of the tender the rate for this item shall include following allied works.

a) The cost of extra excavation in all types of strata which is in addition

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to the line trench, refilling the sides and disposing off surplus stuff will be paid separately under relevant item.

Excavation covered by pipe line trenches coming under M.H. chamber shall not be admissible for payment.

- b) Providing and casting at site 15 cm thick bed concrete in CC M-100 below external size of complete chamber.
- c) Providing B.B. masonry side walls in 225 mm thick in CM 1:5
- d) Providing 20 mm thick plaster in CM 1:3 from inside.
- e) Providing cement plaster 20 mm thick in CM 1:3 from outside at least upto 30 cm below ground level.
- f) Providing top coping 15 cm thick in M-150 with smooth finishing to surface.
- g) Providing and fixing in position pre-cast RCC manhole frame cover.
- h) Unless otherwise directed by the department the finished top of the chamber constructed on road surface and shall not cause hindrance to traffic.

Mode of Measurement

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

54. PROVIDING AND SUPPLYING C.I./D.I. FLANGED PIPES

Sub-Work No., Item No),

The item includes supply CI/DI flanged pipes as per latest IS and approved by Engineer-in-Charge. The cost of pipe should be including all taxes central and local, railway freight, transportation upto site of work or departmental store.

The item will be measured and paid as per running meter basis.

55. PROVIDING AND SUPPLYING C.I.FLANGED / S/S SPECIALS

(Sub-Work No., Item No),

The item includes supply CI flanged/s/s specials as per latest IS and approved by Engineer-in-Charge. The cost of specials should be including all taxes central and local, railway freight, transportation upto site of work or departmental store.

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The item will be measured and paid as per kg. basis.

56. DISMENTLING OF ESR

(Sub Work No. , Item No.)

Dismantling of ESRs of various capacities and heights using crane (10 MT capacity) and handing over M.S./ C.I./ G.I. pipes, valves, bends, etc. to the Department However taking steel reinforcement by the dismantling agency including removing dismantled materials from site and disposing them at suitable place as directed, etc.complete. Capacity of E.S.R. upto 2 lakh literes and staging upto 12.00 M height in conjusted area. Note:- Above 12 M staging height add 5% per meters staging of ESR of any capacity.

Mode of Measurement

This item will be measured and paid on per lit. basis.

57. PROVIDING AND ERECTING WIRE FENCING

(Sub Work No., Item No.)

Providing and erecting 1.5 meter high wire fencing with seven rows of barbed wire supported on mild steel angles (50 x 50 x 6 mm) at 2.5 meters centre to centre including excavating pit for foundation, fixing posts in cement concrete blocks of size 45 x45 x 45 cm, fastening the wire and painting the mild steel angles with one coat of red lead primer and two coats of painting etc. complete.

MODE OF MEASUREMENT

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

12. OBLIGATORY REQUIREMENT AND

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SPECIFICATION FOR HEADWORKS/WTP/ESR/GSR

1) Head works:

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.

1. IS:456-2000
2. IS:875
3. IS:11682
4. IS:1893 with inclusion of seismic zones as per latest circular.
5. IS:1786 for cold worked steel high grade deformed bar (Tor steel of 415 and Mild steel of grade – I shall only be used . If not available FE500 can be used without any financial burden to the department)
6. IS;13920-1993 for ductile detailing. BSI Publication S.D. 34 (S & T) 1987.
7. IS:3370:2009 (Part – I to IV) for water retaining structures.
8. 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).
9. 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.
10. The design shall be carried out by the contractor at his 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

Jack Well

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

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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 baypumps 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 ofmotor, and dynamic load of pump, including column assembly as.....MT.
4. There shall be a M.S. ladder from pump house floor to have access upto RL 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 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 RL M shall be designed for non-cracking condition.

Pump House

1. 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..... M. The clear size of the pump house shall be m x m. The outer column shall be continued upto roof level with internal beams/lintels etc. The total height of pump house shall be minimum M upto 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

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of rolling shutter shall be ... × ... m & other size shall be ×.....m

3. Alluminium windows with glass shutters of size x..... M shall be provided with M.S. grill.
4. The paneling 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.
5. 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.

OBLIGATORY CONDITION FOR JACK WELL

1.	HEAD WORKS		
I	Jack Well		
a)	Location	:	
b)	Type of Construction	:	R.C.C. M – 300
c)	Average of bed level of Jackwell	:	m.
d)	Floor level of jack well	:	M
e)	Dia of Jackwell	:	M
f)	Depth of Jackwell	:	(Top RL - Bottom RL.....) = Total 00 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

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		and then assembly design shall be submitted.
--	--	--	--

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

II	OVER HEAD PUMP HOUSE.		
a)	Size of pump house	:	
b)	Clear height of P.H.	:	.....m for two floor
c)	Construction	:	RCC Framed structure with B.B. Masonry works
d)	Top RL of pump house	:	.....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 extension
h)	Alluminium windows	:	..... m Nos
j)	Lintel (RCC)	:	Over windows and rolling shutter
k)	Chajja (RCC)	:	Over rolling shutter and window of size M.
l)	Cement plaster	:	20 mm for outside and inside face with neeru finish in CM 1:4
m)	Flooring	:	Polished tandur stone flooring
n)	Distemper	:	White wash inside of pump house.
o)	Water proof cement paint	:	Outside of pump house and expose face of Jackwell.

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Note:

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 carried out.

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

R.C.C. Bridge

Designing of R.C.C. Bridge from reputed structural consultant, getting checked from reputed Government Engineering Colleges approved by MJP & ZP at contractors own cost. After due approval of said design & drawing in construction of the RCC bridge shall be carried out as per specification & condition of the agreement till its satisfactory completion .

Design :

The following details should be taken into consideration while carrying out design.

Clear width of RCC bridge shall be m for vehical movement with provision of chairs for carrying mm dia.....pipes along with cable trench / tray.

Length of bridge shall be..... m

The height of bridge shall be 1.0 m above the highest flood level.

IS to be referred :

1. IS:456 (latest edition). Water retaining structure / water container shall be Constructed in M300 and remaining structures shall be constructed in M-250

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2. IS: 3370 :1965 Part-I, Part-II and Part-IV .
3. IS:1893:1975 (Latest edition)
4. IS:875:1964
5. National Building Code of practice ,Government of india Latest edition , Publication of ISI.
6. 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.
7. IS:13920 for Seismic Zone-III

Width of foundation :

Depending upon the safe design of the structure but not less than 2 M.

Height of Bridge :

The height of bridge shall be 1.0 m above the highest flood level and should be in level with floor level of RCC Jack Well and the Jackwell slab and bridge dock slab shall be monolithic to avoid overturning of Jackwell.

Drawing :

Drawing should be based on the actual survey & investigation done at the site and submitted along with Field Book for the said purpose . The detailing of each aspect of the work thus designed should be incorporated in the drawing.

Construction :

The entire work shall be carried out as per the specification laid down in the document and as directed by Engineer-in-charge in the matter.

The foundation of the bridge shall be 3.0 m below respective ground level of cross section of bridge.

The entire structure of RCC Bridge shall be designed in M-250 mix and

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shall be constructed in M-300 mix with required reinforcement. There should be provision for RCC chairs for carrying mm dia Rising Main and cable carrying tray.

The deck slab of RCC bridge shall be designed in such a way that it should be monolithic with floor slab of Jack Well to avoid overturning of Jack Well.

Length of the bridge shall bem.

The said work also includes the cost of necessary coffer dam, dewatering , diversion of flow of water during construction.

Terms Of Payment :

Mode of payment is on item basis.

All other relevance guidance shall be taken from other obligatory data condition enclosed in this document.

- Seismic Zone – III (Preferably one zone higher than prevalent earthquake zone)shall be considered for effect of earth quake while designing.
- Check for eccentricity shall be carried out as per I.S. 456 (Latest edition)
- Design with limit state method is not acceptable
- Irrespective of the design, minimum dia. Of the bars to be used in concreting shall not be less than 8 mm dia. Tor steel.

Constrution :

The construction shall be in R.C.C. carried out as per –

- i) Current I.S.S.
- ii) Standard specification latest edition of Maharashtra Publication.
- iii) Foundation shall be designed for saturated soil condition and permissible stresses shall be reduced as per I.S.3370/1967 and sub sequent amendments.

Bearing Capacity :

The agency should take necessary core samples across the length of bridge @ 30 M. c/c to decide the bearing capacity and shall be approved from competant authority.

Guarantee For :

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Contractor shall stand gaurentee for the stability of the structure and due performance of all the works included in the tender for the period of 5 y` from the date of completion of the work. The Contractor shall be responsible for the technical correctness of the design submitted by him. The structure shall be as per the best recognized Engineering practice . If any provisions are found to be inadequate, faulty or not in accordance with best Engineering practice , necessary modifications will have to be carried out by the contractor at his own cost ,at any stage during execution of the work and no extra payment shall be made for such modification.

Programme Of Work :

On acceptance of the tender the contractor shall submit his programme of carrying out the work giving due bar charts & target dates of completion . The surplus excavated stuff shall be removed from the site of construction without any extra charges as directed by Engineer-in-charge.

Metal :

The metal required for the work of R.C.C. Bridge should be black basalt and it should be brought from approved quarry only .

Submission Of Design And Drawings :

After finalization of Tender , the contractor shall design R.C.C. Bridge from reputed structural consultant , getting the same approved from Reputed Government Engineering colleges at contractors own cost. Any addition data that may be required by the department with reference to the offer have to be submitted by the contractor and shall furnish five sets of design and drawing finally approved by the department before the execution of work is actually started.

1) WATER TREATMENT PLANT

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.All launder channels,connecting pipes,Inlets and outlets shall be designed for 20% overload while units of WTP shall be designed for the rated capacity

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Aeration Fountain

Aeration Fountain shall be cascade type and designed forflow . To avoid splashing , the height of collecting launder shall be upto two launders

Accessories

- 1.2 m wide walkway and 25 mm dia double row S.S pipe railing at the outer periphery of aeration fountain. It is necessary to provide RCC stair for inlet chamber. Glazed coloured tiles in colour cement shall be provided to cascade and collecting launder. As approved by Engineer in charge for Aesthetic appearance

Mechanical Equipment

The central inlet to the chamber shall be of RCC pipe of required thickness and dia with bell mouth at its top, increased to suitable diameter covered with dome shaped SS 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.

Measuring Flume, Flow Measuring Equipment etc..

a) 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.

b) Accessories

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

c) 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

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3000 cum/hour correct upto 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. The Channel shall be 10 to 15 times the width of throat so as to achieve uniform flow.

Flash Mixer

a) 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).

b) Accessories

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

c) Electrical and Mechanical Equipments

This will be consists of the following

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- i) Frame agitators with stainless steel blades and stainless steel vertical shaft mounted on bearing of sufficient strength to prevent vibrations.
- ii) 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.
- iii) Suitable size outlets with proper controlling arrangements of flow.
- iv) Water tight penstock on the inlet.
- v) Protective covers of M.S. sheets duly painted for motor with tray to prevent failing of lubricant into water.
- vi) D.I. pipe lines between flash mixer and clariflocculators shall be provided with control valves and suitable chamber`
- vii) Flash mixer draining arrangements shall be provided with a suitable sluice valve and chamber.

Clariflocculators

a) 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, (c) 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.

b) Construction

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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 D.I. pipes of suitable diameter from flash mixer outlet to central inlet shaft of the flocculation chamber. The portion of D.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 DI pipe K-7. The pipes will be encased in CC M-300 upto cover 20 cm on all sides for length below the floor of the clariflocculator. 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 6 mm thick S.S right angle V notch to give clear fall in the launder. 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.

c) Accessories

The clarifier will have 1.20 M wide peripheral walkway all round with S.S. pipe railing 25 mm dia in two row at the inner/outer circumference as per

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general specifications for mechanical engineering works.

d) 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 epoxy coated, M.S. section of suitable size and Stainless steel section(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 S.S. 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 2 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 worm reduction gears shall be suitable for 8 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 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 worm., reduction gear 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

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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

Filter House and Rapid Gravity Constant Rate Sand Filters

a) 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.

- i) 1.20 m wide walkway all round the filter beds with double row of S.S. pipe railing of 25 mm dia as specified in the general specifications for mechanical engineering works.
- ii) Space for housing air blowers and panel board in a separate filter annex room with adequate working space. Minimum 5 x 5 metre shall be provided required for Air blowe`
- iii) An office room should be having required furniture computer fans table chairs as directed by Engineer in charge
- iv) Pressure reducing arrangement to reduce pressure of water supplied from wash water tank for back washing the filter beds if necessary.

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- v) 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.

a) **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 filter. 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 CaCO₃ 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. The filter media supplied shall be got tested from the reputed Government institute/College/Polytechnic.

c) **Construction**

The filter house and filter annex building shall be of RCC framed structure.

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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 S.S 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 S.S 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

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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

i) 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. All the valves used shall be of Kirloskar/IVC/IVI make only.

All pipes shall be of DI K-7-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.

All valves shall be provided with the Actuators

Under drainage system

- a. This shall be provided with Central manifold of RCC pipe with plain ended RCC tees to be laid over RCC flooring and laterals of UPVC 6 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

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laterals as per design of the Contractor to satisfy the obligatory requirement.

- b. 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%.
- c. 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.
- d. 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.
- e. **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 weir. 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

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3.5 to 4 m supported by due design. The influent channel should be designed for the velocity of 0.6m/sec.

- f. 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.
- g. General Layout and Carpet Area

Full details should be indicated in general layout plan.

C.I.D.F. Sluice Valve (Glandless) With Actuator

The Butterfly valves with electrical Actuators shall be provided for the inlet arrangement .The entire assembly comprising valve actuator reduction gear box and head stock shall be supplied by the approved valve manufacturer only and documentary proof for the same shall be submitted.

SLUICE VALVE

Providing, erecting and commissioning of 300 mm, 250 mm, 200 mm dia PN-1.0 Rating Sluice Valves without by pass shall be approved by the Executive Engineer and shall be provided in the delivery pipe of each pump. The sluice valves of cast iron body suitable for the PN-1.0 rating shall be provided and shall conform to relevant IS 6. The sluice valves shall be double flange, water works pattern, inside screw, non-rising spindle type and shall be fitted with double faced gunmetal taper wedge made in one piece and having two machined facing rings securely fixed into machine recesses in the wedge. The guides and the lugs shall be provided to guide the wedge through its full travel and the lugs and guides shall be lined with bronze. The bronze liners provided on guides and lugs shall be secured by counter sunk screws or rivets of nonferrous metals. The clearances (radial and lugs axial) between the lugs and guides shall not exceed 2.5mm. All valves shall be provided on delivery side of pump.

Materials Of Constructions:

Body, bonnet cover and wedges Grey cast iron

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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

Valve Actuator

Electromechanical valve actuator shall be provided for sluice valve of individual pumpdelivery line the actuator shall be electrically operated. However features shall be incorporated to disengage electric motor and operate the actuators manually.

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 undershoot 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 20% extra margin.

Drive

The actuator gear box shall be of the totally closed oil/greased lubricated type the arrangement shall be such that the gear case can be opened for inspection or disassembled without taking the valve out of the service. The drive shall incorporate bottom entry drive bushing which shall be easily detachable and machined to fit on valve spindle.

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

All the Sluice valves & Valve actuators shall be subject to factory test in presence of Superintending Engineer (M) or his representative and third party inspection agency approved by MJP & ZP.

The scope of third party inspection by the agency approved by MJP & ZP 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

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procedure.

2. High voltage test
3. Insulation resistance test
4. Checking wiring diagram and circuit

Acceptable makes: As per Mechanical approved make of MJP & ZP.

Bypass Arrangement

a) 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.

- i) Flash mixer and clariflocculato`
- ii) Filters totally and/or partially
- iii) Flash mixer and clariflocculators and filters
- iv) Clariflocculators shall be designed to take water to the chlorination point of pure water channel in the filter house proper.

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.

i) Piping

Pipes and specials shall be of D.I. LA Class.

- ii) The CIDF Butterfly valves with electrically/ Hydraulically operated actuators shall be provided instead of sluice valves/sluice gates, i.e. Clariflocculator drain, inlet channel,

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inlet valve of filter beds, outlet valves of filter beds, backwash pumps, blowers, etc. The CIDF Butterfly valves & Actuators , etc. shall be as per approved list of mechanical equipments of MJP & ZP.

Wash Water Tank

a) 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.

b) Allied Items

- i) Level Sensors will be installed
Level Sensors shall be installed in the filter house
- ii) RCC spiral staircases for access to the top of the tank and M.S ladder inside the tank.
- iii) 2 Nos of C.I. heavy-duty manhole covers with frames of size 0.9 x 0.6 m with locking arrangements.
- iv) Lightening conductor
One No. as per relevant IS specifications.
- v) Piping and Valves
D.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 UPVC pipes for chemical tank and sanitary block shall be provided from wash water tank.

Chemical House and Store Chemical Feeding Equipment

a) Design

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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.

b) 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 floor.

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.

c) Construction

i) 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

ii) First floor

The first floor shall accommodate minimum 3 RCC solution

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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.

a) 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.

b) 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

c) 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

d) TCL tanks for Pre-chlorination

These shall be as per post-chlorination requirement

e) 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 S.S pipe railing in double row and 0.85 m high. The operating platform of solution tank shall be provided with S.S 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) S.S. pipe 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

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corrosion proof tiles.

Wash Water Pump Sets

a) 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 hou` The pump characteristics shall be suitable for satisfactory operation for head range qualified. The pump speed shall not exceed 1500 rpm (Syn.). The efficiency shall not be less than 75% at duty point.

A space of 5mx5mx5m shall have to be provided at the start of pure water channel to accommodate the wash water pumpsets and allied electrical mechanical accessories . A sump of minimum 10 min. capacity and depth of 5 meter shall be provided for pumpsets.

Construction Features

The pumps shall be single stage horizontal split casing centrifugal pump. A priming funnel and cock shall also be provided. 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 lantern ring shall be axially splits grease lubricated type and shall be easily removable. 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

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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 painted with Zinc coating. The pumps shall be fitted with solid shaft vertical Motors

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.

A pressure Guage shall be installed on delivery side of each Pump

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	:	A1S1 410 (SS)
Shaft sleeves	:	SS
Flexible coupling	:	Forged steel conforming to IS:3445.
Wearing rings	:	Bronze

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

The scope of inspection is given below.

1. Review of raw materials test certificate and quality control procedures.
2. Hydrostatic test on casing.
3. Performance test.
4. Strip inspection after performance test for one random pump to check,
 - a) Rubbing if any,
 - b) Wearing ring clearances
 - c) Dynamic balancing of impelle`

VACUUM PUMP WITH MOTORS

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.

Contractor

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- | | | | |
|------|--------------------|---|----------------------------|
| 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.

- a) Vacuum gauge of suitable size duly calibrated.
- b) Drain lock
- c) 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.

Allied Items

Piping and valves

The piping shall be provided consisting of suction and delivery upto wash water tank inlet. It shall be of D.I.K-9 A-class of suitable dia. All piping shall be double flanged pipes and specials.

A Monorail Gantry at 6 metre height above chain pulley block shall be provided with capacity chain pulley block

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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.

Chlorine Room And Chlorinators

a) Design

Two numbers of vacuum type chlorinators having capacity to treat required flow at a dose 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.

b) 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 Rural water Supply Division Nandurbar 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 cylinder. 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,

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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,numbers minimum (Toners of 900 Kg) to be installed before commissioning.

c) 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.

- d) 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..

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 S.S pipe railing as

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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.

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 MV lamps and external shall be with HPSV 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.

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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 upto 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 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 actuato`

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.

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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 upto-date design and shall consist of,...

- i) Jar test apparatus to decide optimum alum dose including chemical/electrically operated stirrer.
- ii) One turbidity rod for measuring the turbidity of raw water.
- iii)
 - a) A latest type optical turbidity meter for measuring the clarity turbidity of filtered and settled water.
 - b) A turbidity meter specially to measure turbidity of pure water with digital display alongwith 2 Nos of spare kits.
- iv) One electrically operated pH meter (Aquascope) with full range of compactor discs with necessary reagent.
- v) Two chloroscopes for measurement of chlorine with necessary reagent.
- vi) One wash basin of large size for laboratory use with inlet pipe connections from main and washout pipe arrangements upto manhole.
- vii) Plastic (white/transparent) buckets of 15 liters capacity - 2 Nos.
- viii) 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

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- | | | |
|----|---------------------------------------|-------|
| 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 |
- x) One electrically operated 'Beaker' laboratory flocculator for stirring solution.
- xi) 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.

xii) 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.

- xiii) 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.
- xiv) 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.
- xv) The contractor shall provide 1 No. of Godrej medium size almaries

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and Godrej book case and 1 No. of large Godrej table 6 Nos of chairs along with 3 Nos of cushioned stools.

- xvi) A quartz type battery operated 30 cm dia wall clocks.

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 gutter, which shall be as per standard practice.

Pure Water Sump

a) Design and construction

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

b) Allied equipments

- i) 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.
- ii) Suitable decorative RCC ventilators shall be provided.
- iii) 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.
- iv) Sufficient No. of access ladders/steps shall be provided.
- v) Overflow from pure water sump is necessary upto 15 m length from sump.
- vi) In addition to sump, 30 minutes capacity chlorine contact tank (CCT) shall be provided.

Pure Water Pump House

Pure water pump house with double floor arrangement having pump floor area m × m & panel floor area × m shall be located on pure water sump and shall have adequate area to accommodate pumps. A

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continuous corbel beam shall be cast at 6 m pump house level to install overhead travelling trolley crane of capacity MT 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 Rural water Supply Division Nandurbar. 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. The details of pure water pump house with pump installation layout shall be got approved from SE Mech MJP & ZP

Conveyance Of Waste Water And Sludge Drain Arrangement

a) 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 D.I. pipes shall be used and to convey sludge from manhole to manhole RCC pipe shall be used.

b) 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.

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c) 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.

Sanitary Block**a) 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

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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.

a) **Allied items**

- i) Water feeding connection : G.I. pipelines of required size and lengths with specials, valves, etc. shall be provided for all the units.
- ii) Flushing tanks : Flushing tank of 14 liters capacity shall be provided for each water closet and urinal respectively.
- iii) Sewage effluent connection : All units shall be provided with suitable size and length of outlet connections to septic tank.
- iv) There should be one unit of instant geisure in bathroom.
All the structural steel works/fabrications are to be provided with application of Hot Dip Zinc coating according to specifications as per IS 4759:1996(reaffirmed 2006)

Break up of payment

The break up of payment during construction for every unit shall be as per mentioned in following tables.

Sr.No.	Description of Item	Civil cost`	Mechanical cost`
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%	8%
5.	Rapid sand filter and filter house	22%	19%
6.	Chemical house, administrative block, chemical tank, chlorine room, chlorinator, lab equipment, sanitary block and air blowe`	14%	18%
7.	Wash water tank, wash water pumps, pipe assembly valves etc.	6%	11%

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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%

DESIGN 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.

1 Rated Capacity

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

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 & ZP 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 capacityMLD and in accordance with the detailed specifications.

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

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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.

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.

5 Foundation

- i) The structure should be founded on hard strata and minimum depth of excavation in hard strata shall be not less than 1.00 m.
- ii) The Contractor has to verify the bearing the same during execution and base the foundation suitably.
- iii) 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.
- iv) All the structures should be checked for seismic zone III (one Zone higher than prevalent earthquake zone)action for safety and stability.
- v) 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.

6 Type of Construction

Reinforced Cement Concrete : Cast in-situ.

Contractor

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To be based on following ISI Specifications.

- i) IS:456 (latest edition), Water retaining structure/water container shall be constructed in M-300 and remaining structures shall be constructed in M-250
- ii) IS:3370:1965 Part-I, Part-II and Part-IV.
- iii) IS:1893:1975 (Latest edition)
- iv) IS:875:1964
- v) National Building Code of Practice, Government of India Latest edition, Publication of ISI.
- vi) 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.
- vii) IS:13920 for Seismic Zone – III. (one Zone higher than prevalent earthquake zone)

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 & ZP does not agree to that alternative, the Contractor shall have to adopt the alternative as suggested by the MJP & ZP without extra cost.

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

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- a) **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.
- b) **For Mechanical work** The requirements as laid down in Appendix-B of these tender document shall be essentially govern the offer of the Contractor.
- c) **For Electrical Works** The specification laid down in Appendix-C of these tender documents shall be binding on the Contractor wherever relevant.
- d) **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.

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 market. 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 Rural water Supply Division Nandurbar. 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.

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

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- a) 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.
- b) 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.
- c) The sidewalls of water retaining structures shall be designed for the worst condition such as
- i) Tank full conditions without earth filling from outside.
 - ii) Tank empty conditions with submerged earth pressure from outside.
 - iii) There shall be no counter-force coming inside the structures.

I) 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 Cascaders | : | 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 |

Contractor

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II) 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.
- h) channels Upstream and downstream of Parshall flume : Channels of 15 times throat width shall be provided Upstream and downstream parshall flume for uniform flow. Bypass shall be at this channel.

III) 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 : one for each clariflocculator designed as to carry required MLD
- d) Proper discharge regulating : Discharge with maximum

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- discharge Velocity of 1.8 M/Sec. for normal flow, the velocity should be minimum 0.8 M/Sec
- e) R.P.M. of blade : not more than 150 and should be suitable for achieving required G.
- f) Free Board : 0.50 M. for normal flow
- g) Value of G to be achieved : $G = 300 \text{ sec.}^{-1}$
- h) Prime mover : Not less than 3.00 B.H.P. Design calculation of flash mixer To be submitted for approval.
- i) Loss of head : 0.4 M (maximum)
- j) Side water depth : 3.5 M. (maximum)
- k) Shaft and Blade : Stainless Steel
- l) Access : 1.2 M. wide (minimum) peripheral walkway connected with other components.
- m) M.S. Covers for motors : 6 mm thick M.S. sheet cover for motors

V) Clariflocculator

- a) No. of units and type : 1 No. radial flow
- b) Rated flow : As per data sheet
- c) Detention Period :
- o Flocculator 30 minutes
 - o 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.
- d) Side water depth Free board : 3.50 M. maximum Not less than 0.50 M
- e) Floor slope : 1:12 slope shall be towards central sludge pocket only.
- f) Inlet shaft : RCC of adequate capacity, with velocity between 0.8 M to 1.8 M range.

Contractor

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- g) Surface loading : 30 Cum/Sqm/day i.e. with overloading.
- h) Weir loading : 200 to 300 Cum/M/day i.e. with overloading.
- i) 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
- j) Velocity at the weir : Not more than 0.3 M/Sec.
- k) 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.
- l) Launder : RCC outside the tank
- m) Velocity of flow : In 0.8 M to 1.8 M per sec. flocculator inlet pipe.
- n) Range of velocity Gradient 'G' : 10 to 75 sec⁻¹
- o) Agitator assembly : 4 Nos. of Paddle agitator for each Flocculator.
- p) 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.
- q) Type of clarifier bridge : Full diameter of flocculator and half diameter of clarifier.
- r) Diameter of C.I. drain pipe : 300 mm dia.
- s) Sludge Removal : Mechanized unit with continuous removal of sludge under pressure.
- t) Bleeding pipe with telescopic valve arrangement shall be provided in a separate RCC Chamber.
- u) Access : 1.2 M. wide (minimum) peripheral walkway connected

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- to other components.
- v) Sludge Scrapper : Mechanical sludge scrapper 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 : 4800 Liters/Sq.m/hour normal it shall not exceed 6000litres/Sq M /hour when one of the bed is under maintenance
- g) Overloading to be guaranteed : 20% of above rate
- h) Area of filter house excluding filter beds which are open to sky and excluding control bay : Not less than 150 Sqm With closed roof for administrative officer with sanitation block, lap, blowers, wash waterpump, MCC and enterance lobby.
- The filter bed and filter house shall have closed roof
- i) Free board : Not less than 0.50 M.
- j) Rate of back wash of water Duration of back wash : 600 liters/Sqm/minute. 10 Minutes
- k) Minimum free fall from outlet weir to pure : 20 cm.

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	water channel	
l)	Velocity in the pure water channel with overloading Capacity	: 1 to 1.5 M/sec. with 20% overloading.
m)	Under drain system	: UPVC pipe of designed Dia. Class 15 with C.I. header tees.
n)	Lateral travel of wash water upto the edge of wash water gutter	Maximum 1.2 M.
o)	Water level above sand surface	Minimum 1.30 M.
p)	Uniformity coefficient of sand.	1.3 to 1.7
q)	Effective size of sand	0.55 mm to 0.65 mm.
r)	Specific gravity	2.5 to 2.65
s)	Inlet sluice gate for each filter bed	As per design, but 100 mm dia (Min.)
t)	All outlet sluice valve dia for each filter bed	As per design, but 100 mm dia (Min.)
u)	Drain valve of each filter bed	As per design, but 100 mm dia (Min.)
v)	Minimum control valves for each filter bed when sectional wash is adopted	Filter inlet – 1 No. per bed Filtered water outlet – 1 No. per Sec. Wash water outlet – 1 No. per bed Air inlet-1 No per Sec Wash water inlet- 1 No per Sec
w)	Loss of head	Maximum 1.8 to 2.0 M.
x)	Design 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

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accordingly pipe respective.

All valves shall be provided with electrically operated actuators

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 calculations 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

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600Lit/Sqm/ Min + 10 Cum.
Vide detailed specification
under DS-7

- c) Location : Chemical House/filter house/independent structure

X) 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 stand by)
 f) Pipe works and valves : To be designed at 2 M./sec velocity minimum size 100 mm.
 Location & priming : upto 8 MLD on pure water sump with priming arrangement. Above 8 MLD near pure water channel with positive suction

Note : Total area should be as per schedule 'B'

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

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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.

XX) 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.).

XX) 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

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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.

- a) 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.
- b) 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.
- c) The colour scheme shall got approved from the Executive Engineer.

3. DESIGN REQUIREMENT & OBLIGATORY LEVELS OF ESR

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 & ZP before tendering and designing the schedules. The contractor should make his own arrangement about probable depth and strata for resting foundations. The obligatory levels, locations ,storage capacity and bearing capacity of each ESR /GSR /BPT/MBR shall as shown in table below.

Details of levels, capacity,location etc

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S.No	Location of GSR/BPT/MBR /ESR	Cap. in Liters	Avg. Ground Level	Bearing Capacity in T/m ²	Low supply level and full supply level
			M		M

Note: No change in these levels will be permitted & RCC design will not be accepted by MJP & ZP, if changes are made.

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

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1. The reservoir will be a covered RCC container supported on RCC column footing and termed as braces, etc as per drawing.
2. Suitable RCC spiral staircase 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 size. 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 & ZP

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 & ZP shall be rendered.

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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

Material

1. Sand, Metal & Bricks

Sand, metal & bricks of best quality will be insisted. Samples of these will have to be got approved prior to use on work.

2. Cement

OPC of 43 grade in jute/polyethylene bags (weighing 50 Kg each)shall be used for all water retaining Structures & for all works. The cement shall be used of following brands (1) Ultratech, (2) Birla and (3) Ambuja. Super plasticizer in the proportion of 0.5 % (0.25Kg/cement

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bag) should be used.

3. Reinforcement

Tor steel of 415 grade & mild steel grade-I shall only be used as per design. /The steel to be used shall be of grade Fe-250, Fe-450 as per design.. FE500 shall be used at no extra cost to department if FE415 is not available in the market

The Contractor shall have to procure the steel from open market .The steel procured by Contractor shall be only tested one and the Contractor shall produce manufacturer's test certificate without which it shall not be accepted. Further the Contractor shall arrange to get tested any sample from steel brought at site by him in laboratory at his cost and results should be submitted to the MJP & ZP Defective steel brought by Contractor shall be rejected and will not be allowed to be used.Test certificate stating the chemical composition & characteristics of the product should also be produced.

At least three samples of each diameter should be tested from every 5 tons (MT) or part thereof. Tested lots only will be permitted to be used.

4. Concrete

The PCC and RCC work shall be as per IS 456:2000.(OR LATEST REVISION) Concrete mixer shall be used for preparing concrete.

Vibrator shall be used to consolidate concrete while placing in position. Mix design will be allowed only if required for minimum infrastructure like weigh batching plant, Needle vibrator and proper form work is provided.

While concreting, representative samples in form of Test Cubes shall be taken by the MJP & ZP 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.

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5. Water Level Indicator Assembly

Mercury water level indicator with 15 mm dia. required GI pipes (medium duty), stop cocks (2 nos.), necessary fixtures suitable for staging height upto 15 M and water depth up to 5 M to represent depth of water in tank, etc. shall be provided and fixed by the Contractor as per direction of MJP & ZP. The indicator should be fixed to exterior face of column at about 1.5 M above ground level at site or as per requirement of Engineer –in-charge.

6. Lightning Arrestor

Lightening arrestor conforming to IS and Indian Electricity Rules shall be provided. The lowermost portion of tape for 2 metres above ground level and 2 meters below ground level shall be enclosed by 50 mm GI pipe of 'M' class.

7. Pipe Railing at free end of Catwalk

Railing shall be of GI pipes 'A' class not less than 25 mm diameter in two rows and shall be fixed in position to RCC posts or M.S. angle posts of size 65 mm 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.

8. M.S.Ladder

M.S. Staircase with one meter width from ground level to bottom slab, gallery to roof slab with intermediate platforms .The ladder should be fabricated from heavy angles, steps & railing as directed by Engineer-in-charge.

9. S.S. Ladder in container

Two nos of heavy type S.S. Ladder & of required length & design as approved by Department shall be provided by the contractor for each ESR. This shall be for the access inside the tank .The contractor shall furnish to the MJP & ZP/... MC the various manufacturers of the ladder.

10. Centering Work

Before starting the work of ESR, the Contractor should submit design of centering and its detailed drawing for approval by MJP & ZP. This

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set of drawings shall be kept at site. This condition shall be applicable for the ESR with Contractor's design.

Designing, Providing & Constructing RCC ESRs Own Design Specification and Design Criteria for RCC ESR/MBR/GSR/Sump with Contractor's own Design-Designing, Providing and Constructing RCC ESR/MBR

1. General Note

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.

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.

The design Engineer has to prepare and submit a note on design methodology and construction and drawings in two copies through the contractor. The note should indicate general description, and salient features of the design covering the following points

- a) Capacity
- b) Shape and type
- c) The construction of ESR should include the following works
 - i) The Spiral Staircase should be constructed up to the top of

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dome irrespective of capacity of ESR.

ii)The plinth area (at ground brace) of the ESR should be covered with PCC which should be given slopes in all direction for the staging of ESR.

- i) Duck foot bends for inlet, outlet & washout shall be rest at ground level for which necessary footing should be designed and constructed.
- iv) Inlet, outlet and washout valves should be provided at ground level without chamber The necessary drainage arrangement in case of leakages of valves should be done.
- v)The room shall be constructed below the container of ESR (From GL brace to 1st brace of ESR) . The size of the room should accommodate Inlet, outlet and washout valves, Chlorination &Automation arrangements.
- d) Staging height of tank indicating various levels
- e) 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.
- f) Maximum and minimum subsoil water level.
- g) Site plan showing location of ESR.
- h) Line diagram showing dimensional and sectional elevation with important levels.
- i) Design parameters proposed to be adopted for detailed design.

This note 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.

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.

The Design Engineer will be required to attend the office of Engineer-in-Charge for preliminary discussion for scrutiny remarks,

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etc. whenever required with all reference data, books, IS specifications, etc. at his own cost.

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.

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.

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.

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.

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.

The design should be with consideration of uplift pressure & seismic pressure.

Design Conditions

The Contractor shall quote with his own design with following conditions:

1. The design of R.C.C. ESR shall be carried out by a designer having minimum Qualification of Post Graduate in Structural

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Engineering. He shall sign the design and affix his name and stamp.

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

- a) IS 456:2000
- b) IS 3370 -Part I and IV
- c) IS 875: 1987 Part I to Part IV
- d) IS 11682:1985 for RCC staging of overhead tanks.
- e) IS 1893:1984 with inclusion of seismic zones as per latest circular.
- f) IS 1786 for cold worked steel high grade deformed bars
(Tor steel of Fe-415 grade & mild steel grade-I shall only be used.)
- g) IS 13920:1993 -for ductile detailing, applicable for ESRs under seismic zone III, IV and V. (Recent editions of IS shall be referred.)
- h) B.S.I. publication S.P. 34 (S and T) 1987.
- i) IS;13928:Ductile detailing of RCC structure.

3. Foundation for ESR

The foundation should have the required safe bearing capacity. Minimum depth of foundation shall satisfy the following criteria.

- a) Depth in soft rock shall not be less than 1M or depth in hard rock shall not be less than 0.5 M.
- b) The total depth in all strata put together shall not be less than 1.50M.
- c) In B.C. Soil, raft shall be provided at minimum of 3M, No extra payment shall be given to the contractor on increase in depth of foundation.

4. The free board shall be included in the depth of water for design purposes.

5. Minimum free board shall be 300 mm; measured below bottom of roof beam.

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6. Maximum actual water depth shall not exceed 5.0 M.
7. Clear cover for reinforcement shall be provided as below :
 - a) Footing/Raft 50 mm. at bottom and sides & 40 mm. at top
 - b) Columns 40 mm.
 - c) Braces, beams, slab (Bottom and roof), 40 mm vertical wall, gallery.
8. Minimum thickness of container members shall be as below.
 - a) Bottom slab and vertical wall 200 mm.
 - b) Roof slab 120 mm.
9. The design and casting of container members which includes bottom and roof beams, bottom dome, roof dome, vertical wall and gallery, shall be done in M-30 grade of concrete
10. The staging of ESRs (Columns, braces, footing/Raft) shall be designed in M-25 Grade of concrete, however, casting shall be done in M-300 grade of concrete. The concrete of grade M-15 shall be used for PCC work.
11. The staging shall be designed for ductile detailing as per IS 13920/1993, wherever applicable.
12. The width of braces shall be maximum of the following in case of Earth Quake Zone (as applicable) and above.
 - a) 250 mm.
 - b) There shall be a minimum distance of 75 mm between two adjacent reinforcement bars provided in the braces as well as beams.
13. Minimum width of brace – 300 mm.
14. Width to depth ratio in case of braces shall preferably be more than 0.30

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15. Increase in permissible stresses in braces, for Earth Quake/ Wind force design, will not be allowed.
16. The centre to centre distance between braces shall not exceed 4.50 M for ESR/MBR of capacity less than 5 lakh liters and 6.0 M for ESR/MBR of capacity above 5 lakh liter. At the joints of braces and columns, the links to the column bars shall be tied properly and this shall be thoroughly checked before concreting.
17. Wherever annular raft is provided, the inside and outside width of raft shall be provided in such a way that the centre of gravity of upward reaction shall co-inside with column/raft beam centre.
18. Uplift pressure on the foundation of structure should be considered as per available water table at site in rainy season. However, minimum uplift up to 50% of depth of foundation below ground level should be considered in the designs.
19. Epoxy paint as per specifications & 20 mm. thick cement plaster with CM 1:2 proportion with water proof compound shall be provided to the container from inside (including roof beams and roof slabs/dome, etc.)
20. The shape of container may be square or circular. Similarly the column shape may also be square or circular.
21. Minimum size of column (width or diameter) shall not be less than 400 mm. columns, if required to be provided inside container, for supporting roof ring beam/ dome/ slab, may be provided as per design requirements, with minimum size (width or diameter) requirements of 200 mm. Centering should be designed by the contractor. Same should be approved by the Competent authority before construction. Only steel/ plywood centering shall be used. For design having more than 6 columns, provision of internal bracing is obligatory. All columns shall have the same foundation level as far as possible. In any case the foundation level difference

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between any two columns shall not exceed 1.50. In such case 'Sway Analysis' of the staging shall be done and additional reinforcement or increase in sizes shall be provided if necessary. When safe bearing capacity of foundation is less than 15Tones/m² only raft foundation should be provided.

22. Minimum dia. of main bars in the footing shall be 10 mm. and minimum clear distance between reinforcing bars shall not be more than 180 mm.
23. Water density shall be taken as 1000 Kg./Cum and live load on gallery shall be considered as 300 Kg./ m². Minimum load of water proof treatment on roof slabs be taken as 100 Kg./ m²
8. The diameter, weight per metre, tensile strength and minimum elongation properties of steel, brought by the contractor/supplied by the department, shall be got tested from the approved laboratory before using it. It shall be used only when the test report indicates that the steel is in accordance with the I.S. specifications and design presumptions.
25. i) The inlet, outlet, overflow and bypass piping shall be of cast iron D/F. pipes only.
- ii) Spout type overflow arrangement shall not be allowed. Overflow arrangement shall be from top to bottom as a vertical pipe assembly with proper drainage arrangement.
- iii) Duck foot bends for inlet, outlet & washout shall be rest at ground level for which necessary footing should be designed and constructed.
- iv) The manhole frame and covers, provided in the roof slab, shall be of cast iron only. Mild steel covers shall not be allowed.

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The above four conditions i.e. 25 (i), 25 (ii), 25 (iii), 25(iv) shall be followed without substitutes and equals. No M.S. piping and spout type overflow arrangement shall be accepted, even if rebates, etc. are offered.

v) Inlet, outlet and washout valves should be provided at ground level without chamber. The necessary drainage arrangement in case of leakages of valves should be done.

vi) Lightening conductor, water level indicator, central ventilator and M.S. ladders/RCC staircase shall be provided as per department specification.

26. The design submitted by the Contractor, shall be got checked from the nearest Government Engineering College/ Government Polytechnic/ reputed Engineering College, for which the scrutiny charges shall be borne by the contractor. The delay in checking designs from third party as above shall be treated as the delay on the part of contractor for operation of tender clauses.

27. Size of inlet, outlet, overflow, bypass piping and valves including scour valve shall be specified as per actual requirements & makes of valves shall also be approved by the Engineer-In-Charge.

28. Capacity of the container of the tank shall be the volume of the water it can store between the designed full supply level and the lowest supply level.

29. Height of staging shall be the vertical difference between lowest supply level and the average ground level and the site of tank.

30. Rectification of Defective Members

If it is found that certain members are defective and are found giving acoustical or vibration disturbances even though these may be

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structurally sound, rectification of such members should be done by the contractor free of charge and to the satisfaction of Engineer-In-Charge.

31. Criteria For Design Of RCC ESR

1. The structural design of water tank shall confirm the following standard specification & codes of practice of IS.(latest revisions or editions).

IS:456-Code of practice for plain & reinforced concrete

IS:875-Code of practice for structural safety of building standards

IS:3370-Code of practice for concrete structures for storage of liquids (Pat-I to IV)\IS:1893-Criteria for earth quake resistant design of structures.

2. Capacity of the container of the tank shall be the volume of the water it can store between the designed FSL & LSL.

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.

The walls of the container shall be designed for free board full condition.

The tank foundation & other members of the structure shall also be designed for free board full condition.

Part of the tank in contact with stored water & enclosing water vapor above FSL shall also be constructed in M30 grade of concrete.

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.

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

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adopt bearing capacity so arrived for design.

The factor of safety shall be adopted as per clause 6.1 of IS:6403:1971.

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.

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 investigator`

For the design of foundation of the solid raft type, the plate theory shall be adopted.

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.

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.

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Column may be assumed as fixed at the top of footing,

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

For all RCC & PCC components unit weight of concrete shall be taken as 2500 Kg/M³ & 800Kg/M³ respectively.

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

Shape of the structure shall be most economically as directed by Engineer-in-charge & shall be selected depending upon site conditions.

Design shall be based on worst possible combination of various loads, moments, shears & resultant stresses in the tank in following cases:

- 1) tank full
- 2) tank empty
- 3) uplift pressure, if any.

Tank full means depth of water inside the container is up to full height of container including free board.

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.)

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

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adequate strength. Calculation of stresses shall be as per Para 3:3:2 of IS:3370,Part-II (latest version)

5 ***Permissible Stresses in Concrete for resistance to Cracking.***

For calculation resistance of members to Cracking the permissible stresses tension (direct & due to bending) & shear shall conform to the values specified in table 1 of IS:3370 (Part-II) The permissible tensile stresses due to bending apply to the face of the member in contact with the liquid". In members with thickness less than 225 mm & in contact with the liquid on one side, these permissible stresses in bending shall apply also to the face remote from liquid.

For Strength Calculation

For Strength Calculation, the permissible concrete stresses shall be in accordance with Para 44 of IS: 456:2000 where the calculated shear stress in concrete alone exceeds the permissible value, reinforcement acting in conjunction with diagonal compression in concrete shall be provided to take the whole of the shear. The maximum reinforcement shall conform Cl.25.5.1.1&25.5.1.2 of IS: 456:2000.

6. ***Permissible stresses in steel.***

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.

The modular ratio 'm' for different concrete mixes shall be as under.

Grade of Concrete	Modular Ratio 'm'
M15	19
M20	13
M25	11

Modulus of Elasticity of concrete E_c shall be taken as $5700 E_{ck}$ where E_c is the characteristic cube strength of concrete in N/mm^2 as per Cl.5.23.1 of IS:456.

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7. Age Factor

Age Factor for increasing strength shall not be considered for the design.

8. Units

Design should be in Metric units only.

9. Detailing

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.

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).

Covers to Reinforcement

Minimum clear to reinforcement shall be per IS: 456 and IS: 3370 (latest version of IS shall be referred).

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

Spacing of Reinforcement

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Spacing of reinforcement shall be as per Para 25.3 of IS:456-1978

Spacing of lateral ties of column shall satisfy the provisions of Para 25.5.3.2 of IS:4562000.

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	6%
Roof slab	7%
On completion of spiral staircase / M.S ladder	7% 3%
On completion of plastering and finishing	1%
On erection of pipes valves	3%

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and constructions of chambers	
Hydraulic testing	4%
Other Miscellaneous items as per A/T including snowcem, painting water level indicator, lighting Conductor, M.S. ladder and nameplate etc.	4%
	100 %

Note:Standard colour schemes shall be provided by the MJP & ZP for ESRs & WTPs.

**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	17%
Vertical wall Remaining height	18%
Roof slab	10%
On supply pipes valves and specials	15%
Plaster finishing	5%
On erection of pipes valves and constructions of chambers	3%
Hydraulic testing	10%
Other Miscellaneous items as per A/T including painting water level indicator, lighting Conductor, M.S. / SS ladder and nameplate etc.	8 %
Total	100 %

13. SPECIFICATION FOR ELECTRICAL INSTALLATION

Contractor

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1) GENERAL

- a. All the electrical installations, both internal & external shall be carried out as per Indian Electricity Rules, 1956 and subsequent amendments from time to time.
- b. The work shall be carried out through a licensed electrical contractor registered with Government of Maharashtra.
- c. 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.
- d. 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.
- e. All safety measures shall be adopted for all the installations as per Indian Electricity Rules i.e. providing adequate earthing, proper installation, etc.
- f. 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.
- g. All the external and internal electrical installations shall be properly fixed to poles and walls respectively to withstand storm, rains etc.
- h. The electrical installations, internal and external shall be adequate and should have decorative finish, keeping in view architectural beauty of the civil structure.
- i. 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 calander

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months for its performance, design equipments and workmanship, from the date of commissioning.

2) 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 made his own arrangement for electric supply per construction purpose. Department will made 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

1. Motor

All the prime movers required for mechanical equipments 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 'Fonstruction as per IS: 12615. 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 & ZP.

2. 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

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HP auto transformer starter shall be provided, these starters shall be of fully automatic.

Recommended Makes : As per approved list of MJP & ZP.

3. Panel Board

a) 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.

- i) Reception of power from pump house by providing and laying adequate size 3.5 core aluminium armoured cable.
- ii) Distribution of power to filter house, chemical houses and lightening purpose etc.
- b) This switch gears and controls gears components shall be
 - ii) The design and components of this panel shall be for approved prior to its fabrication.
 - iii) One No. adequate Capacity MCCB for reception of power shall be front operated and shunt release type.
 - iv) 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.

- i) 415 Volts suitable sized bus-bars with neutral housed in enclosed compartment horizontal/vertical formation.
- ii) Inter panel barriers in the bus bar chamber shall be of epoxy painted. The panel shall be fabricated from MS sheets 2 mm

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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.

4. Capacitor

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

5. 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.

6. 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

7. Labels and danger mark

Scheme of labeling shall be as under

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- i) Each compartment door shall have title label. The component / control on each compartment shall have function label.
- ii) 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.

- 8. 'Danger Live Terminal' with flash mark and volts in red letter on white background

9. 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

- 1. MCCB shall be of (i) LT /EE, Telemecanique/Siemense/C&S only
- 2. Digital Ammeter with 96 Sqmm size with CT having suitable ratio
- 3. 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.

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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:188. 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.

- i) Complete panel after assembling.
- ii) HV test on power and control circuits.
- iii) Simulation test of check functioning of control.

Documents

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

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be installed on the bridge of clariflocculator and should be waterproof and weatherproof. It shall consist 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 capacity, star delta starter and single phase presenter. The panel board should be waterproof and weather proof. The canopy 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 & ZP 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 & ZP.

Wiring

Internal

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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

- a) PVC sheathed wires : Multistrand copper conductor 660/440 Volts grade
- b) 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 & ZP.

Poles

- a) 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.
- b) 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.
- c) Painting : All the poles shall be nicely painted with one coat of red oxide and 2 coats of superior quality anticorrosive Silver paint.

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- d) 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.

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Ceiling fans of approved type with condenser, AC 50 Hz., 230 Volts and 1200 mm 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,

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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, laboratory 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.

Illumination

The value of illumination shall as given in table below.

Values of illumination at WTP

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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

Pumping Machinery

Due to Geographical situation the levels may vary, while execution of work. Hence, the agency is requested to get the levels confirmed. The material shall be procured after confirming and approval of actual head of pumps, make and size of all respective equipments by the Superintending Engineer (M). The pumping machinery and allied equipments will be allowed to supply after completion of head works, WTP so as to synchronize the commissioning of the scheme.

Agency has to submit the layout drawing of pumping machinery, sub-station and individual drawing of all equipments for approval well in time or as directed by the 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 equipments including wiring diagrams and charts in duplicate for periodical maintenance of equipment.

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Rectification of any defects during guarantee period of pump, motor, transformer and all allied electrical and mechanical, civil work shall be carried out immediately, so that water supply should not be hampered.

The necessary opening required for erection of pump set, cable, entry pocket, cable duct etc. shall be discussed during joint visit, so that during casting of floor, beams suitable arrangement is made.

The guarantee period starts from date of commissioning of the equipment. The defect liability period for the pumping machinery will be counted from the date of Trial Run of entire scheme for a period of 12 months. During this period all wear and tear to pumping machinery is to be borne by the Contractor. Considering this offer may be quoted

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.

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14.SPECIFICATION FOR PUMPING MACHINERY

Due to Geographical situation the levels may vary, while execution of work. Hence, the agency is requested to get the levels confirmed. The material shall be procured after confirming and approval of actual head of pumps, make and size of all respective equipments by the Superintending Engineer (M). The pumping machinery and allied equipments will be allowed to supply after completion of head works, WTP so as to synchronize the commissioning of the scheme.

Agency has to submit the layout drawing of pumping machinery, sub-station and individual drawing of all equipments for approval well in time or as directed by the superintending Engineer (M).

The general arrangement drawing mentioning dimensions of sump & pump house at WTP shall be got approved from Superintending Engineer (M) before execution.

The installation of following equipments shall be done under the guidance & supervision of representative of Manufacturer.

- 1) V.T. Pumps
- 2) VHS Motors
- 3) Transformers
- 4) VCB
- 5) Flow meters

Test Certificate and Manuals

The successful tenderer shall submit the test certificate for various components as called for in the specification if necessary and required by the Engineer. Certificate for material of construction of equipment shall be furnished. The successful tenderer shall also submit instruction manual in duplicate covering operation, maintenance and repairs of all equipments including wiring diagrams and charts in duplicate for periodical maintenance of equipment.

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Rectification of any defects during guarantee period of pump, motor, transformer and all allied electrical and mechanical, civil work shall be carried out immediately, so that water supply should not be hampered.

The necessary opening required for erection of pump set, cable, entry pocket, cable duct etc. shall be discussed during joint visit, so that during casting of floor, beams suitable arrangement is made.

The guarantee period starts from date of commissioning of the equipment. The defect liability period for the pumping machinery will be counted from the date of Trial Run of entire scheme for a period of 12 months. During this period all wear and tear to pumping machinery is to be borne by the Contractor. Considering this offer may be quoted

Mode of Payment

Break-up of the payment admissible for pumping machinery and other Electrical, Mechanical items shall be as under :

- a) 70% against supply of material as per approval
- b) 15% after completion of erection at site
- c) 10% after satisfactory commissioning of equipments
- d) 5% after satisfactory operation of 12 months.

DETAILED SPECIFICATIONS

The scope of work includes providing approved make pumps & allied Mechanical & Electrical equipments for the scheme as per requirement of the Department. The essential design features and detailed specifications of each and every item are as under. The layout drawing of pumping machinery & allied equipments shall have to be submitted to the Superintending Engineer (mech) for approval before actual procurement.

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1. VERTICAL TURBINE PUMP (WATER LUBRICATED) ESSENTIAL DESIGN REQUIREMENTS

The Vertical Turbine Pump offered shall satisfy the following basic design features.

- ◆ It shall have a rising head characteristic.
- ◆ The impeller adjustment shall be such that, the impellers run free in any installed condition in spite of the extension of line shaft caused by hydraulic down thrust and weight of shafting and 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.

The pumps shall have following technical parameters and particula`

- | | | | |
|-----|--|---|--|
| 1) | No. of pumps to be installed | : | Nos.....
.....working, stand by |
| 2) | Discharge | : | LPS |
| 3) | Duty head | : |mt` |
| 4) | Working head range | : | mt` to..... mt` |
| 5) | Shut off head | : | Not less than .....mtr. |
| 6) | Pump efficiency at duty point | : | Not less than 80 % |
| 7) | Speed | : | 1470 RPM |
| 9) | Column pipe dia | : | Not less than..... mm |
| 10) | Column pipe wall thickness | : | Minimum mm |
| 11) | Column pipe flange thickness | : | Minimum mm |
| 12) | Pump/Line shaft material | : | Stainless steel AISI - 316 |
| 13) | Total column length (Including bowl assembly) | : | M. |

Contractor

No. of corrections

Executive Engineer

14)	Strainer	:	Basket type, fabricated out of stainless steel bars
15)	No of Stages of Bowl Assembly	:	Not more than stages.
16)	Column assembly & other fasteners	:	Stainless steel AISI 316
17)	M.S. Sole plate	:	Minimum mm
18)	Base frame size.	:	Fabricated with ISMC mm
19)	Pump and column shaft	:	S.S. Not less than mm

V.T. Pump Sets (Water Lubricated)

The Vertical Turbine pump sets shall be (self water lubricated) suitable for following conditions and specifications.

- ◆ The pump shall be of approved by the Superintending Engineer (M) and shall conform to IS: 1710 & shall satisfy test & trial as per IS:5120 with latest modifications from time to time.
- ◆ Pump efficiency shall not be less than 80% at duty point under all circumstances & shall be maintained for 3 years from date of commissioning of the pumps.
- ◆ Constructional and design details of the set shall be as follows.

a) Impeller

Impellers shall be Stainless Steel CF8M shall be statically and dynamically balanced. Balancing holes in impeller are not acceptable.

b) Wearing Rings

It shall be of Bronze conforming to IS: 318 and suitable Grade and shall be of renewable type. It shall be held in place against rotation by screw in or locking with pins press fitted locked with pins. The wearing rings shall be provided on both impeller and casing.

Composite design of line shaft material and diameter and bearing centers shall ensure that the entire rotating assembly

Contractor

No. of corrections

Executive Engineer

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 Mtr. column length. Spider shall be provided with nitrile rubber bushing.

d) Suction Bell Mouth

Entrance dia of Bell mouth shall be such that the suction velocity shall not exceed 1.5 m/sec. and shall be of M.S. heavy duty/C.I. The shape and curvature of the bell mouth shall be designed for streamlined flow of bowl suction, the thickness of bell mouth shall not be less than 12 mm.

e) Strainer

Suction strainer shall be of flanged type heavy duty made from S. S AISI 410 plate of thickness not less than 10 mm. Total area of perforations shall not be less than 300% of entrance area of bell mouth. Stainless steel hardware shall be provided.

f) Bowl Assembly

The pump bowl / bowls shall be flanged type with machined matching of faces. The suction bell mouth, bowl assembly, column pipe and all joints shall be of flange joints. The bowls shall be capable of withstanding a hydrostatic pressure equal to twice the duty-head or 1.5 times shutoff head whichever is greater.

Contractor

No. of corrections

Executive Engineer

g) Discharge Head

Discharge head shall be fully flanged type fabricated from M.S./C.I. It shall incorporate full diameter radial branch (same as that of column pipe) stuffing box with renewable bushing and tapping for pressure gauge. It shall be of robust construction and shall be designed to support VHS or VSS motor & entire loading of pump assembly, water column etc. and shall withstand all static, dynamic, torsional loads hydraulic thrust imposed during operation from shutoff to stipulated operating conditions and thrust due to change in direction of flow without any vibration. The discharge head shall be capable of withstanding hydrostatic pressure equal to twice the duty head or 1.50 times shut off head whichever is greater. The discharge head shall be properly supported to eliminate vibration. An air cock of 50 mm dia with same size of 'B' class G.I. pipes, bend shall be fixed to the discharge head. The G.I. B Class pipes shall be suspended vertically in the well with adequate length to release air.

h) Sole Plates

M.S. Sole Plate of minimum 30 mm or above thickness machined from both the sides shall be provided. The size of sole plate shall cover entire pump supporting girders (base frame). Suitable opening shall be provided at the center, considering diameter of bell mouth bowl assembly and strainer.

The Sole Plate shall be fixed with nut bolts on 200 mm. ISMC frame and shall be machined. The sole plate shall be kept on girders and blue matched to the extent of least 60 % of contact area. If necessary uneven surface shall be smoothed 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.

Contractor

No. of corrections

Executive Engineer

- i) The pump shall be driven by vertical hollow shaft Or Solid shaft motor and shall be provided with non-reversible ratchet, check nut, flexible coupling etc. complete.
 - j) Special tools i.e. two pairs of erection clamps for the column and line shaft as recommended by manufacturer, adjusting nut spanner & impeller collate hammer shall be supplied with each pump set.
 - k) Pre Lubrication Tank & Other Accessories : - In order to lubricate line shaft bearing of the pump, lubrication arrangement comprising the following shall be provided.
 - l) Lubrication tanks 2 Nos. interconnected with each other common for all pumps fabricated from M.S. sheet metal of thickness not less than 5 mm and of capacity not less than 1 m³. The tank shall be cylindrical and shall be installed on pump mounting floor with concrete saddles or as directed during execution by Engineer-in-charge.
- ii) Each lubrication tank shall be equipped with the following :
- a) W. L. side gauge
 - b) Over-flow lead to sump
 - c) Drain valve lead to sump
 - d) "B" Class G.I. pipe connection with isolating valve and non-return valve to each pump column assembly for lubrication. The valve shall be located near the tank. The size of individual pipe and valve to pump shall be 40 mm diameter.
 - e) Inlet connection with solenoid operated valve and suitable removable strainer by suitable tapping from common header.

Contractor

No. of corrections

Executive Engineer

- 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 & ZP.

Factory Test

- a) Hydrostatic Test

Following item shall be tested at hydrostatic pressure equal to twice duty head or 1.5 times shut off head of bowl assembly whichever is higher as per IS : 5120.

Bowl assembly - Each.

Discharge Head. - Each.

Column Pipes At least 20% of total quantity

b) Performance Test

Performance test of each pump should be carried out. The test shall generally be carried out as per IS:10981 of acceptance test for pumps Class - B. The test shall be carried out at full speed & full load at manufacturers work. The test shall cover six points i.e.

- i) duty point.
- ii) Two points above duty point.
- iii) Two points below duty point.
- iv) Shutoff head
- v) Power consumption at all above points.

The test at reduced speed will not be accepted.

c) Strip Inspection

Two pump sets out of five of pure water after completion of its performance test and as selected by the Engineer or inspector at random will be offered for strip-inspection and dimensional checking. The manufacturer/contractor shall submit all required dimensional drawings. Minimum points as under shall be checked.

Contractor

No. of corrections

Executive Engineer

- Original dimensions of impeller, neck ring etc.
 - Condition of all components particularly bushes, bearing, and wearing rings to examine for undue rubbing, wear etc. and verification of dimensions after performance test.
 - Dynamic balancing of (a) Impeller, (b) Flexible coupling, shall be carried out as per relevant IS.
 - Verification of clearance and tolerance between :
 - a) Wearing rings
 - b) Impeller shaft and bearings
 - c) Impeller shaft and key
 - d) Shaft and flexible coupling
 - e) Key and keyway on shaft at (d)
- 5) Finish of water passage in impeller and diffuser.
- 6) Review of raw Material Test Certificate and quality control procedure.

Any deviation from tenders specifications & related IS shall be pointed out in inspection report.

Material test certificate to the various pump components shall be furnished.

Field Performance Test

Field test shall be witnessed by at least Two Engineers of MJP & ZP.

The test shall be carried out as per IS:10981 Code of acceptance test of pump Class-B, in general and stated below in particular. The purpose of field test is not to ensure whether pump performance as regards acceptance limit as per IS : 9137, the purpose is to ensure that the pump performance is generally acceptable or otherwise. Final acceptance shall be as per following criteria.

- i) Verification of guarantee for H and Q specified in Clause 9.4.1 shall be based on following liberalised tolerances.

Contractor

No. of corrections

Executive Engineer

X_{Hv}	<u>+0.006</u>
X_{Qv}	± 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.

Contractor

No. of corrections

Executive Engineer

- e) The field test shall be taken with entire head range in such a manner that it would cover at least 6 points (i.e. duty point, 2 above, 2 below and shut off). The guarantees for head and discharge shall be deemed to be fulfilled as per clause under 9.4.1 of IS : 10981.
- f) The field performance test at site is absolutely essential as above (a) to (e).

Make: As per approved list of MJP & ZP.

2. VERTICAL TURBINE PUMP (OIL LUBRICATED) ESSENTIAL DESIGN REQUIREMENTS

The Vertical Turbine Pump offered shall satisfy the following basic design features.

- ◆ It shall have a rising head characteristic.
- ◆ The impeller adjustment shall be such that, the impellers run free in any installed condition in spite of the extension of line shaft caused by hydraulic down thrust and weight of shafting and 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.
- ◆ The pump shaft shall be enclosed in oil tube having thickness not less than 4 mm
- ◆ The oil Tube shall be coupled with each other having bearing bush made up of Brass and suitable for shaft diameter.
- ◆ Necessary spider arrangement shall be provided to hold the oil tubes and to avoid the vibrations in oil tube.
- ◆ The shaft shall be adjusted in length in such a way so that the couplings of the shaft shall not be interrupted to the coupling of oil tubes

Contractor

No. of corrections

Executive Engineer

- ◆ The groove in Brass Bearing bush shall be provided in such a way that the SAE 10 oil will be easily pass through the bush.
- ◆ The oil tank of suitable capacity not less than 5 Ltr shall be provided along with pump and necessary controlling arrangement with solenoid valve and manual control valve shall be fixed to the provided tank to supply desired quantity of oil.
- ◆ The TT Plate (Tube Tensioning) shall be arranged and provided on Discharge head for Tensioning the oil Tubes and for passing the oil to the shafts provided.
- ◆ Necessary oil-water separator arrangement suitable for the shaft provided shall be mounted on the shaft and in the discharge case of the bowl assembly.
- ◆ The material of the pump shall be got approved before supply from the competent authority.

Necessary NPSH curve shall be submitted and minimum submergence required shall be stated. The system head curve and performance curve for all level conditions is to be enclosed.

The pump shall be suitable for satisfactory operation at the duty conditions, the head range stipulated.

The pumps shall have following technical parameters and particula`

- | | | | |
|-----|---|---|--|
| 1) | No. of pumps to be installed | : | Nos.....
.....working, stand by |
| 2) | Discharge | : | LPS |
| 3) | Duty head | : |mt` |
| 4) | Working head range | : | mt` to..... mt` |
| 5) | Shut off head | : | Not less than.....mtr. |
| 6) | Pump efficiency at duty point | : | Not less than 80 % |
| 7) | Speed | : | 1470 RPM |
| 8) | Column pipe dia | : | Not less than..... mm |
| 9) | Column pipe wall thickness | : | Minimum mm |
| 10) | Column pipe flange thickness | : | Minimum mm |
| 11) | Pump/Line shaft material | : | Stainless steel AISI - 316 |
| 12) | Total column length (Including bowl assembly) | : | M. |

Contractor

No. of corrections

Executive Engineer

13)	Strainer	:	Basket type, fabricated out of stainless steel bars
14)	No of Stages of Bowl Assembly	:	Not more than stages.
15)	Column assembly & other fasteners	:	Stainless steel AISI 316
16)	M.S. Sole plate	:	Minimum mm
17)	Base frame size.	:	Fabricated with ISMC mm
18)	Pump and column shaft	:	S.S. Not less than mm

3. CENTRIFUGAL PUMP (PURE WATER) ESSENTIAL DESIGN REQUIREMENTS

The Centrifugal Pump offered shall satisfy the following basic design features.

- ◆ It shall have a rising head characteristic.
- ◆ It shall be designed for non-overloading of prime mover.
- ◆ It shall be designed to run with closed sluice valve condition without overloading the prime mover.
- ◆ The pumps shall run smooth without noise & vibration. The magnitude of peak to peak vibration at slip will be limited to 100 microns at the bearing housing.

Necessary NPSH curve shall be submitted and minimum submergence required shall be stated. The system head curve and performance curve for all level conditions is to be enclosed.

The pump shall be suitable for satisfactory operation at the duty conditions, the head range stipulated.

The pumps shall have following technical parameters and particula`

1)	No. of pumps to be installed	:	Nos..... .....working, stand by
2)	Discharge	:	.....LPS
3)	Duty head	:	..... mt`
4)	Working head range	:	..... mt` to .....mt`

Contractor

No. of corrections

Executive Engineer

- | | | | |
|-----|-------------------------------|---|----------------------------------|
| 5) | Shut off head | : | Not less than mtr. |
| 6) | Pump efficiency at duty point | : | Not less than 80 % |
| 7) | Speed | : | 1470 RPM |
| 8) | No of Stages | : | Not more than stages. |
| 9) | Base frame size. | : | Fabricated with ISMC
mm |
| 10) | Pump shaft | : | S.S. Not less than mm |

4. HORIZONTAL CENTRIFUGAL PUMPS

Pump Performance

The pumps shall have preferably best efficiency point when operating at ... m of head. The pumps shall have a stable characteristics within the operating head range +7% - 15% i.e. to ... m shutoff head shall be minimum m.

Constructional Features of Centrifugal Pump

The pumps shall be single stage horizontally split casing, double suction centrifugal pumps. The casing shall be provided with tapping and bronze collared plugs for air release. The make of pump shall be approved make by the Executive Engineer.

The impeller shall be shrouded double suction type and shall be balanced both statically and dynamically. The interior surfaces and passages shall be smoothly finished.

The shafts shall be of solid type. The shaft sleeves shall be securely keyed to the shaft. The bearing shall be heavy duty, anti-friction ball bearing.

The stuffing boxes shall be of such design as to enable repacking without removal of any part except gland and lantern ring. The lantern ring shall be axially split water lubricated type and shall be easily removable. The stuffing boxes shall be provided with a drain hole for connecting drain pipe to drain the leaked water through gland.

Contractor

No. of corrections

Executive Engineer

The pumps shall be provided with a common base plate of fabricated steel or cast iron for mounting of pump and motor. If base plate of fabricated steel is provided, it shall be sufficiently rigid and design shall be got approved prior to fabrication. The fabricated base plate shall not be acceptable if shims plate are required for alignment of pump and motor set.

The coupling between pump and motor shall be steel pin and rubber bush type flexible coupling 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 faces and drilled to IS:1537.

Both suction and delivery ends of the casing shall be provided with a 12 mm (1/2") tapping for mounting of pressure gauges. The tapings shall be provided with bronze collared plugs. Each pump shall be provided with 150 mm dia pressure gauge and vacuum gauge with S.S. siphon tube, vibration damper and S.S. isolating cock and suitably calibrated to indicate pressure from 0 m to 100 m and vacuum of 0 to 760 mm of Hg.

All other accessories e.g. funnel, air vent etc. shall be provided. Also necessary cement concrete foundation block in M-200 shall be provided and cast by the contractor without any extra cost for erection of each pump motor set.

Material and Construction

- | | | |
|----------------|---|--|
| 1) Pump Casing | : | Grey cast iron conforming to Grade 20 of IS:210. |
| 2) Impeller | : | Bronze conforming to IS:318 Grade-II |
| 3) Shaft | : | CS. IS:2073, Gr. C-40 or SS AISI 410 |

Contractor

No. of corrections

Executive Engineer

- | | | | |
|----|-------------------|---|---|
| 4) | Shaft sleeve | : | Stainless steel S.S. AISI-410OR
C.I. IS:210 Gr. FG-200 |
| 5) | Wearing Rings | : | Bronze |
| 6) | Flexible coupling | : | Forged steel conforming to
IS:3445 |

Testing and Inspection

a) Mechanical and hydraulic shop tests on pumps

Each pump shall be factory tested for satisfactory mechanical and hydraulic operation at full load speed in presence of MJP & ZP authorities. The performance test shall be taken with entire head range in such a manner that it would cover at least five points on the head discharge curve (one at duty point and other above and below duty head). Three certified copies of test records for each pump shall be submitted to the Engineer immediately upon completion of the factory test.

Field Test

The field test shall generally be carried out as per IS. The volumetric measurements of discharge would be on the basis of depletion of levels in the sump from which water is pumped. Discharge measurement by calibrated ultrasonic flow meter also acceptable. The effective head shall be measured with pressure gauge fitted to delivery pipe at an elevation of at least 2 m. above the delivery pipe. The gauge shall be fitted at 1 m distance from the discharge nozzle. The reading may be taken with different gauges. The tenderer shall note that the stipulation of delivery valve be placed at at least 4 times the diameter away from the discharge nozzle cannot be simulated due to site conditions and no allowance for this deficiency shall be considered. The electrical inputs will be measured with the help of calibrated energy meter.

Contractor

No. of corrections

Executive Engineer

The pumps showing a fall of efficiency below guaranteed efficiency while operating at duty point shall not be accepted unless necessary rectification is carried out by the Contractor to restrict the efficiency shortfall in field test upto the quoted efficiency.

Testing

All the pumps shall be subject to factory test in presence of Executive Engineer(M)/Superintending Engineer (M) or his representative and third party inspection agency approved by MJP & ZP.

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 whichever is higher as per IS : 5120.

b) Performance Test

Performance test of each pump should be carried out. The test shall generally be carried out as per IS:10981 of acceptance test for pumps Class - B. The test shall be carried out at full speed & full load at manufacturers work. The test shall cover six points i.e.

- i) duty point.
- ii) Two points above duty point.
- iii) Two points below duty point.
- iv) Shutoff head
- v) Power consumption at all above points.

The test at reduced speed will not be accepted.

- Original dimensions of impeller, neck ring etc.

Contractor

No. of corrections

Executive Engineer

- 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)

Finish of water passage in impeller and casing.

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 & ZP.

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.

Contractor

No. of corrections

Executive Engineer

- i) Verification of guarantee for H and Q specified in Clause 9.4.1 shall be based on following liberalised tolerances.

$$\begin{array}{ll} X_{Hv} & +0.006 \\ X_{Qv} & \pm 0.09 \end{array}$$

- ii) As regards P-Q. characteristics for acceptance. It shall be checked whether motor is not getting overloaded within specified head range.

- a) Volumetric

Volumetric measurement shall be taken on the basis of rise of level in clarifloculator. In addition, one Ultrasonic calibrated flow meter shall be arranged by the contractor at his cost

- c) 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.

Contractor

No. of corrections

Executive Engineer

- 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).

5. 415 V HORIZONTAL FOOT MOUNTED MOTOR

KW of Motor	Minimum kW
Qty	2 Nos
Speed	1500 Rpm Synch.
Type	Horizontal foot mounted
Enclosure	TEFC - IP 23
Rated voltage	415 kV \pm 10 %
Frequency	50 Hz \pm 3 %
Phase	3 phase, AC
Insulation	"F" – Class
Duty	S-1

The tenderer shall provide 415 V totally enclosed fan cooled induction motors of approved make suitable for driving pure water centrifugal pumps (Item No.1). The motors shall conform to IS: 12615. The contractor shall have to supply winding data of motor duly signed by manufacturer.

The motor shall be suitable for voltage variations of \pm 10% and frequency variation of \pm 3% and combined variation of \pm 10%.

Contractor

No. of corrections

Executive Engineer

Design

- i) The rated power of the motor shall be at least 20% above at duty point and at least 10% above the maximum power required over rated head range of pump.
- ii) The starting time and locked rotor withstand time under hot condition shall have suitably discrimination for proper selection of protection relay. The locked rotor withstand time under hot conditions and at 110% rated voltage shall be more by at least three second than the starting time with driven equipment coupled and at 85% rated voltage.

The motor shall be suitable for restricted operation at following conditions.

- a) Accelerating the driven equipment from stand still to full speed within duration of one minute or less at 85% of rated voltage.
- b) Operation on load at 75% of rated voltage for 5 minutes.
- c) Two starts in quick succession from cold condition.
- d) One hot restart at maximum steady state temperature over ambient temperature of 48 Degree Centigrade
- e) Three starts per hour equally spaced over the duration after attaining thermal equilibrium.

The class of insulation of the motor shall be minimum 'B' class. However temperature rise of the motor when operating at extreme conditions of voltage and frequency variation shall not exceed 80⁰C by thermometer and 90⁰C by resistance over an ambient temperature of 45⁰ C at site.

Construction

Contractor

No. of corrections

Executive Engineer

The motor shall be foot mounted TEFC induction type. The motor shall be statically and dynamically balanced and critical speed shall not be in the range of 80 % to 120 % of the motor speed.

The motor shall having heavy duty anti-friction bearing, grease lubricated type.

The cable box shall be phase segregated and with degree of protection conforming to IP 54. The terminal box shall be suitable for termination of power cables as per size in cable schedule The fault withstand capacity of the cable box shall not less than the fault level specified in Section-1.

Accessories

Shaft mounted cooling fan of cast iron/aluminum or mild steel and dynamic balanced.

Test, Vibration And Noise

The vibration level should be within permissible limit (IS: 12075) and noise level shall be 80 db or less for which the certificate shall be submitted. Manufacturer test certificate should be submitted by the contractor.

6. VACUUM PUMP WITH MOTOR AND G.I. PIPING

The bidder shall design priming arrangement by providing and installing 2 Nos vacuum pumps (minimum of capacity kV 30, 3 HP). The arrangement shall be available for manual operation and shall be complete with suitable size of G.I. piping arrangement with required valves and specials. DOL starte`

The pump shall be capable of creating vacuum of not less than 600 mm on mercury evacuating air at normal temperature and pressure at the rate of not less than 150 Cum per hour (approx.). The pump unit shall be set type, operating on principle of formation pump of liquid ring due to rotation of rotor complete to

Contractor

No. of corrections

Executive Engineer

casting or operating on equally good principle. The casing shall be designed to withstand vacuum. It shall be complete with foot for mounting and suction and delivery nozzles. The rotor and its fitting shall be designed to withstand vacuum. It shall be complete with foot for mounting and suction and delivery nozzles. The rotor and its fitting shall be designed to withstand high temperature and stresses. The rotor shaft and shaft sleeves shall be heavy duty and designed for minimum wear. Stuffing box shall be adequately deep to prevent entry of gland leakage of bearings. The bearing shall be grease lubricated with arrangement for re-packing and refilling of grease.

- i) Casing .. C.I. (IS:210 PG 180)
- ii) Rotor, Rotor shaft .. Steel (E.N.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 on 415 V, 3 PH, 50 Hz electric supply. Accessories as under shall be provided with vacuum pump.

- i) Drain cock
- ii) Adjustable relief valves
- iii) Suitable size M.S. lubrication tank of capacity not less than 20 litre`

7. VERTICAL HOLLOW SHAFT MOTOR

The scope of the work includes providing approved make, vertical hollow shaft squirrel cage induction motor(min HP), conforming to IS 325 –1970,suitable to operate on 415 Volts +/- 10%, 3 Phase, 50 Hz, AC supply. The synchronous speed of the motor should be 1500 RPM. The insulation grade of the motor should be 'B'. The motor should be screen protected and drip proof type. **It should have suitable terminal box to accommodate incoming cable from starter & size of which shall be got**

Contractor

No. of corrections

Executive Engineer

approved from department. It shall be suitable to operate on +/- 10% voltage variation, +/-5% frequency variation and +/-10% voltage and frequency variation.

Thrust bearing shall be suitable and of adequate capacity to carry the weight of all rotating parts and the hydraulic down thrust. Non reversing ratchet or similar mechanism should be provided to the motor to prevent reverse rotation.

Continuous maximum rating of the motor shall be at least 20% above the maximum power absorbed by the pump under any operating point within stipulated head range of the pump, or at least 10% above the power required at shut off, which ever is higher.

However the motor rating should not be less than that mentioned in schedule 'B'.

All the motors shall be subject to factory test in presence of Superintending Engineer (M) or his representative and third party inspection agency approved by MJP & ZP.

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.

8. C.I.D.F. SLUICE VALVE (GLANDLESS) WITH ACTUATOR

Contractor

No. of corrections

Executive Engineer

The entire assembly comprising valve actuator reduction gear box and head stock shall be supplied by the approved valve manufacturer only and documentary proof for the same shall be submitted.

Sluice Valve

Providing, erecting and commissioning of mm dia PN-..... Rating Sluice Valves without by pass shall be of approved by the Executive Engineer and shall be provided in the delivery pipe of each pump. The sluice valves of cast iron body suitable for the PN-..... rating shall be provided and shall conform to relevant IS6. The sluice valves shall be double flange, water works pattern, in- side screw, non-rising spindle type and shall be fitted with double faced gunmetal taper wedge made in one piece and having two machined facing rings securely fixed into machine recesses in the wedge. The guides and the lugs shall be provided to guide the wedge through its full travel and the lugs and guides shall be lined with bronze. The bronze liners provided on guides and lugs shall be secured by counter sunk screws or rivets of nonferrous metals. The clearances (radial and lugs axial) between the lugs and guides shall not exceed 2.5mm. All valves shall be provided on delivery side of pump.

Materials Of Constructions:

Body, bonnet cover and wedges	Grey cast iron
Stuffing box and gland.	FG – 200 of IS-210
Spindle	Stainless steel IS:6603
Wedge and body rings	Leaded in bronze conforming
to grade-2 of IS:318	
Nuts and Bolts	As per IS: 1363
Wedge Nut	High tensile brass conforming
	to Alloy 3 of IS : 320

9. SLUICE VALVE(GLANDLESS)

Contractor

No. of corrections

Executive Engineer

A mm dia Class 300, Cast Steel sluice valve shall be provided on the delivery pipe of each pump. The valve shall be double flanged water works pattern inside screw with non-rising spindle. The valve shall generally conform to Class 300 rating of relevant international standard. The valve shall be suitable for operation with valve actuator mounted on valve body with reduction gear box and head stock.

The materials of construction shall be as per relevant standard with stainless steel spindle of grade specified in standard. Thrust bearing shall be located in suitable housing above stuffing box and shall be oil/grease lubricated. Construction shall be such that ingress of water into bearing housing is totally prevented.

The valve shall be subjected to test at manufacturer's works in the presence of the Third Party Engineer for seat and body test at the pressure stipulated for the rating and entire operation with valve actuator simulating field installations.

Material of construction of Valve

Body, Bonnet - CS ASTM A216 Gr WCB
 Body Seat Ring - SS CA15 / CS WCB +13% Cr. HF
 Wedge - CS WCB +13% Cr. HF
 Spindle & Gland Bush - SS AISI type 410
 Seal (O) ring – Nitrile rubber
 Back Seat Bush - SS AISI type 410
 Yoke Sleeve - SG Iron / Gun Metal
 Gasket - Spiral wound SS 304 + Graphoil filled
 Body Studs - ASTM A 193 Gr B7
 Body Bolts - ASTM A 194 Gr 2H
 Ends- **Flanged Drilled to ANSI B16.5, CL-300**

10. VALVE ACTUATOR

Electromechanical valve actuator shall be provided for sluice valve of individual pump delivery line the actuator shall be electrically operated. However features shall be incorporated to disengage electric motor and operate the actuators manually.

Actuators

Contractor

No. of corrections

Executive Engineer

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% extra margin.

Drive

The actuator gear box shall be of the totally closed oil/greased lubricated type the arrangement shall be such that the gear case can be opened for inspection or disassembled without taking the valve out of the service.

The drive shall incorporate bottom entry drive bushing which shall be easily detachable and machined to fit on valve spindle.

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.

Contractor

No. of corrections

Executive Engineer

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

All the Sluice valves & Valve actuators shall be subject to factory test in presence of Superintending Engineer (M) or his representative and third party inspection agency approved by MJP & ZP.

The scope of third party inspection by the agency approved by MJP & ZP 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 & ZP.

Contractor

No. of corrections

Executive Engineer

11. C.I.D.F. REFLUX VALVE

- a) mm dia for Each pump
 b) mm dia on Rising Main

A mm dia non-return valve generally conforming to relevant international standard shall be provided on the delivery pipe of each pump. The valve shall have free acting, quick opening, non-slam closure, and low head loss characteristics. The entire assembly shall be suitable for working pressure of Kg/Sqcm and body test pressure of Kg/Sqcm construction materials shall be as per relevant standard. However, rubber faces shall not be offered. A mm dia Non-Return valve shall be multidoor generally conforming to relevant standard and shall be installed on rising main at location as directed by Engineer In Charge . Alternatively CIDF mm dia valve with sliding disk generally as per construction of zero velocity valve can be accepted if manufacturer and contractor jointly give guarantee for yea` Themm dia NRV/ZVV shall be provided on rising main.

The valves shall be of approved make and shall be tested at manufacturer's works for seat and test and body test for test pressure in presence of the Third party inspection agency.

Necessary CC support shall be provided underneath the valves and shall be paid under relevant item in Schedule 'B'.

Materials Of Construction

Body, cover, door and door face disc	Grey cast iron conforming to grade 2
Disc.	FG -200 of IS-210
Hinges,	Cast steel to IS:1030
Hinges pins, door pins & door	Stainless steel to IS:6603
Suspension pins	
Bearing bushes, body hinges and door faces	Gun metal conforming to grade 2 of IS:318

Contractor

No. of corrections

Executive Engineer

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 & ZP.

The scope of third party inspection by the agency approved by MJP & ZP is as under

- a) Review of raw material test certificate and quality control procedure.
- b) Body test and seat test.

All test certificates in triplicate shall be submitted along with supply of valves.

Acceptable makes: As per approved mechanical list of MJP & ZP

12. CAST STEEL REFLUX VALVE (CLASS 150/300)

- a) mm dia for Each pump
- b) mm dia on Rising Main

A mm dia non-return valve generally conforming to relevant international standard shall be provided on the delivery pipe of each pump. The valve shall have free acting, quick opening, non-slam closure, and low head loss characteristics. The entire assembly shall be suitable for working pressure of 52 Kg/Sq cm and body test pressure of 78 Kg/Sq cm construction materials shall be as per relevant standard. However, rubber faces shall not be offered. A mm dia Non-Return valve shall be multi door generally conforming to relevant standard and shall be installed on rising main at location as directed by Engineer In Charge . Alternatively M.S. fabricated mm dia valve with sliding disk generally as per construction of zero velocity valve can be accepted if manufacturer and contractor jointly give guarantee for 3 year`
Themm dia NRV/ZVV shall be provided on rising main.

Contractor

No. of corrections

Executive Engineer

The valves shall be of approved make and shall be tested at manufacturer's works for seat and test and body test for test pressure in presence of the Third party inspection agency.

Necessary CC support shall be provided underneath the valves and shall be paid under relevant item in Schedule 'B'.

Material of Construction

For mm dia and ,.....mm dia REFLUX VALVE :

Body , Cover & Hinge - CS ASTM A216 Gr.WCB

Disc - CS WCB + 13% Cr. HF

Body Seat Ring-SS CA15 / CS WCB +13% Cr. HF

Washer, Hinge Pin & Split Nut - SS AISI 410

Gasket - Spiral Wound SS 304 + Graphoil filled

Cover Stud / Nut - ASTM A 193 Gr B7 / A 194 Gr 2H

Valves 400mm & above sizes are with Counter weight arrangement.

Ends- Flanged Drilled to ANSI B16.5, CL-300

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 & ZP.

The scope of third party inspection by the agency approved by MJP & ZP is as under

- a) Review of raw material test certificate and quality control procedure.
- b) Body test and seat test.

All test certificates in triplicate shall be submitted along with supply of valves.

Acceptable makes: As per approved mechanical list of MJP & ZP

Contractor

No. of corrections

Executive Engineer

13. BUTTERFLY VALVE

BUTTERFLY VALVE, P.N.-..... (..... mm dia for each pump andmm dia for rising main).

..... mm dia and mm dia Butterfly valve shall be short wall body pattern conforming to BS 5155 suitable for working pressure ofKg/Sq.cm and body pressureKg/Sq.cm. The manual actuator with suitable hand wheel shall be provided to operate the valve. The shaft shall be horizontal. The mm dia. butterfly valve shall be installed on rising main as directed by Engineer-in-Charge.

The valve seat of the disc shall be synthetic rubber and renewable without dismantling the valve.

All fasteners shall be stainless steel. The casting shall conform by third party inspection agency.

Necessary CC support shall be provided underneath the valve and shall be paid separately under relevant item in Schedule-B.

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 & ZP.

The scope of third party inspection by the agency approved by MJP & ZP is as under

- a) Review of raw material test certificate and quality control procedure.
- b) Body and seat test.

Acceptable makes: As per Mechanical approved list of MJP & ZP.

Contractor

No. of corrections

Executive Engineer

14. KINETIC AIR VALVE

Double orifice kinetic type mm dia air valve of approved make by MJP & ZP shall be provided on 800 mm dia common manifold as shown in drawing as per direction of Engineer-in-Charge. The air valve shall be suitable for working pressure of Kg/Sq.cm and isolating sluice valve designed for working pressure of Kg/Sqcm shall be provided.

The air valve shall be mounted on mm dia branch hole with taper of sizex mm and at least height of mm. The air valve shall be of approved make by MJP & ZP only and shall be test at factory in presence of Third Party Inspection agency approved by MJP & ZP.

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 & ZP.

The scope of third party inspection by the agency approved by MJP & ZP 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 & ZP.

15. M.S. DISMANTLING JOINTS.

A mm dia dismantling joint shall be provided between the discharge elbow and non-return valve in delivery line of each pump &

Contractor

No. of corrections

Executive Engineer

mm dia dismantling joint shall be provided between butterfly valve & N.R.V. for easy assembling and dismantling of the pipe work . The shell thickness shall be 10 mm and flange thickness shall be mm. The dismantling joint shall be withstanding test pressure of Kg/Sqcm or twice the shut off whichever is greater. The design shall generally confirm to typical drawing of dismantling joint. The tenderer may offer other technically equal arrangement. The arrangement shall however fully ensure that...

- 1) When assembled and under dynamic load the bolts together shall withstand pull equal to 1.5 times the duty head and no torque or pull is extend on the pump foundation arrangement.
- 2) During assembling or dismantling the sliding flange can be slided adequately to enable to detach the discharge tapper and piping from each other.
- 3) The seal ring joint shall be designed to withstand test pressure of 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 & ZP and Superintending Engineer(Mech.) or his representative is as under:

- a) Review of raw material test certificate and quality control procedure.
- b) Operation test.

The drawing shall be got approved from department before actual fabrication.

Contractor

No. of corrections

Executive Engineer

16. M.S.D.F.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 mm, dia manifold @ Raw water pumping station.

Material And Fabrication

The pipes, specials and flanges shall be manufactured from mild steel plates generally conforming to IS: 226 Thickness of plates shall not be less than those stated below or nearest commercial thickness.

- i) M.S. pipes and specials mm thick
- ii) Dished endmm 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

Contractor

No. of corrections

Executive Engineer

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 Kg / Sq.cm. in presence of Engineer-in-charge.

17. M.S. FLANGES

Providing, fabricating, erecting M.S. flanges mm dia., mm thick. The flanges shall be machined on both sides. The flanges shall be welded to the M.S. pipes used for connecting the pumps and other accessories. The payment will be made on weight basis.

18. FLANGED JOINTS

The delivery of pump shall be connected to the rising main by making flanged joints mm dia. to the MS pipes & specials. The flanges

Contractor

No. of corrections

Executive Engineer

shall be jointed with fasteners of adequate strength and quality . The bolt diameters shall conform to IS: 1538.

The joint ring between flanges shall be of 3mm thick rubber of adequate hardness for forming watertight joints and suitable to withstand pressure of kg/Sq.cm.

This item includes the cost of good quality rubber packing & nut bolts with washer. All flanged joints shall be hydraulically tested on full load of pump.

19. PRESSURE GAUGE

This job covers providing and fixing mm dia Glycerine filled pressure gauge Bourdon's type pressure gauge as per IS 368 : 1987 with brass cock, siphon tube, etc. as per direction of Engineer in charge. Contractor should provide suitable tapped holes at appropriate places for fixing these pressure gauges & the pressure gauge shall be located at a height of 2.5 feet from floor level to ease easy reading for the operator. The pressure gauges shall have range from 0- 14 Kg/ sq. cm. should be of approved make only.

20. CONCRETE FOUNDATION

General

The work includes excavation in all types of strata, reinforcement casting of RCC works as required with curing etc. complete. Payment shall be made on the basis of finished concrete work. Excavation disposal of excavated stuff refilling., form work and curing etc. shall not be paid separately and deemed to be included in cost of RCC/PCC work.

The thrust block for foundation NRV/SV using M-200 concrete shall be provided. All foundations shall be made finished with proper edges and surfaces.

Contractor

No. of corrections

Executive Engineer

C.C. Foundations

- a) The support for valves and pipes, platform for valve operation, shall be cast in M-200 concrete. The dimensions and spacing of block shall be submitted for prior approval.

Suitably designed and adequate numbers of concrete supports for pipe work and all sluice valves and non-return valves shall be provided. Minimum design criteria as under shall be adopted.

- i) Span shall be such as to restrict deflection within $1/360$ of span.
 - ii) Width of the support shall be equal to pipe diameter (+) 200 mm.
 - iii) Cradle thickness shall be $1/4^{\text{th}}$ of pipe diameter but not less than 300 mm.
 - iv) Minimum cradle depth shall be $1/4^{\text{th}}$ of pipe diameter.
 - v) Bearing angle shall be 120°
- b) The free end of mm dia common delivery line shall be suitably anchored to withstand and relieve pipe work and fasteners from stresses due to thrust.

The thrust block to common manifold free end / bend should be designed and got approved from the Deptt. Proper RCC chairs blocks should be provided to common manifold.

- c) There should be separate foundation blocks for all valves.

Contractor

No. of corrections

Executive Engineer

21.H.O.T. CRANE- MT- MTR. SPAN**General****Particular****For Pure water pump house**

Qty	1 No.
Capacity	.... Tonnes
Span	.... Mtr.
Lift	... Mtr

- i) The contractor should design & provide the H.O.T of tone safe working capacity tested to 50 % overload times working capacity, overhead travelling crane with all equipments & accessories shall be provided. Functional requirements of the crane are as under.
- ii) To lift complete weight of the pump or motor from any point, in the pump house.

The sub-work includes.

- a) Bridge girder mounted on track wheels and end carriages.
- b) Travelling Trolley
- c) Chain Pulley Block

Minimum capacity of crane, ISMB, 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

Contractor

No. of corrections

Executive Engineer

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 means 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 conform to IS – 3832. The chain pulley block shall consist of load chain wheel, hand chain wheel. The hand chain for hoisting shall be hanged well clear of the hook. The hand chain wheel shall be provided with roller type guarding to prevent slip off the chain. Gearing arrangement shall be totally enclosed with proper lubrication arrangement for bearing and pinions. Gears shall conform to IS – 4460. The brake shall be of automatic screw and friction disc type and shall offer no resistance during hoisting.

The assembly shall be such that the load could be sustained automatically at any position of the lift on release of the manual hoisting effort.

The hook shall swivel and operate on ball and roller bearing and shall be generally conforming to IS- 3815.

Contractor

No. of corrections

Executive Engineer

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 & ZP 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.

22. SQUARE BAR / RAIL

The rails shall be square bars, not less than mm x mm or equivalent rail sections of EN 8 material. The rails/square bars shall be secured on supporting RCC continuous corbel beam with all required fasteners and end stops to prevent over-travel.

The Rail section shall be secured on the provided M.S. plate on RCC continuous corbel beams.

23.H.T. SUBSTATION :-

General :

The equipments and associated works included shall be suitable for applicable site voltage system and characteristics.

Contractor

No. of corrections

Executive Engineer

Primary Voltage

Voltage system on MSEDCL side shall be kV. Fault level MVA.

Secondary Voltage

On secondary side the tenderer shall offer and quote for the following.

415V system for motor feeders and 415V system for lighting load and auxiliary load.

415 V system Fault level 35 MVA.

General Arrangement :

The general arrangement of the switch yard shall be as per I.E. rule.

It will be responsibility of the tenderer to prepare the layout conforming to Indian Electricity Act 2003, Indian Electricity Act modified up to-date, Guidelines of Electric Inspector of Government of Maharashtra and MAHADISCOM, without any extra cost to the Owner. Entire technical and financial responsibility, including fees etc. to get the approval from the Electrical Inspector and MAHADISCOM authorities shall rest with the tenderer.

The Conceptual Arrangement Is As Under

- i) One incoming kV feeder from MSEDCL will be connected to a proposed ten pole structure arrangement.
- ii) Two Nos kVA, kV/0.433 kV outdoor transformer are to be installed with H.T. equipment.
- iii) The proposed work includes LBS Or RMU OR VCB of kV on incoming feeder with stand bye arrangement .

Contractor

No. of corrections

Executive Engineer

- i) For this kV AB switch on incoming side of the LBS Or RMU OR VCB and kV isolator with pedestal on outgoing side of incoming VCB shall be provided.
- ii) HT Sub-station equipments are to be installed separately.
- iii) For Power Transformer P.F. Correction/control panel shall be provided.

.....KV Switch Yard :

.... (.....) Pole (ISMB 200 x 100) structure for switch yard shall be erected for reception and distributing kV power supply to one new kV LBS Or RMU OR VCB. In Feeder Yard and in transformer feeder yard, new bays of adequate size of copper conductor not less than 6 SWG shall be provided for entire pole structure suitably.

The item includes required number of channel section ISMC 100 x 50 mm to accommodate AB switches, Outdoor CTs, PTs, Insulators and bus-bars, poles of size ISMB 200 x 100, Lightning arrestors, chain link fencing for sub-station, stone metal for entire sub-station, civil work such as filling murum, pole and raft foundation etc. Stays for poles shall be provided.

For the poles and steel structure sufficient earthing as required by I.E. Rules shall be provided. All poles shall have adequate foundation.

.... KV Lightning Arrestor Station Class :-

Required sets (minimum 3 sets) (as per I.E. Rules and Electric Inspectors Inspections) of lightning arrestors (each set comprising 3 Nos) shall be provided on pole structure at suitable location in feeder switch yard and transformer switch yard. The final location shall be as approved during detail Engineering and as approved by Electrical Inspector. The arrestor shall be station class as per relevant IS. It shall be suitable for kV, 3 Phase, and 50 Hz effectively grounded system.

Contractor

No. of corrections

Executive Engineer

It shall have anti-contamination feature and pressure relief device with current limiting gaps generally conforming to IS: 3070, Part-I proven gap less lightning arrestors will also be accepted.

Test certificate in duplicate from the manufacturer shall be furnished.

..... kV Air Break Switches And Isolators :-

A.B. switches (with earth switch) (minimum 3 sets) shall be provided. The isolators shall be post type suitable for kV system and confirm to IS:2544. Each switch shall be rated to 200 Amps, continuous current and short time current of KA RMS. The AB switches shall be mounted on cross channels on pole structure. The isolator shall be mounted on concrete pedestal or pedestals is included in this item.

The A.B. switches shall be triple pole, manually operated off load type, single break with earth switch and suitable for mounting in vertical position shall be gang operated.

Each pole of the switches shall be rated for 200 Amp. The switch shall be complete with down rod lever, G.I. pipe operating handle erected on extended square shaft and supports by external bush bearing phase coupling pipe, padlocking arrangement and other components copper alloy only. Total Six Nos, kV A.B. switches / Horizontal isolators should be provided minimum. One AB switch each on incoming and one isolator each on outgoing side of outdoor VCB shall be provided. The Porcelain post insulators for air break switches shall be of kV single stacks or kV double stack type post insulator. The insulators shall comply with the specifications separately mentioned below in respect of electrical and mechanical characteristics.

..... kV D.O. Fuses :-

The kV D.O. fuse sets (3 sets) shall be of 200 Amp rating and shall offer protection against a suitable fault level at kV on H.V.

Contractor

No. of corrections

Executive Engineer

side. The fuses shall be designed for vertical mounting. The fuse holder shall be of phosphor bronze leaf spring type. All other current carrying parts shall be of aluminum bronze. The insulators shall conforming to IS: 731 and IS: 2544. The complete fuse shall meet impulse voltage in accordance with IS: 2692 or IS: 3106. Each fuse shall be assembled and mounted on channel base. The complete fuse unit shall withstand power frequency wet voltage in accordance with IS:1818. Two pairs of rubber hand gloves for working on kV shall be provided along with D.O. operating rod (in 3 pieces).

..... kV Horn Gap Fuse :-

..... kV horn gap fuses (2 sets shall offer protection against short circuit and suitable for use conjunction with kV system. The fuse shall be suitable for horizontal mounting with kV post insulator. The set shall comprise of 3 No of fuses. The complete fuse shall meet impulse voltage in accordance with BS: 2692 or IS: 3106. The same shall withstand power frequency wet withstand voltage in accordance with IS: 1818.

The fuse equipment shall be mounted on pedestal as specified for isolator. The cost of pedestal is included in this item.

24. CONDUCTORS AND INSULATORS :-

..... kV Bus Bars And Taps

The bus bars bus-taps inter-connector jumpers shall be copper conductor rated to carry Amp. Continuous current without exceeding temperature rise of 70° C over ambient temperature and to carry KA fault current for 1 second without exceeding temperature limit of 200 degree.

The bus bars spacing and supports shall be designed to keep deflection within limit. The terminations and interconnections shall be with mechanical bolted type clamps, insuring reliable permanent and good electrical connections. Wherever

Contractor

No. of corrections

Executive Engineer

appropriate and required the bus conductors shall be covered with alkathene pipes or other insulating pipes / tubes.

..... kV Insulators:-

Required number of disc insulators and port-pin insulators shall be provided. The insulators shall conform to IS:731 and IS:2544 applicable for system voltage of kV.

Tests as per relevant IS shall be carried out test certificate shall be furnished in duplicate.

Substation Civil Work:-

The item includes work of pole foundations, fencing, equipment foundations and all necessary civil work for sub-station equipments. The fencing for entire sub-station shall be galvanized chain link mesh size 50mm x 50mm made of 10 SWG G.I. wire. The fencing mesh wire shall be welded on I.S.A. 75 galvanized angle frame of 2.5 m height spaced at distance not exceeding 3m with extra stay to corner poles on both sides to prevent bending 4 Nos of 3.8m wide gates in two halves with 1.85m height shall be provided. The halves shall be fixed on steel joist ISMB, 15 mm or above. A padlock and duplicate key shall be provided for each gate. Suitable foundation for entire fencing shall be provided. Adequate size of rail shall be provided and grouted in sub-station area for sliding transformer for loading and unloading.

The pole foundation for poles (ISMB x) shall be constructed and foundation for VCB shall be constructed in switch yard as per I.E. Rules.

25. CURRENT TRANSFORMERS FOR PROTECTION (Dual Core)

(Protection + Metering) :-

The outdoor type current transformer for protection shall be single phase, oil filled type suitable for kV effectively earthed

Contractor

No. of corrections

Executive Engineer

system and generally conforming to IS:2705. Oil level indicators shall be provided at suitable location.

The rating of the current transformer shall as per I.E. rule & related IS / ISO.

CTs are to be installed with each outdoor LBS or RMU or VCB on galvanized iron associated structure of LBS or RMU or VCB or separate pedestal. Pedestal cost is included in this item. CTs shall be of approved make by MJP & ZP. Out of two cores one core shall be used for metering, one core for protection. VA Burden shall be designed and modified to suit actual requirement.

Test certificate in duplicate from the manufacturer shall be furnished.

26. POTENTIAL TRANSFORMERS (Double Core) :-

The outdoor type potential transformer of approved make for measurement shall be single phase double wound oil filled type, suitable for kV effectively earthed system and generally conforming to IS:3156. They shall be mounted on pole structure, on incoming feeder oil level indicator shall be provided as suitable location.

The rating of the potential transformer shall be as per relevant standard.

Test certificate in duplicate from the manufacturer shall be furnished.

Contractor shall provide following Items as per requirement

D.O. opting rod of kV	Length 20' long
Base copper wire	6 SWG - 0.668 kg/Mtr.
Alkathene pipe	10 mm dia
Stone metal spreading	For 50 x 25m substation area
Instruction chart	As required as per IE rules.
G.I. Stay	..... Nos.
Steel for CC foundation/plinth, girders for switch yard.	

Contractor

No. of corrections

Executive Engineer

27. FENCING :-

The fencing frame 2.45 m (height) x 1.2 m (width) size shall be fabricated from angle of size 50 x 50 x 6 mm and covered with G.I. welded 50 mm Sq. mesh made out of 10 SWG G.I. hard drawn wire duly painted with two coats of red lead and two coats of silver paint/aluminum paint for minimum 40 x 20 . The vertical angles of the frames, shall be extended 0.5 m on both sides and duly erected in CC foundation block. Adjacent frame shall be fixed by means of nuts and bolts to vertical angles on both sides. Anti-climbing spikes shall be provided. Four fence gate of overall size 3.0 m x 1.85 m height shall be fabricated from G.I. pipe 25 dia and shall be in two halves, each half of 1.50 m x 1.85 M with anti-climbing devices and frames are to be covered with similar welded mesh. The gates (minimum 2 Nos.) shall be supported on hinges fixed on 2 Nos ISMC 100 channels. The channels shall be 3 m long and vertically erected in CC foundation 400 x 400 x 600 mm deep in the ground. Suitable padlock and keys shall be provided with Godrej Navtal lock of 7 level. Also walkway of 1 m wide on three side of switch yard compound shall be provided. The entire area shall be levelled and covered with 100 mm layer of 20 to 25 mm stone metal. The contractor will have to refill sub-station area upto required level as directed by Engineer-in-Charge without any extra cost.

Acceptable makes of substation equipments: As per list of approved make of MJP & ZP enclosed

28. POWER TRANSFORMER

- | | |
|------------------------------|-----------------------|
| 1. Quantity | Nos. (....+....) |
| 2. KVA Rating | kVA |
| 3. Transformer Voltage ratio | kV/0.433 kV |

1. General Design And Rating

..... transformers of kVA,/0.433 kV are to be installed for 440V LT load pump house.

Contractor

No. of corrections

Executive Engineer

The transformer shall be designed manufactured, supplied of approved make by MJP & ZP to fulfill requirements of the specifications and to render satisfactory trouble free operation. Transformer shall be of latest manufacturing standards as per amended I.S. specifications and the load and no load losses shall be limited to valves as per IS and norms issued by MSEDCL whichever are lower.

The short time overload rating shall be conform to relevant IS.

2 Tanks

Transformer tank shall be manufactured from high grade steel plates suitably reinforced by providing stiffeners of structural steel. Tank shall be provided with lifting lugs, so located that safe clearance is obtained between sling attached to the lifting lug and transformer fittings without use of spreader.

Main tank drain valve shall be provided with flanged connection at the bottom-most location of the tank to ensure complete drainage of the transformer oil. One filter valve, at the top and one drain valve at the bottom of the tank shall be provided.

The tanks shall be constructed as to prevent collection of water at any location. The bottom and cover thickness of plate shall not be less than 6 mm and that of side shall not be less than 5 mm.

All gasketed joints on the tanks such as main tank cover, bushings, mounting and other bolted attachments shall have high quality neoprene gaskets and so designed that the gasket will not be exposed to the weather. If necessary, suitable stops shall be provided to prevent crushing of the gasket due to over tightening.

3. Transformer Cores

The cores shall be constructed from high grade cold rolled grain oriented silicon steel laminations. The operating flux density shall be of the order of 16.5 x 17 Kilo lines/Sqcm. The design shall provide

Contractor

No. of corrections

Executive Engineer

tank mounted core and the use of core bolts shall be totally avoided for securing the core to the tank. Suitable arrangement shall be provided for lifting the core and winding for inspection.

4. Windings

The transformer windings shall be made using electrolytic grade copper conductors. The insulation of transformer windings and connections shall be of insulating paper. The material used for winding insulation shall not shrink, disintegrate, carbonize or become brittle under the action of hot oil. While copper conductors are being covered with paper, care shall be taken to avoid damage to the paper layers due to sharp edges etc.. Completed windings shall be subjected to shrinkage treatment before assembly on the core.

Tappings shall be provided at such on the windings so as to preserve, as far as possible, the electromagnetic balance of the transformer at all voltage ratios.

Joints carrying shall be riveted and soldered or riveted and brazed. No joint shall be made in the disc of the windings.

The windings shall be suitable for withstanding the short circuit current in the even of fault without damage. Adequate insulation shall be provided between the windings and core / tanks wherever the specified minimum clearance in oil are difficult to obtain.

5. Radiators

Radiators shall be either tubular or plate type. Each radiator shall be provided with air releasing plug, isolating valve and drain valve. The radiators shall withstand the pressure tests specified for the tanks to which these are fitted. Radiator earthing shall be as per IS:3043-1982.

6. Conservators

Conservators shall be fitted with filling hole with cap and drain plug. Each feed pipe from the conservators shall be connected to the

highest point of any part of the transformers and associated equipment to which it may run.

A dehydrating breather shall be fitted to the conservator. The breather shall be designed to ensure that external atmosphere is not in contact with the dehydrating agent. The transformers shall be supplied with first filling of dehydrating agent. Conservators shall be provided with magnetic oil level gauge on one face and prismatic oil level gauge on other face and which shall be clearly visible from ground level.

7. Bushings

The bushings shall be of solid porcelain or oil filled porcelain type. The bushings shall have continuous metal stud or tube from end to end making intimate contact with either solid or liquid dielectric at all points throughout the length.

Porcelain used for insulator shall be of best electrical quality, sound, free from defects and thoroughly vitrified so that glaze shall be smooth and of uniform brown shade and shall completely cover the exposed parts of the insulator. The protected creepage distance shall be at least 50% of the total creepage distance.

8. Tap Changers

The tap changers shall be off circuit type electrically and mechanically rugged and arranged to provide for convenient tap changing. Tap position indicators shall be positive and there shall not be any ambiguity resulting into incomplete tap changer position with respect to the mechanical tap position indication. The operating handle of tap exchanger shall be brought out of the tank at the side at an accessible height from ground level. Tap changer operating switch mounted on the top of the transformer tanks will not be acceptable. Provision of padlocking the tap changers without interfering with visual tap position indicator shall be provided. The tap changers shall be provided with a micro switch arrangement to issue trip command to the breaker disconnecting

Contractor

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Executive Engineer

the transformer from source of power in the event of an inadvertent attempt to change the taps when transformer is on load.

8. Temperature Indicators

Transformers shall be provided with oil temperature indicators which shall register the temperature of the top oil in the transformer tank. Indicators shall be housed in the marshalling box of the transformer. The connection between the temperature sensing element and the temperature indicator located in the marshalling box shall have adequate mechanical protection.

9. Cable Boxes

Transformers shall be provided with air insulated type boxes with disconnecting chamber of L.V. side cable boxes shall be suitable for accommodating the termination / glands of appropriate size. The cable boxes shall be suitable for withstanding the short circuit current of the corresponding system for one second duration. The minimum phase to phase and phase to earth clearances in the cable boxes shall be as under.

For 415 Volts	
Phase to phase	50 mm
Phase to earth	25 mm

The cable boxes shall be fully weather proof in construction, with provision of suitable gaskets on the joints of cover. Suitable canopy shall be provided on the boxes to prevent entry of rain water through the joints. Necessary inspection covers shall be provided on the cable boxes and disconnecting chambers so as to access to the bushing connections.

11. Insulating Oil

The transformer shall be supplied with new, filtered and tested transformer oil duly filled. The insulating oil shall conform the

Contractor

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Executive Engineer

IS:335. Approximately 10% excess oil shall also be supplied to account for loss.

12. Transformer Fittings

The fittings to be provided on the transformer shall include the following among others and shall be as per IS:3639-1966.

- a) Off-load manual tap changing switch extremely operated specified and positioned on side of transformer accessible from the ground level.
- b) Conservator with drain plug, filling plug as specified
- c) Explosion vent with diaphragm
- d) Air relief vents
- e) Inspection cover on the tank covers for all transformers
- f) Following valves shall be provided.
 - i) Oil sampling valve One No.
 - ii) Oil drain valve One No.
 - iii) Filtering Valve One No.
- g) Grounding terminals, two for the transformer tank for clamping to grounding grid connections.
- h) Lifting lugs or eyes for the cover top part of tanks cores and soils and for the complete transformer
- i) Pulling eyes for pulling the transformer parallel to and at right angle to the axis of bushing.
- j) Diagram and rating plate of transformer
- k) Bidirectional Rollers
- l) Thermometer pockets with dial type thermometer for top oil temperature indication. The thermometer shall be clearly visible from ground level as specified and
- m) Weather proof control cabinet

Contractor

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Executive Engineer

13. Rating

Capacity required	→ kVA
Quantity	→
Number of phases	→	Three
Frequency	→	50 Hz.
Number of windings	→	Two
Type of cooling	→	ON
Max. system voltage	→	..... kV
Transformer ratio	→	..... kV/433 Volts
Specification	→	IS:2026
Method of connection		
Primary	→	Delta
Secondary	→	Star
Vector group	→	Dy.11
Impedance at rated kVA And corrected to 75°C for	→	4%

Neutral Earthing The neutral of the secondary winding brought out through an appropriate connection to earthing system

Tapping Off circuit taps from -12.5% To +2.5% on the primary side in steps of 2.5%

Installation Outdoor

Tolerance in impedance ± 10%

Temperature Max. temperature for oil (measured by thermometer shall not exceed 45°C and of windings (measured by Resistance method) shall not exceed 50°C

Terminal details

H.V. side Suitable for receiving kV overhead copper wire connection covered with alkathene pipe.

L.V. Side Outdoor type suitable for three and half core of required size PVC armored cable with brass compression cable

Contractor

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ending gland with suitable disconnecting chamber (marshalling box)

Noise level	Less than 80 db
Earthing	Grounding terminal with clamps suitable for connecting to the grounding grid to be provided for transformer body earthing.

Tests

Both the KVA transformers shall be tested at manufacturer's works for routine and performance tests and No. for type test as mentioned below as per relevant IS in presence of the third party inspector and Superintending Engineer (Mech.) or his representative and MSEDCL representative. Manufacturers test certificate shall be furnished.

The scope of third party and MSEDCL inspection of transformer by the agency approved by MJP & ZP is as under.

- a) Review of raw material test certificates and quality control procedure.
- b) Routine test for all
- c) Type test including impulse test for random one transformer
- d) Load & no load losses.

Acceptable makes:As per list of approved make of MJP & ZP enclosed

29. L.T. PANEL BOARD :-

1. 415 Volt L.T. Panel

The section specifies 415 V, LT Panel, 3 phase, 50 Hz switch board panel related equipment, control, metering, protection and indication. The eneral requirements of the system are described in the following clauses.

Contractor

No. of corrections

Executive Engineer

One 415 V switch gear would receive power from the transformer in Raw Water pump house and would serve power to another switch gear to starter and driving motors

A dimensional drawing of the panel; showing position of switch gears, Ammeter, Voltmeter etc. shall be submitted before manufacturing, for approval.

2. Construction

The control panel shall comprise of fully compartmentalized modular type cubicles suitable for floor mounting. The panel board shall be divided into distinct vertical sections each comprising of:

- a) A completely metal enclosed bus bar compartment running horizontally.
- b) Individual feeder modules arranged in multi-tier formation.
- c) Enclosed vertical bus bars serving all motors in the vertical sections.

The panel shall be fabricated out of 50 x 50 mm angles and 16 SWG M.S. sheets at the bottom and rear and 14 SWG M.S. sheets in the front and top. The front and the rear sides shall be provided with hinged door. Mechanical interlock shall be provided so that the front doors cannot be opened on 'ON' positions. Cable entry and exit to and from the panels board shall be from the bottom. The fabricated cubical shall form a totally enclosed, metal clad, dust and vermin proof enclosure. The indicating and operating switches shall not be mounted above 1.6 m from floor level.

The panel in cubical in shape and of minimum sizem x m x m (height x width x length)

3. Internal Cabling

The switch board shall be completely factory wired, ready for connecting to the equipment.

Power cabling shall be of suitable size not less than 2.5 mm, 2 PVC insulated, multistoried copper conductors of 1100 V grade. All cable

Contractor

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Executive Engineer

connections shall be made using proper crimping sockets. Suitable size flanged type glands shall be provided for outgoing cables.

Control cabling shall be done with PVC insulated multistrand copper conductors of size not less than 1.5 Sqmm of 600 V grade. The control wiring shall be concealed by taking through neatly arranged PVC cable trays and all cables shall be terminated in suitable compression type terminal blocks. The

cable terminations shall be made in accordance with wiring diagrams, using identifying codes as approved by the Engineer.

All cable shall be arranged and marked in general compliance with IS:375.

4. Earthing

A x mm G.I. earthing flat, running the length of control panels shall be provided. Metal frame of control switchboard shall have two separate and distinct earth connections of adequate size.

5. Painting

The panel shall undergo chemical de-rusting and shall be effectively phosphatised as per IS:6005 and primed. The panels shall be thoroughly rinsed with clean water after phosphatising, followed by final rinsing with dilute bicromate solutions and oven drying. The phosphate coating shall be sealed by the application of two coats of ready mixes, stoving type zinc chromate primer.

Two coats of finishing synthetic enamel paint shall be applied, each coat followed by stoving. The final finished thickness of paint film on steels shall not be less than 100 microns and shall not be more than 150 microns. The color for the finishing paints shall be approved by the Engineer. The finished painted appearance of panels shall present an aesthetically pleasing appearance free dust and un-even surface.

6. Miscellaneous

Contractor

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Executive Engineer

Engraved PVC labels shall be provided on all incoming and out going compartments. The exact legend to be provided shall be as approved by the Engineer.

7. Component

The power receiving panel comprises of following equipments for receiving the power from transformer`

a) Amp capacity ACB(Electrically operated Drawout type)(2 for reception of power from transformers & 1 as bus coupler)	..... No. Nos.
b)AMP capacity ACB(Electrically operated Drawout type) (Nos. for ATS feeder )	..... Nos.
c) Amp capacity ACB (Electrically operated Drawout type) (..... Nos. for APFC panel + No. for WTP)	..... Nos.
i) 63 Amp MCB (2 for Lighting + 2 spare) ii) 32 Amp MCB (For actuator starter)	..... Nos Nos
Aluminum bus bar of minimum Amp rating with insulator (minimum 3 meter in length)	..... Set
Volt meter with selector switch (0-500V)	..... No.
Ammeter 0-100-300 Amp with suppressed scale with selector switch and CTs of proper ratio.	..... No.
Indicating lamps 22 mm dia LED type	.....Set
PVC Synthetic elastomer electrically insulating mat with B class insulation 2.5 mm thick up to kV	..... Sq.m.
Power Analyser with CT's	..... No.
Forward Reverse DOL Starter for actuators	..... Nos
Iron work	As required for completi on of Job
Caution board	2 Nos

Contractor

No. of corrections

Executive Engineer

Internal wiring	Job
Name board for P/M details of size 2 Sqm	1 No.

8. Air Circuit Breaker Electrically Operated Drawout Type

.....No Amp ACB shall be provided and fixed for reception of power supply. Two shall be used for reception of power from transformers and one as bus coupler. Standard accessories shall be provided as relevant IS. Shunt Release and ELR shall be provided for receiving breakers`

9. Moulded Case Circuit Breaker

The 440 volt Moulded case circuit breaker shall have the following features. All MCCB shall be provided for distribution of power supply.

The continuous rating of MCCB shall be as shown in above table. The final steady state operation temperature of the contacts when carrying rated current under continuous operation shall not exceed the limit specified in relevant IS. The contacts shall be of silver alloy of high arc resistance and long electrical life quality. The operating mechanism shall be quick make quick break and trip free. The housing shall be made of heat resistant insulating material. Mechanical ON-OFF indication shall be provided. The MCCB shall be mounted in panel board.

The MCCB shall incorporate shunt release device. The overload protection shall have the setting range to meet the load requirement. All release should operate on common trip bar. The auxiliary contact block should be provided to facilitate visual ON-OFF indication. The MCCB shall be supplied with all standard accessories for functional requirement as per duty conditions, as per relevant standard.

10. Bus Bar

Bus bar shall be of electrolytic Aluminum to suit Amp current rating and of withstanding the electro mechanical force due to short circuit. The neutral bus bars shall not be smaller than half cross section of main bus bar` The bus bars shall be housed in separate bus

Contractor

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Executive Engineer

bar chamber and supported on unbreakable, non-hygroscopic supports, rigidly held to the framework. The bus bar shall have separate special screwed cover with ventilating louve` The continuous rating of the bus bars shall not be less than Amp. The temperature rise of the bus bars shall not exceed 55°C over an ambient temperature of 40°C. The

bus bars shall be PVC insulated with colour code for phase identifications. The bus bars shall be easily accessible for inspection. The power distribution bus bars or cables shall be bolted clamp type. The parallel bus bar shall not be used for main bus bars or distribution.

The current density for auxiliary bus to connect out going switches or other switches shall be minimum 1 Amp per square mm or nearest commercial size whichever is on higher side for Aluminum bus and 2 Amp/Sq.mm for copper bus.

11 MCB

The Miniature Circuit Breakers shall be provided for isolation purpose and have the rating to suit the load continuous on it. The ON-OFF position shall be clearly marked on the panel. The mechanical interlocking shall be provided so that the door opens only on off position of switch

12. H.R.C. Fuses

H.R.C. cartridge fuses shall be of link type for power and control, non-deteriorating has adequate fault capacity, indication to show health and tripped conditions. Fuses shall conform to IS:2208.

13. Indicating Lamps

The indicating lamps of 22 mm dia shall be of filament bulbs type of 230 volts rating with series resistance for different voltages. The oil and dust proof, un-breakable suitably colored poly-

Contractor

No. of corrections

Executive Engineer

carbonate lenses shall be used to improve appearance and illumination.

14. Selector Switch

The selector switch shall be with three positions, unit designed for heavy duty application and handle of robust design. The required position shall be engraved on the front plate.

15. Ammeter, Voltmeter

The meters shall meet following general requirements.

i.	Accuracy	Class 1 as per IS;188
ii.	Case	Steel
iii.	Cover	Metal
iv.	Window	Plastic
v.	Scale	Flat
vi.	Voltmeter – 0-500 V	... No. with S/S
vii.	Ammeter - 0-100-300	.....Nos. with suppressed scale with S/S and suitable CTS

16. Forward Reverse Dol Starter:

Forward reverse type DOL Starter shall be provided for operation of valve actuators .The starter shall be associated with interlocking arrangement of pump starters including control wiring required for satisfactory operation of valves .

17. Rubber Matting

PVC Synthetic elastomer electrically insulating mat with B class insulation 2.5 mm thick up to kV of approved make shall be provided for panel boards and starte`

18. Factory Testing

The Panel shall be tested at Manufacturer's workshop in presence of third party inspection agency approved by MJP & ZP& superintending Engineer (Mech.) or his representative . The scope of inspection is as under and as mentioned in QAP for the LT Panel .

Contractor

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Executive Engineer

- i) Review of raw material test certificate and quality control procedure.
- ii) HV test
- iii) IR test
- iv) Routine test
- v) Checking phase and earth clearance of bus bar
- vi) Checking wiring diagram and contact circuit and operation of panels.
- vii) Fault simulation for testing protection relays except short circuit and earth fault.

Note :- The complete circuit diagram of all power circuits, control circuits with necessary protection relays, CTs, PTs, auxiliary contacts etc. shall be prepared and drawn on A - 1 size engineering sheets duly laminated and fixed on teak wood board and shall be fixed in the pump house.

In addition to above five laminated copies of above sized circuit diagram shall be submitted to the office for Record and . purpose.

30. A.T. S. STARTER :-

The scope of work includes, designing, providing and giving test and trial of locally manufactured fully automatic auto transformer starter with approved make power contactor

Fully automatic auto transformer starter shall be housed in totally enclosed sheet metal clad, vermin and dust proof cubical box, suitable for floor / plinth mounted for indoor operation. The panel shall be fabricated from MS sheet SWG 14, with hinged door at front. Limit switch shall be provided to trip the motor in the event of opening of door. The panel framework shall have ICMC-100 base channels.

The size of the cubical box shall be sufficient for ease in maintenance work and proper ventilation. However the size of the cubical should not be less than X X Mt. At least two number of ventilating louvers shall be provided on side walls, at top to exit the hot air, and one number louver at bottom to allow fresh air inlet.

Contractor

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Executive Engineer

The terminal box shall be of waterproof construction suitable for outdoor service. Gaskets shall be provided at the cover joints and between box and the motor frame.

The terminal box shall be suitable for termination of 120 Sq.mm aluminium armoured three core PVC cable . The Contractor should make this arrangement specially, the cost for which is included in the rate of item.

Terminal box shall be complete with stud type terminals, plain washers, spring washers, check nuts, cable glands and lugs.

The panel shall be painted with one coat of primer and two coats of enamel paint of approved shade.

Bus bar, copper strips, copper leads shall be designed for twice the full load current. The potential wiring shall be carried out in 1.5 Sq.mm copper cable, and CT. circuitry wiring shall be carried in 2.5 Sq.mm copper cable.

The Auto transformer starter shall incorporate following equipment.

- ◆ Triple pole AC3 rating Amp. power contactor
With required number of NO & NC
- MAIN CONTACTOR 2 Nos.
- AUXILLARY CONTACTOR, Amp. 1 No..
- ◆ Oil immersed, copper wound Auto transformer
With tapings, 50%, 65%, 80% with first fill of
Best quality transformer oil. 1 No
- ◆ CT operated bimetallic over load relay 1 No
- ◆ ON & OFF Pneumatic timer (0.05 to 30 Sec) 1 No
- ◆ ON delay pneumatic timer (0.05 to 30 Sec) 1 No
- ◆ Master timer 1 No.
- ◆ ON OFF Push buttons. 2 Nos.
- ◆ HRC control fuses. 2 Nos.
- ◆ Suitable rating Ammeter with metering CTS
& Selector switch. 1 No
- ◆ Thermostat with 1No.+ 1 NC. for oil temperature 1 No
- ◆ Door limit switch. (1 NO +1 NC) 1 No
- ◆ Current sensing Single phasing presenter with CTS 1 No

Contractor

No. of corrections

Executive Engineer

- ◆ No volt release 1 No
- ◆ Motor Protection Relay, solid state with protection CT's 1 No.
- ◆ Indicating lamps, Motor ON, OFF, TRIP 3 Nos.
(Protection CTs 10P3 /
10 VA

Auto Transformer

Fully automatic auto transformer shall be 3 Phase, oil cooled type, suitable for motor starting duty, core type, copper wound of high grade silicon lamination with 'B' class insulation. The auto-transformer shall be suitable for operation on 45-degree ambient temperature with tapping at 65%, 80% and 100% regulation when fully loaded. The lowest tapping at auto-transformer shall be in compliance with driven equipment torque requirement. It shall be suitable for 6 operation per hour, all six starts being uniformly distributed over an hour with equal period in between.

The auto-transformer shall conform IS 1822. The auto transformer starter shall be wired up as per standard connection to avoid open circuit transition providing for a smooth change over from tap to line voltage. The main contactor shall be of suitable rating.

Adequately rated thermal overload relays operated through suitable CT shall be provided. The CT operated base mounted single-phase presenter shall be provided. The starter shall be complete with necessary adjustable timer, auxiliary contactor other accessories, wiring, etc to make a composite unit. The master timer set shall be provided to cut off supply to auto transformer in case of the change over timer fails to operate.

Power Contactor

The contactors in starter shall have 3 main poles with a minimum of 2 Nos. + 2 NCs, auxiliary contacts, with one spare NO and NC of capacities as mentioned above. The contact shall be made of anti weld Silver Cadmium oxide and contact system shall be designed with minimum bounce to ensure long contact life. The contactor shall be sufficiently rated for severity operating condition for use in motor circuit. The coil shall be

Contractor

No. of corrections

Executive Engineer

molded in hard resin suitable for continuous operation. The contactor shall be suitable for making and breaking at 0.35 power factor and stalled current of associated motor which shall be assumed and times full load current of corresponding motor. All contactors employed shall conform IS 2959

Single Phasing Preventor.

The single-phase preventor in the starter shall be provided for each panel and it shall be current operated negative sequence with necessary CTs.

The indicating lamp shall be of filament bulb type of 160-Volt rating with series of resistance for different voltage.

The timer shall have 2 Nos + 2 NCs auxiliary contacts. The timer shall be capable of the thermal effect of switching and have very close accuracy. The timer shall be capable for operating on 80 Volts AC supply in the voltage range of 80% to 110% and frequency range 95% to 105%.

Factory Inspection And Test.

The Auto Transformer Starter, shall be inspected and tested by third party approved by M.J.P. in presence of Superintending Engineer (Mech.) or his representative.

The scope of inspection includes: -

- ◆ Review of raw material test certificate and quality control procedure.
- ◆ High voltage test.
- ◆ Insulation resistance test.
- ◆ Full load test of auto transformer winding.
- ◆ Die- electric strength of oil.
- ◆ Fault simulation for testing protection relays except short circuit and earth fault.

Electronic Motor Protection Relay

The Electronic motor protection relay shall be provided for protection of VHS motors like overload, phase failure, locked rotor, phase reversal with trip indication and adjustable over current function & DIN rail mounted. The separate CT's shall be provided for each Electronic Motor Protection Relay.

Contractor

No. of corrections

Executive Engineer

- ◆ The make and type of EMPR shall be got approved from competent authority before supply.

APFC PANEL If Required

The contractor shall design, supply, erect, commission & give satisfactory test & trial of Automatic power factor correction panel. The panel shall be designed in such a way that the system P.F. shall be improved to 0.99 or above. But in any case the system P.F. should not be on leading side. The tentative technical details of the equipment is given below. But it is the responsibility of the contractor to provide necessary accessories for proper functioning of the equipment. The P.F. shall be improved by min.4 step CONTACTOR SWITCHED APFC PANEL. The capacitor bank shall be Mix dielectric type. Each bank shall be of KVAR .Two banks of KVAR shall be kept spare.

1)	<u>Main Incomer</u> –A, TP, KA,MCCB	01 No.
2)	<u>Protection:</u> .....A, TP,MCB	..... Nos.
3)	Switching -Contactor Type Capacitor Duty Contactor for ....KVAR step	..... Nos.
4)	<u>P.F.Controller</u> – 04 steps	01No.
5)	<u>Cooling Fan</u>	01 No.
6)	<u>Capacitors</u> –Mixdielectric.....KVAR O/P at 440V.	..... Nos.
7)	Power Cable- For .....KVAR Step	As required
8)	C.T. –/.....A, Class 1.0	03 Nos.
9)	Panel (control Cubicle): - CRCA Sheet	-
10)	Aluminium Bus bar -	As required

The AFSC panel board shall be completely factory wired ready for connecting

Contractor

No. of corrections

Executive Engineer

the equipment. All internal wiring of the panel is to be carried out by PVC insulated PVC sheathed copper cable of adequate capacity. Incoming and outgoing cable entries shall be enclosed in metal clad dust and vermin proof enclosure and suitable size cable glands shall be provided for cable entries from bottom.. The drawing of the panel shall be got approved before actual manufacturing and the panel board shall be tested at manufacturers work in presence of departments representatives

Factory Inspection And Test.

The APFC Panel shall be inspected and tested by third party agency approved by M.J.P. in presence of Superintending Engineer (Mech.) or his representative

31. CABLE & CABLE TRMINATION KIT

..... kV GRADE POWER CABLES

..... kV grade power cable shall be aluminum conductor XLPE insulated armoured cable earthed and of MJP & ZP 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 & ZP 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 Schecule

Contractor

No. of corrections

Executive Engineer

The cable lengths stated in the schedule are estimated quantity and shall form the base for comparison of the tender offer. 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.

Sr. No.	From	To	Grade	Cores x Run	Size Sq.mm	Total length in meter.
1	AB Switch / Isolators	..... kV VCB to kVA	..... kV XLPE	.... core ... Run	.... sq mm	..... m
2	Transformer kVA	0.433 kV LT Panell	1.1 kV PVC/XPLE	.... Core Run per phase	....sqm m	..... m
3	0.433 kV LT Panel	ATS Starter to 0.433 kV motor	1.1 kV PVC/XPLE	.... core Run	.....sq mm	..... m
4	0.433 kV LT Panel	APFC Panel	1.1 kV PVC/XPLE	.... core Run	.....sq mm	..... m
5	0.433 kV LT Panel	WTP panel	1.1 kV	3.5 Core Run	.....sq mm	..... m
6	440 Volts LT panel	Valve actuator	1.1 kV	4 Core Copper 1Run	.....sq mm	.....m
7	440 Volts L.T. panel	Internal & external lighting DBs and Fixtures.	1..1 kV	4 core Copper 1 Run	10 sq mm	..... m
8 kV VCBs	Relay Metering Panel	1.1 kV Control Cables	As required for satisfactory	As Required	As Required

Contractor

No. of corrections

Executive Engineer

				completion		
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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 under ground duct / trench.
- ii) Exits from the building.
- iii) At every 5 m distance of straight run.
- iv) Any other position necessary to trace route.

A metallic plastic tag bearing cable reference number indicated in cable schedule at every 4 m run or part thereof and at both ends shall be provided. For case of identification and route tracing. The schedule shall be prepared by the contractor and submitted for approval.

The cable routing and laying shall be such that sharp bends and links are avoided. The radius at bends for PVC insulated cables shall not be less than 15 D where D is overall diameter of the cable. Laying and termination ofkV and kV grade cable shall be as per manufacturers instructions. Such instructions shall be furnished to the Engineer-in-Charge.

Contractor

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Loops/extra length shall be provided in each cable run located suitably. The loop/extra length shall be adequate for two straight through joints as and when such needs arises.

Cable Duct :

Following cables shall be laid in cable ducts –

- a) kV 3 core Sq. mm XLPE (E) cable from isolator / AB switch to all transformer`
- b) From kVA transformer to KV panel and kVA Transformer to 415 V Panel.

The duct shall be designed and constructed in RCC of suitable size as required as per I.E. rules, ISA 40 shall be inserted at 400 mm center to center to support at 200 height above bottom and clamp the cable. The 1 core cables shall be laid in trefoil formation. The cables shall be clamped at 1200 mm interval. The ducts shall be supported by suitably designed rigid RCC column from HT sub-station to pump house. The cost of all this RCC work is included in this item.

Pre-cast covers shall be provided over the trench. The arrangements shall be got approved prior to execution.

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 cente` Cable trays from panel to motors shall be supported from underside of floor slab.

Contractor

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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 core of suitable size copper conductor PVC sheathed armoured shall be provided as required and approved by the Engineer and MSEB. All above cable or purpose of tendering are designated as control cables and includes all required cable not specifically stipulated. Number of cores in the cable as under shall be spare.

a)	Upto 6 Core	Nil
b)	7 core to 10 core	1 No
c)	11 core to 20 core	2 Nos.
d)	Above 20 core	3 Nos.

Complete electric diagram showing terminal block numbers, ferrule numbers and units with earthing point shall be submitted for prior approval before execution.

Termination Method:

Termination method on pole structure, VCB, Vacuum contractor, motor for kV and kV cables shall be as recommended by the manufacturer, with cable termination heat shrink type Kit/Compound etc. and any structural work required for its proper mounting connections including lugs and glands. The kV cable shall be laid in suitable vertical G.I. Pipe with clamp while jointing to DP structure.

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Tests

The scope of third party inspection by the agenda approved by MJP & ZP to as under;

- a) Review of raw materials test certificate and quality control procedure,
- b) Routine test,
- c) Overload test,
- d) Insulation Resistance test.

Above test are to be carried out

- i) For H.T.cables of Sq.mm size and above and if length required is mtand above.
- ii) For L.T. cables of Sq.mm size and above and if length required ismt. and above.

For conditions other than (a) and (b) manufactured test certificate for routine test shall be furnished.

32. EARTHING**1. General**

The earthing arrangement for sub-station switch yard and indoor equipment shall be designed in conformity with the I.E. rules 1956 and IS: 3043 and Rules/ Regulation/ Instructions of statutory authorities, as applicable for the class of work under the contract. The arrangement specifications and quantity/size stipulated hereunder are minimum requirements. It shall however, be the responsibility of the contractor to design and provide the earthing arrangement as stated above without any extra cost. Required excavation for above system by Mechanical Means should be done by concern contractor without any extra cost

2. *Earth Electrode And Earth Pits*

All earth electrodes shall be of Galvanised cast iron earth plate size 60 x 60 x 0.6 cms. with funnel with a wire mesh for watering and brick masonry block C. I. cover complete with all materials, testing & recording the results as per specification No. EA-EP . The electrodes shall not be situated at a distance less than 1.5 m from building fencing structure and equipment foundations. The earth pits shall confirm to the provisions in IS and shall be constructed in M-150 concrete. Required quantity of salt and charcoal shall be provided.

Contractor

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Each earth pit shall have funnel arrangement for watering, minimum requirements of each pits/ electrodes are as under.

Earthing for kV / 0.4 33kV system:

1. Pole structure	10 Nos.
2. Lightening arrestor	3 Nos.
3. KV Indoor VCB body	2 Nos.
4. Transformer body	8 Nos.
5. Transformer neutral	4 Nos.
6. GOD/D.O./Insulator	3 Nos.
7. Earthing for 0.4 KV system	7 Nos.

Total 37 Nos. or as per instructions from Electrical Inspector-----	

Each earth electrode shall have disconnecting link to disconnect and measure resistance of earth electrode. RCC chamber shall be provided with C.I. cover to each earth pit. RCC chamber's top shall be flushing to metal spreading level in switch yard.

A ring bus shall be formed in a pole yard and transformer yard to which individual earth electrode shall be connected. Earth leads from equipment, structure etc. shall be connected separately to the ring bus. Both ring buses shall be interconnected with two parallel earth leads at two opposite points on each ring bus.

3. Extent Of Earth Connections

Earth connections shall be given to metal frame work of A. B. switches, operating handles, lightening handles, lightening arrestors, insulators, transformer neutral and body cable box and glands, VCB body and frame work, pole structure and fencing. Each unit shall have two separate and distinct earth connections of adequate size.

4. Earth Leads

Minimum size of earth leads for earthing of equipment shall be as under.

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Lightening arrestor, A.B. switches steel structure	50 x 6 mm
Transformer body, cable box, gland fencing	Galvanized flat
Transformer neutral	.... kv system

The earth leads run on the structure shall be severely bolted or clamped. Neutral earth leads shall run on separate support without touching body of the transformer. The run and arrangement of earth lead shall be neat and in parallel and at right angles formation with reference to general layout of switch yard and equipment. The bend in flat shall be gradual to prevent mechanical damage and 90° multiple bends if required in earth leads shall be located below ground level.

Inter connections of the earth continuity conductor and main/branch earth shall be bolted ensuring reliable, permanent and good electrical connection and further brazed. Earth leads shall be protected against mechanical damage and corrosion particularly at the point of connection.

5. Earthing For 415v Systems

The earthing shall be generally as specified above and as detailed

- a) Minimum 30 earth pits for kV system.
- b) Minimum 7 Nos. earth pits for equipments and panel of 415V system.
- c) There shall be separate and independent earthing system for kV and 415V system and isolated from each other.
- d) Earth electrodes for ... kV and 415V system shall be 50 mm diameter G.I. and of 3m long.
- e) Separate ring bus shall be formed for each system to which individual earth electrode of the system shall be connected. Earth leads from equipment shall be connected separately to the ring bus.
- f) Two earth leads from each equipment shall be connected to ring bus independently.

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- g) A disconnecting link shall be provided at each pit for disconnection and measuring earth electrode resistance.
- h) Water tap connection with necessary G.I. pipe & isolating valves(Brass) shall be provided for watering earthing pit. The water connection shall be tapped from rising main with suitable arrangement of isolation.

Testing

The contractor shall arrange for taking the actual earth tests for all electrodes as per I.E. Rules & relevant BIS code. These tests shall be taken in presence of Engineer-in-charge & test results shall be submitted in five copies for record.

The Tenderer shall submit the details earthing system layout drawing for HT & L.T. earthing system from Competent Authority before starting / Execute the above work.

33. EARTHING STRIP

All electrical equipment shall be double earthed with suitable size GI earth lead as per IE rule and IS 3043 / 1966. All earth electrodes shall be inter connected by GI strip of suitable size through a common circular ring.

The earth resistance should not exceed the limit prescribed in IS / IE rule.

34. IRON WORK

The iron work includes providing, erecting the ISMB and base plate for monorail travelling trolley including cutting, welding, drilling etc and complete erection in position with necessary material hardware etc. as per direction of Engineer in charge duly painted with one coat of red oxide and two coats of enamel paint to match with the associated equipment.

Mode Of Payment

The payment will be made on Kg basis as per standard weight of

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plate, bar angle used for fabrication work. The nut bolts and any sundry material will not be considered for weight calculation.

35. 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 80 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.

36. METERS AND INSTRUMENTS :-

1	Insulation tester(megger) cranking type having metal body 1000 V/1000 Ohms with housing box make shanti /meco/motwane only	1 No
2	Earth Tester – 4 Terminals of range 0-10-100-1000-10000 ohms	1 No
3	Supplying tong tester(clip on meter) to read current 0 to 1000 Amp,voltage 0 to 600 v, and insulation resistance with housing box. Make/Shanti/ Meco/ Motwance only. for 3.3 kV	1 No. 1 No.
4	Digital non contact techo meter having digital display of above make. duly calibrated for	1 No.

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	measurement of speed.	
5	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	1 No.
6	Engineer's prinson 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 sqmm to 185 sqmm cable size. In pairs and hand ratchet. (Make Usha Ismail or Dowels)	1 No.
9	Supplying screw type puller for removing motor bearing of suitable size minimum size 12inches,three legs type with a wrench drop forged carban 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.

37. 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

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4.	Hack saw frame 300mm size with blade heavy duty	1 No
5.	Insulated combination cutting plier size 200mm KDPE quoted.	1 No
6.	Ball pan Hammer 1000 gm capacity with handle	1 No
7.	Screw driver Engineering pattern blade from selected steel chrome plated size 8 x 200mm	2 Nos
8.	Screw driver Engineering pattern blade from selected steel chrome plated size 5 x 200	2 Nos
9.	a) Screw driver Electrical pattern blade from selected chrome plated size 5 x 200mm (Insulated) b) Screw driver Electrical pattern blade from selected chrome plated size 5 x 300mm (Insulated)	2 Nos 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 b) Pipe wrench stillson pattern selected carbon steel polish handle rod Japan confirm to IS 4003 of size 600mm – 76mm	1 No 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 spanner set with racket & extension bar etc. complete from size 3/8" to 1 1/2" (2.2 Sockets)	1 No
19.	Cold chisels chrome vanadium hexagonal 19/14 -	1 No

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	200mm	
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 paintedwith two coats of anticorrosive paint and two coats of post office red color of minimum size 4 feet x 2 feet x 1.5 feet having compartment for keeping of various tools	1 No

38. 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

1Fiber chair of "Nilkamal" make only 6 Nos

2Fiber chair with cushion of "Nilkamal" make only 1 Nos

3a) Office Almari of Godrej make 150 x 90 x 45 cm. with 3 sheves 1 No

b) Eight locker Cupboard of Godrej make 1 No

4Office table of 120 x 75 size,sunmica top with one cabinet & 3 drawers Make - Godrej 1 No

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39. 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 + singleline diagram of complete installation etc details on G.I. sheet of 18 gauge of required size duly paintedwith red oxide and enamel paint for displaying theabove details, Board shall be provided with suitable size	6	Nos (Minimum)
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40. 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.

41. TEST & TRIAL.

The contractor shall carry out operation and maintenance of pumps and the relevant works involved in the scope of this item.

The intention of carrying out operation & maintenance through contractor is to operate the pumps as per the requirement, impart training to the staff in a systematic manner, so that the starting and stopping of pumps is done methodically, the records are maintained, checks, routine maintenance which shall be as under.

1. Operation of all pump, motor, valve and supply water as per the requirement of deptt.
2. To maintain all records i.e. logbook, for operation and maintenance.

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3. To monitor all parameters such as pressure temperature, substation equipments and for all other systems specified in the tender.
4. To carry out routine checks water level, operation of equipments noise, vibrations and shall maintain all corresponding records.
5. Carrying out preventive maintenance during above period such as lubrication, greasing, gland cooling abnormal heating of panel, motor, etc. checking of loose connections decolourisation of cables, and keep the installation neat and clean dust free.
6. The pump house shall be clean as far possible from leakage water i.e. checking and keeping the drainage arrangement clean and clear removing waste etc.
7. To give training to the operators or to the agency envisaged by the department for smooth ..
8. The contractor shall provide log books and all records as directed by the department and shall hand over to the department and safety precautions for emergency situations such as power failure, tripping restarting, abnormal leakage's in pump house short circuits sparking fire etc.

The contractor shall engage the following staff.(Three shifts per day)

- | | |
|----|--|
| a) | Operator-cum-Electrician having valid PWD electrical license- 1 No per shift |
| b) | Helpers – 1 No per shift |

The contractor shall make suitable arrangement to provide reliever for operator/helper to avail weekly off, without hampering water supply Contact No. of employees engaged with operation and maintenance shall be informed to office Engineer-in-Charge prior to start . work.

He shall carry out following duties.

1. **Operate the pump set.**

Contractor

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Operate the pumps as & when required to meet the water demand & as per instruction of engineer in charge.

2. Keep the log book of activities:-

All activities regarding pumping machinery should be kept regularly i.e. starting time , stop time, voltages, currents, daily P.F. , transformer temperature etc. should be maintained.

3. Carry out preventive maintenance.

Contractor shall arrange for preventive maintenance of pump, motor, starter, transformer, all types of valves to avoid the breakdown proper maintenance procedure should be carried and the necessary record should be kept. as required. The tools supplied under the contract shall be allowed to be used for . and shall be handed over in good working condition.

Normally the pump is to be operated to required quantity in 8 Hrs a day.

The contractor shall carry out daily operation of the pumpset to meet the daily requirement of the water as per instruction of Engineer in charge.

4. House keeping, watching & guarding:-

The contractor shall provide for watching & guarding of premises. He is responsible for any loss of material from our premises.

5. Rectification of defects:-

The defects noticed during operation of pumps shall be attended & keep the pumps in smooth working condition immediately. The defects remained un rectified shall be brought to the notice of engineer in charge.

42. VERTICAL SOLID SHAFT MOTOR

Three phase squirrel cage induction motors shall be supplied as per IS: 12615 the technical requirement suitable to VT pump and also to meet following requirements and shall be suitable for the vertical flange mounting

Contractor

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on pump stool and motor coupling half. Pump is being located on the lower side.

Constructional Features

- i) The motors shall be vertical solid spindle pointing downward and stool mounting type. The design shall be suitable for easy disassemble and reassemble. The enclosure shall be sturdy and shall permit easy removal of any part of motor for inspection and repair. The motors shall be provided with eyebolts, lugs or other means to facilitate safe lifting.
- ii) The rotor bars shall be of copper. The bars shall not be insulated in the slot portion between the iron core laminations and the bars.
- iii) The motors shall be provided with class 'F' or better insulation. The winding shall be given vacuum impregnation treatment.
- v) The winding joints, end connections and terminals shall be braced to withstand short circuit current of 26.2 kA RMS (with 67 kA peak) for one second.
- vi) The motors bearings shall be so constructed that the loss of lubricating fluid is kept to minimum and the greasing shall be possible without any dismantling operation. The bearings shall prevent dirt and water from getting into the motor. Bearing lubricant shall not find access to motor windings. The bearings shall permit running of the motor in either direction of rotation. Lubricants shall be selected for prolonged storage and normal use of the motors in tropical climate and shall contain corrosion and oxidation inhibitors. The bearings shall be designed for L-10 rating of 40,000 hour.
- vii) Phase segregated terminal boxes shall be of weatherproof construction designed for outdoor service to eliminate entry of dust and water. Gaskets of neoprene or approved equivalent material shall be provided at cover joints and between boxes and motor frame. The terminal box shall be suitable for installation of soft starter & bottom

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entry of cables. The terminals and other general arrangement shall be as per the relevant IS standard. This shall be substantially designed for the current carrying capacity and shall ensure ample phase to phase and phase to ground clearance. Cable glands shall be nickel plated brass of suitable size. The connectors between motor leads & cable shall be tinned brass. The orientation of phase segregating terminal box shall be on the left side looking from the front side of the motor. Total two number phase segregating terminal boxes are to be provided to each motor.

- vi) Since the motor shall be supplied for VT pumps, utmost care shall be taken adequately to keep vibrations and misalignments within satisfactory limits and conforming to BS 4675 Part – I, Class – III, Sub Class – B and should in no case exceed 2.8mm / sec. the TIR at shaft end shall be within 0.02 mm per meter. The surface finish of the motor shall be within 0.8 – micron root mean square. The rotor shall be dynamically balanced to VDI standard 2060 to Q-2.5 quality grade.
- vii) Motor external parts shall be finished and painted to produce a neat and durable surface, which will prevent rusting and corrosion. The equipment shall be thoroughly degreased, all rust, sharp edges and scales removed and treated with one coat of primer and finished with two coats of enamel paint.
- viii) The motors shall be provided with two earthing pads. These pads shall be of non corroding metal welded or brazed at two locations on opposite sides. The size of the pads shall be 75 x 10 mm with two holes drilled at 40 mm. Centers, tapped and provided with suitable bolts and washers. All the mechanical operations like bending, straightening, cutting etc. shall be carried out as per the site requirement.

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Performance And Characteristics

- i) Motors shall be coupled to vertical turbine type, raw water pumps.
- ii) Motors shall be capable of giving rated output without reduction in expected life span when operated continuously under following supply condition :
 - a) Rated voltages of 3300 volts with $\pm 10.0\%$ variation.
 - b) Rated frequency of 50 Hz with $\pm 3\%$ variation.
 - c) Combined voltage and frequency variation $\pm 10.0\%$
 - d) Rated capacity - kW (Minimum) [If higher capacity i.e. k.w. motor is necessary as per design then the same shall be provided & install with no extra cost.]
- iii) Motors shall be suitable for full voltage direct on line starting with soft starter starting.
- iv) Motors shall be capable of starting and accelerating the load with above method of starting without exceeding winding temperature rise when supply voltage is 80% of the rated voltage.
- v) Motors shall be capable of satisfactory operation on full load at a supply voltage of the rated voltage for 5 minutes, commencing from hot condition.
- vi) Motor shall be capable of developing the rated full load torque even if the supply voltage drops to 70% of the rated voltage. Such operation is envisaged for a period of one second. The pull out torque of the motor, to meet this requirement, shall be at least 205% of full load torque.
- vii) Motors shall be designed to withstand 120% of rated speed for two minutes without any mechanical damage in either direction of rotation.
- viii) The locked rotor current of the motors shall not exceed 600% of full load current (inclusive of tolerance as per standard).
- ix) The locked rotor withstand time be more than the starting time at minimum permissible voltage mentioned in (IV) above, by at least 2 seconds.

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- x) The motor shall be designed for 45°C ambient temperature. The maximum allowable temperature rise is 60°C for measurement by thermometer method and 75°C for measurement by winding resistance method.
- xi) Motor shall be suitable for S1 duty as per Indian Standards. The motors shall also be suitable for 3 equally spread starts per hour under supply conditions mentioned in Clauses (II) & (IV) above.
- xii) The motors shall be capable of running continuously at break horse-power of minimum 10% in excess of that absorbed by the pump at the overall head range of pump.
- xiii) The efficiency of the motor shall be 96% in all conditions. (Without any negative tolerance as per standard).

Accessories

- I) The motors shall be provided with anti-condensation heaters of adequate rating suitable for 80 V 50 Hz AC supply. The space heater connections shall be brought out to suitable terminals in a separate terminal box for connection to supply cable. The space heaters shall be easily accessible & continuous rating type.
- II) The motors shall have drain plugs so located that they will drain water, resulting from condensation or other cause from all pockets in the motor casing.
- III) Six resistance type temperature detectors (PT-100) for the stator winding each having D.C. resistance of 100 ohms at 0°C embedded in the stator winding at locations where highest temperatures may be expected, shall be provided. The material of the RTDs (3 wire) shall be platinum. The leads of the RTDs shall be wired to separate terminal box mounted on motor.
- IV) The motor bearings (top and bottom) shall be provided with dial type thermometers for local indication. The temperature sensors (RTD) shall also be provided and wired up to the terminal box mentioned in

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the item (III) above.

- V) Contacts / leads of all the accessories mentioned in III & IV above and those of the pump thrust bearing temperature as required shall be brought into one separate terminal box for external connections. This terminal box shall be mounted adjacent to motor terminal box. The terminal box shall be complete with internal wiring and provided with terminals for receiving power supply to various accessories (A.C. and of D.C.). the terminal shall be of suitable current rating.
- VI) The tenderer shall provide 2 Nos. of M.S. earthing strips of size minimum 75 x 10 mm of required length and shall be suitably connected to the existing earthing grid.
- VII) Core Balance Current Transformer 50/5A, Class 5P-20, 15 VA 2 Nos. – one each for motor and capacitor earth fault – shall be provided to the motor and the capacitor cables. The CBCT shall be suitable for rated size XPLE cable. The CBCTs shall be accommodated in the cubicle in cable chamber.
- VIII) Shaft mounted cooling fan & CI / AI or MS & dynamically balanced.

43. E.O.T. CRANE (SPAN – Mtr).

General

A 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 & ZP. Functional requirement of the crane are as under:

- i. 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 mtr. Minimum.
- ii. To travel longitudinally along entire length of the pump house including loading / unloading bay. Operation shall be electrical.
- iii. To travel across entire nominal pump house by span .Operation shall be electrical.

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The sub-work includes

- a) Minimum 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 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 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.

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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 joist 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 enclosed 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.

44. H.O.T. CRANE- MT- MTR. SPAN

GENERAL

Particular	For Pure water pump house
Qty	1 No.
Capacity Tonnes

Contractor

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Executive Engineer

Span Mtr.
Lift ... Mtr

The contractor should design & provide the H.O.T of tone safe working capacity tested to 50 % overload times working capacity, overhead travelling crane with all equipments & accessories shall be provided. Functional requirements of the crane are as under.

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.

Contractor

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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 conform to IS – 3832 .The chain pulley block shall consist of load chain wheel, hand chain wheel. The hand chain for hoisting shall be hanged well clear of the hook. The hand chain wheel shall be provided with roller type guarding to prevent slip off the chain. Gearing arrangement shall be totally enclosed with proper lubrication arrangement for bearing and pinions. Gears shall conform to IS – 4460. The brake shall be of automatic screw and friction disc type and shall offer no resistance during hoisting.

The assembly shall be such that the load could be sustained automatically at any position of the lift on release of the manual hoisting effort.

The hook shall swivel and operate on ball and roller bearing and shall be generally conforming 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 & ZP 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.

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Square Bar / Rail

The rails shall be square bars, not less than mm x mm or equivalent rail sections of EN 8 material. The rails/square bars shall be secured on supporting RCC continuous corbel beam with all required fasteners and end stops to prevent over-travel.

The Rail section shall be secured on the provided M.S. plate on RCC continuous corbel beams.

Switch Gears, Control Gear And Electrical Works :-

A panel fabricated from mild steel sheet of 2.0 mm thickness and down shop leads shall be provided to meet the functional requirement of the crane. The essential features shall be as under:

Reception and distribution of power for Electric motorized operation.

Control gears for start and stop the motors with reversing contactor.

Operation of hoisting motion including reversing motion by means of suspended mobile pendant set for operation from pump floor level at RL m

Limit switch for automatic stop of hoisting motion.

Earthing arrangement

L.T.cable as required

Holder and bulb fixture should be provided on trolley, so as to travel with trolley for required illumination at work site.

EOT crane shall have optional alarm arrangement while travelling from one place to another and during lifting and lowering of loads.

Material Of Construction

Material of construction for components shall be stipulated below or superior.

1. Structural steel conforming to IS 808.
2. End carriage steel to IS:2061
3. Track and trolley wheel carbon steel casting IS:1030
4. Hooks steel to IS: 1875/Forged steel.

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Testing :-

The crane shall be tested for 1.25 times working capacity for all 3 motions and for below mentioned tests at manufacturer work in presence of the third party inspection agency & Superintending Engineer (Mech.) or his representative. Site conditions shall be simulated for deflection test. The scope of third party inspection of EOT crane by the agency approved by MJP & ZP is as under.

- a) Review of raw material test certificate and quality control procedure.
- b) Operation test
- c) Deflection test.
- d) Load test.

Acceptable makes: As per Mechanical approved list of MJP & ZP.

45. SURGE VESSEL/AIR VESSEL**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 yea`

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

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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 conforming 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

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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.

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

- 1) One 50 mm dia pressure relief safety valve of the spring loaded type.
- 2) One 15/25 mm ball plug type valve for connecting the air supply to the vessel.
- 3) One 200 mm dia pressure gauge having scale reading from 0 to twice the pressure to which air vessel is designed.
- 4) An adequate size flanged branch from the vessel for intermediate pipe connection between air vessel and delivery main branch.
- 5) Inspection manhole cover of suitable size..
- 6) 1 No. 100 mm dia. Drain connection with hand operated sluice valve.
- 7) Lifting lugs and sturdy supports for mounting.
- 8) 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.

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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 & ZP.

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.

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6] Product inspection, test and certification

Inspection certificate in triplicate shall be submitted to MJP & ZP.

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.

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.

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.

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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 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-

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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 & ZP is as under

1. Review of raw material test certificate and quality control procedure.
2. Body and seat test

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3. Test with operation of actuator and reduction gearbox fully assembled with valve opening and closing with synchronizing.
4. 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 40 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 +/- 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

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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

- 1) One 200 mm dia pressure gauge having scale reading from 0 to twice the working pressure to which air receiver is designed.
- 2) 1 No. 50 mm dia. Drain connection with hand operated sluice valve.
- 3) Inlet and outlet connections.
- 4) Pressure switches to control automatic working of the air compressor to work within predetermined limits.
- 5) 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

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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 :

A) MCCB & starters :

- 1 No. 63 A for incoming.
- 2 Nos. 63 A for outgoing.
- 1 No. 63 A as bus coupler
- 2 Nos. STAR DELTA type fully automatic starters for 3 pH, 50 Hz. For 415 squirrel cage induction motors of compressors
- 1 No. ELCB.

B) Required capacitor with isolator MCB, indication and annunciation

- 3 Nos. Pilot lamps LED type for incoming supply
- 4 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

C) Metering :

- 2 Nos. 96 sq.mm ammeter for each motor of suitable range.
- 1 No. 96 sq.mm voltmeter with selector switch.

D) Protection :

Suitable protection shall be provided in starter for individual motors as follows

- i) Bi- metallic or electromagnetic type adjustable over current protection.
- ii) Negative current operated single phasing protection
- iii) Starters shall be electrically interlocked so that only one of the two motors shall run at a time.

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Controls :**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.

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 +/- 10%, a frequency variation of +/- 5 % and combined voltage and frequency variation of +/- 15%. The contractor shall be responsible to supply actual lengths and

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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 adjacent 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

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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.

- A) Primer – Zinc rich epoxy primer
- B) Intermediate – Coal tar epoxy polyamide
- C) 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.

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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.

46. 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.

1) 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

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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**

2) 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 Flexible wire twin core 8/0.2mm and with LED Fluorescent lamp and making Sr.No. & date of erection - **Nos.**

3) LED Flood Light Fitting

Supplying and erecting ISI mark LED flood light luminaires suitable for use with 150 watt with LED lamp. The luminaire 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 Aluminium electrochemically 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.**

4) 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.**

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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.**

6) 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.**

7) 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

- i) Dimensional drawings and electrical system connections drawing
- ii) Manufacture's test certificate for MCB/ fittings etc
- iii) Guarantee card for all fittings/MCB/ etc.

47. AREA LIGHTING

The item includes electrification of approach bridge to the pump house

Contractor

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&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.

1) 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.**

2) 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.

3) 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.

4) 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.**

5) G.I,PIPE (A Class) :-

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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.**

6) 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.**

7) 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.**

8) 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.**

9) 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.**

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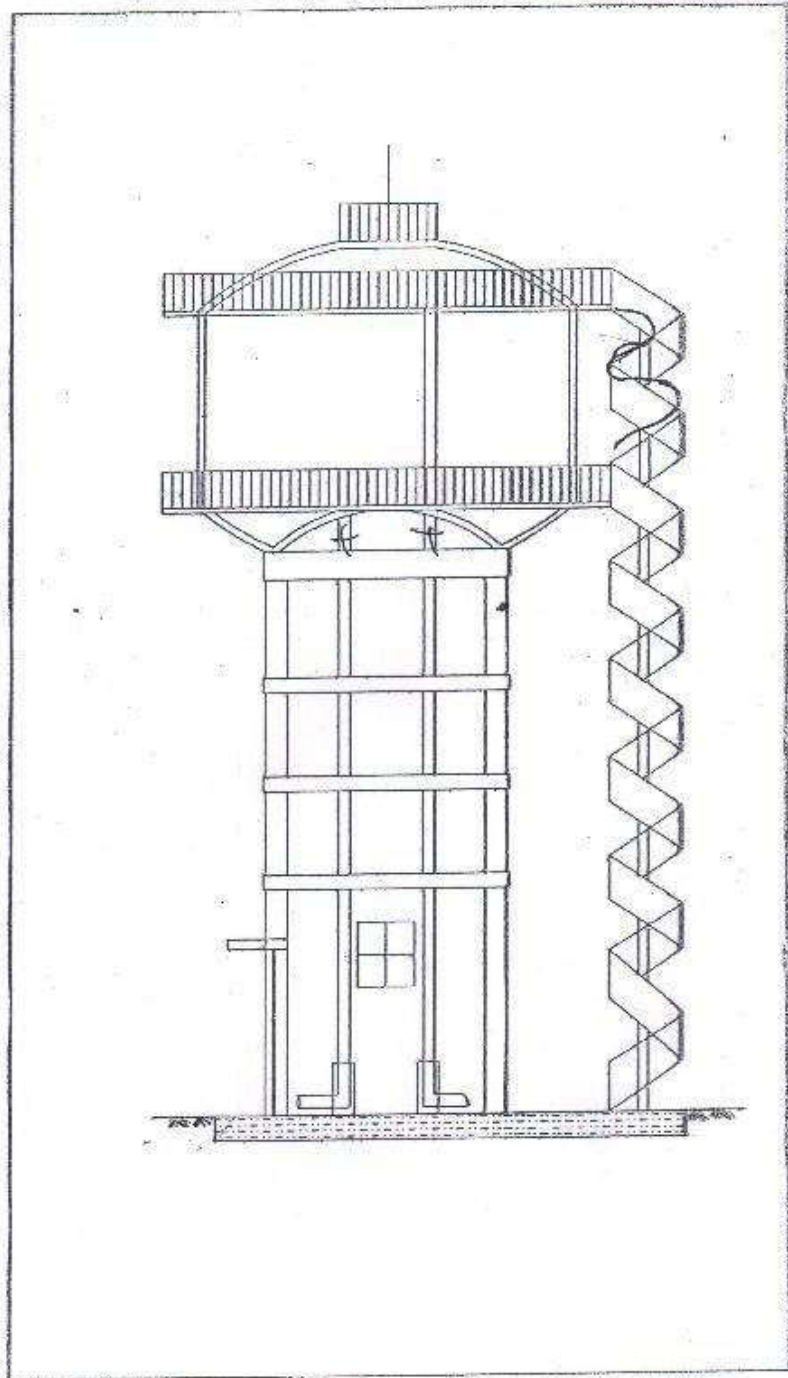
15.DRAWINGS

- a. Key Plan
- b. Flow Diagram
- c. Distribution network drawing
- d. Excavation profile of Jack-well
- e. Headwork drawing showing all levels related to execution of works
- f. Contour map of WTP/ESR
- g. Typical House service connection
- h. Typical drawing of ESR

Contractor

No. of corrections

Executive Engineer



Contractor

No. of corrections

Executive Engineer