

REQUEST FOR PROPOSAL (RFP)

PART 2-SCHEDULES

December 2006

MAHARASHTRA JEEVAN PRADHIKARAN

Management Contract for operation, maintenance and repairs of Latur Water Supply Scheme including metering, billing and collection of water charges from the consumers, with water supply scheme from Dhanegaon dam, Nagzari weir, Sai weir with all pumping stations, electrical installations, WTPs, water reservoirs, connecting pipelines and distribution system including cost of all materials, energy and labour

SCHEDULE A**SCHEDULE A – SITE OF THE PROJECT (PROJECT AREA)****About Latur**

Latur city is located in the Maratwada region of Maharashtra and is the district headquarters for Latur district. The city has an area of 32.56 sq kms and a population of approximately three Lakhs, as per the 2001 census. It is one of the fastest growing cities in the Maratawada division with a decadal growth of over 52%.

Being the district headquarters, the city is an important administrative centre that houses many regional offices of the Government. A majority of the working population in Latur is employed in the tertiary sector. In addition, Latur Municipal Council (LMC) estimates that Latur has a floating population of about 25,000 that visit the city for various trade and commerce related activities.

Latur acts as an important centre of trade, commerce and services for the surrounding villages of not only the Latur district, but also those of the neighbouring districts of Osmanabad in Maharashtra and Bidar district of the Karnataka state.

In comparison with cities in Maratawada and comparable cities in Maharashtra, Latur appears to be on a high growth trajectory as it has been consistently attracting investments as well as immigration of people. In the last decade, Latur's economy was primarily driven by investments in infrastructure; employment in government sector; trade and commerce; and construction activities. The presence of educational institutes of repute, coupled with quality health care facilities and infrastructure services makes the city an attractive destination.

Description of the water supply system

The water supply system of the city consists of intake works from three location viz. Sai head works, Nagzari Head works and Dhanegaon head works. The entire water supply scheme for the city is described in the map enclosed with Schedule T.

The following presents the technical details of the scheme along with the year of commissioning of the said works.

A) Sai Head works scheme**1. Original scheme – 1938**

- Source :- K.T.Weir on Manjara river; Height 1.20 mtr with MS drop gates
- Head Works :- 4 No of Inspection well 2 mtr dia 450 mm dia connecting main and 500 mm dia slotted pipe trench Gallery 5 mtr dia Intake well
- Pumping Machinery :- 35 H.P.Vertical turbine 2 sets 150 HP horizontal split casing centrifugal pumps - 2 Sets.
- Settling Tank (Near Sai Head Work):- One Tank of Cap 272700 Liters (not in use)

- Pure Water Tank (Near Sai Head work) :- One Tank of Cap 272700 Liters
- Pressure Filter (Near Sai Head Works) :- Candy Type 3 Nos (Now not in working condition)
- Pure water rising Main (H/W to Gandhi Chowk GSR):- 450 mm dia C.I. "LA" Class length 8650 Rmt
- Ground Service Reservoir At Gandhi Chowk:- 22.72 Lakh Liters in Stone Masonary of size 20 x 37.50 Mtr with 3 mtr Height.
- Distribution System:- R.C.C.. & C.I.pipe Lines of 300 mm to 80 mm dia Total Length – 135 kms

2. Works Executed Under Stage II Part I (1970)

- R.C.C.Elevated Storage Reservoir At Gandhi Chowk :- 18 Lakh Liters Capacity Staging Height 14.50 mtr water depth 6.00 Mtr

3. Works Executed Under Stage –III Part –III (1989)

- Improvement to K.T. Weir at Sai :- Height of K.T.Weir increased from 1.2 mtr to 2.0 mtr
- Pump House at Sai Head Works :- construction of New pump House / Repairs of old pump house
- Raw Water Pumping machinery at Sai Head works :- Replaced by 35 HP Pumps – 2 sets Discharge - 4.1 Lakh Ltr/Hr
- Water Treatment Plant at Arvi (Ambajogai Road):- Conventional type 9.84 MLD Capacity
- Pure Water Pumping Machinery at W.T.P.(Sai) :- 150 HP Pumps - 2 Sets Centrifugal coupled.

B) Scheme Executed from Nagzari Head Works (1972)

1. Works executed under Stage – II Part – II

- Source :- Construction of K.T.Weir on Manjara River Capacity 3.39 mm³

2. Works executed under Stage-III Part –I (1983)

- Head works down stream of Of Nagzari Weir :-Intake well of 3 mtr dia with 700 mm dia connecting main length 57 mtr
- Jack well & Pump House at Nagzari :- 9.0 mtr dia
- Pumping Machinery :-250 H.P.Vertical Turbine - 3 Sets

- Raw Water Rising main/Pumping main From Nagzari Head Works to Warwati WTP:- 600 mm dia C.I. “LA” Class pipe Length 5160 Rmt
- Water treatment plant at Warwanti Village :- Capacity 19.20 MLD Conventional Type
- Pure Water Pumping Machinery at WTP :- 350 H.P.Centrifugal coupled pump – 2 set Discharge cap 8 lakh ltr/Hr
- Pure water Rising main from warwanti :- 600 mm dia C.I. “ A” class pipe; WTP to ESR Length 4700 Rmt
- Elevated storage Reservoir at Barshi Road:- Capacity 14 Lakh liter
- E.S.R. at Nanded naka:- Capacity 14 Lakh liters
- Pure Water Gravity main from ESR at Barshi Road to G.S.R at Gandhi Chowk :- 600 mm dia prestressed cement concrete pipe L=2980 Rmt (This is now replaced by MS and BWSC pipes)

3. Work Executed Under Stage – III Part – II (1988)

- Replacement of pure Water gravity main from Shivaji chowk to Gandhi Chowk:- Previously 600 mm P.S.C. pipe Replaced by 600 mm dia M.S. pipe of L= 1580 Rmt

4. Works Executed Under Stage – IV Part – I (1990)

- Additional distribution pipe line in Nanded Naka area:-above 200 mm dia C.I. pipe and below 200 mm dia A.C. pipe distribution Lines Total Length = 35 Km

5. Works Executed Under Stage – IV Part – II (1993 To 2001)

- Pure Water Gravity Main from Gandhi Chowk to Dalda factory E.S.R.:- 600 mm to 400 mm dia C..I.pipe length 950 Rmt
- R.C.C. E.S.R's:-
 - at Ashok Hotel:- Capacity 21 lakh liters
 - at Dalda Factory:- Capacity 17.5 Lakh liters
- Additional distribution system :- above 200 mm dia C.I. pipe & below 200 mm dia A.C.pipe distribution lines Total Length 180 Km.
- Replacement of 35 HP VT pump sets at Sai Head work

C) Scheme From Dhanegaon Head Works (2005)

1. Latur Water Supply Scheme Stage V

Intake well in submergence of : 4 x 6 mtr Elliptical shape
Manjara Dam

Connecting main : 1800 mm dia RCC pipe of two parallel pipes of length 92.50 M and beyond it approach channel

	of 660 mtr length.
Inspection Wells	: elliptical size of 6 x 2 mtr dia - 2 Nos
Approach bund	: Approach bund of 65 mtr length
Jack well & Pump House	: elliptical shape, size of 17.15 x 6.35 mtr and Depth 21.50 mtr with 23.50 mtr x 11.50 mtr overhead pump house with Height 10.75 Mtr
Raw Water pumping machinery	: 700 HP V.T.Pumps with VSS HT motors - 3 sets discharge cap 17lakh ltr/Hr
Raw Water rising Main from H/W To M.S.shaft at Dhaba Pati	: 965 mm dia M.S.pipe length 4250 Rmt.
M.S.pipe shaft at Dhaba pati	: 1500 mm dia M.S. pipe of Height 5 mtr
Raw Water Gravity main	
i) upto Harangul Phata	: 1219 mm dia 7.9 mm thick M.S. pipe length 43.30 Km
ii) Harangul Phata to harangul WTP	: 1118 mm dia 7.9 mm thick M.S. pipe length 3.12 Km
iii) Harangul Phata to Warwanti WTP	: 610 mm dia 7.9 mm thick M.S. pipe length 2.65 Km
iv) Warwanti WTP to Arvi WTP	: 500 mm dia D.I K-9 pipes Length 5.25 Km
Water Treatment Plant at Harangul (BK) Village	: Conventional Type 80 MLD Capacity alongwith recirculation arrangement
Pure Water Pumping machinery	: 442 H.P VT Pumps with VSS HT Motors discharge cap 11.23 lakh lit/Hr – 3 sets with 50% standby
Pure Water Rising main	: 762 mm dia 9.5 mm thick M.S. pipe Length 1.29 Km
Master balancing Reservoirs Near Harangul Railway station	: 2 Nos of cap 31.25 Lakh Liters.
Pure Water Gravity mains	
i) M.B.R. to Gandhi Chowk ESR	: 1158 mm to 1016 mm dia M.S. pipe Length 10 Km

- ii) Shivaji Chowk to Saraswati Colony ESR : 457 mm dia M.S. pipe L= 625 mtr
- iii) Saraswati Colony ESR to Basaweshwar Colony ESR : 323.90 mm dia M.S. pipe Length 1175 mtr
- iv) Gandhi Chowk to Nanded Naka ESR : 610 mm dia M.S.pipe length 860 mtr 559 mm dia M.S.pipe Length 1680 mtr 457 mm dia M.S.pipe length 50 mtr.

R.C.C. Storage reservoirs

- i) At Osmanabad Road : Capacity 22 Lakh liters staging height 15 mtr water depth 5mtr
- ii) At Saraswati Colony : Capacity 41 Lakh liters staging height 13.28 mtr water depth 5 mtr
- iii) At Basaweshwar Colony : Capacity 21 Lakh liters staging height 15 mtr water depth 5 mtr
- iv) At Keshav Nagar : Capacity 35 Lakh liters staging height 22.30 mtr water depth 5 Mtr
- v) At Nanded Naka : Capacity 40 Lakh liters staging height 16 mtr water depth 5 mtr

Distribution System	:	80 mm dia C.I.pipe L= 69002 RM
		100 mm dia C.I.pipe L=16096 RM
		150 mm dia C.I.pipe L=16091 RM
		200 mm dia D.I.pipe L=11640 RM
		250 mm dia D.I.pipe L=5580 RM
		300 mm dia D.I.pipe L= 2421 RM
		350 mm dia D.I.pipe L= 3615 RM
		400 mm dia D.I.pipe L= 1878 RM
		Total 126,323 RM

Rehabilitation of Old water works

- i) Pumping machinery at Sai head works and Arvi Headworks : Replacement of 150 H.P.Centrifugal Pump – 4 sets
- ii) Pumping machinery at Nagzari Head works : Replacement of 250 HP V.T.Pumps (Raw Water) 350 HP Centrifugal (Pure Water)
- iii) Replacement of P.S.C. Line from MJP Office to Shivaji chowk : 600 mm dia B.W.S.C. pipe Length 1400 Rmt.

SCHEDULE B**SCHEDULE B – SCOPE OF WORK****A] GENERAL:**

The following sections of this schedule briefly highlight the scope of the work of the Project for the information of the Contractor. The description of the requirements for the various elements of the Project given herein under is the bare minimum requirements that the Contractor needs to undertake/provide for improvement of the same.

The Contractor shall also do the value addition for improving operations and maintenance processes of the Water Supply and Distribution Assets by providing facilities as per Schedule C. Operate and maintain the Water Supply and distribution assets in accordance with the Standards and specifications in Schedule D, provide services to consumers in accordance with Service Levels in Schedule H, and follow procedures in accordance with Schedule O – Operations and Maintenance Standards.

The Contractor shall provide capital assets for the project in accordance with Schedule J – Minimum Capital Expenditure by the Contractor. Provide minimum level of current assets in accordance with Schedule M – Minimum level of current assets.

The Contractor shall provide regular reports in accordance with Schedule P, comply with the employee services rules enclosed in Schedules L and S. And obtain the Discharge Certificate from MJP after termination of Agreement.

B] SCOPE OF WORK

1. Operations and maintenance of the entire Water Supply and Distribution Assets described in Schedule A that covers the following:

- i. All the existing Head works, i.e. Sai Head works, Nagzari Head works & Dhanegaon Head works shall be maintained by the contractor.
- ii. All the pipe lines from above Head works to Water Treatment plants, at Arvi road, Warwanti, Harangul (Bk), Pipe lines from these Water Treatment Plants to existing reservoirs & distribution network thereafter shall be maintained by the contractor.
- iii. Distribution system of around 476 Km shall be maintained by the contractor;
- iv. Undertake the expenditure and make payments towards electric energy charges, chemicals required for running Water Treatment Plant, pay water charges to water resources dept. The establishment charges, telephone charges and all other charges required to operate and maintain the water supply and distribution assets as per prudent utility practices shall have to be borne by contractor.

2. Contractor shall provide well-equipped two mobile vans alongwith drivers, one for maintaining distribution system and other for maintaining works located outside town with communication facility.
3. The Contractor shall have to provide a minimum level of staff for the Project in accordance with Schedule S.
4. Qualified staff from MJP and M.C. Latur as listed in Schedule P will be provided on service to the Contractor for the Project. The additional staff required for the project net of the staff deputed by MJP shall be appointed by the Contractor.
5. The Contractor shall be responsible for timely payment of salaries of his staff as well as the salaries of the staff deputed by MJP in accordance with Schedule L.
6. The staff appointed by the contractor particularly chemist, electrical equipment operating staff shall have experience relevant to the project.
7. Contractor shall implement modern techniques like computerized working of pumping machinery, W.T.P's. and distribution system. The cost of such improvement shall be borne by the contractor.
8. The Contractor shall be responsible for the safety and safe operations of all civil structures and electrical & mechanical equipment and installations and the Water supply and Distribution Assets.
9. Maintaining the Water Supply and Distribution System in accordance with the Agreement and handing over to MJP in good and working condition on completion of the Term of Agreement.
10. Contractor is permitted to avail unavoidable shut down for preventive maintenance of electrical, mechanical equipments, W.T.P. pipeline & distribution system with the permission of M.J.P. The Contractor shall provide its Consumers prior intimation of such shutdown maintenance through local newspapers and news channels at his cost and expense.
11. The contractor shall maintain records, Logbook and history sheet of pumping machinery at each pumping station.
12. The contractor should provide a set of two uniforms once in two years and identity card to the employees at his cost Employees means employee appointed by the contractor and employees on service from MJP for this project.
13. All types of major and minor repairs to the mechanical & electrical equipments shall be attended by the contractor including providing of spare parts, repairs, etc.

14. The contractor should keep the necessary spare-parts in his stock during the term of agreement in accordance with Schedule M.
15. Preventive maintenance required for all major and minor electrical & mechanical equipments shall be attended by the contractor at his cost. Responsibility of faults due to lack of maintenance lies on the contractor. All planning of shutdowns etc. shall be as per the directives from MJP Representative.
16. Annual inspection of electrical inspector shall be arranged at each substation. The necessary fees toward, such inspection shall be paid by the contractor. The contractor shall attend compliance of all the points raised by the Electrical Inspector.
17. Contractor shall arrange communication system at all the head works, Water Treatment Plant, pure water pumping stations, zonal offices and wherever required for smooth operation of the scheme.
18. The Contractor shall provide necessary labour to MJP for achieving a minimum distribution system expansion of 1 km per year in accordance with Schedule I. The necessary material in the form of pipes, specials and valves for system expansion shall be provided by MJP free of cost.
19. Immediately after the Commencement date the Contractor shall undertake minor repairs to the Water supply and Distribution Assets. The minor repairs referred to in this clause covers the following:
 - a. In case of civil structures minor repair shall mean minor damages to civil structure, including sweating to water storing structures, need of plastering, painting of structure, replacement of broken glasses of ventilators, repairs to doors and windows, removal of joint leakages of pipes which do not need replacement of pipe, replacement of air valve bolts, replacement of gland packing to valves, repairs to railing, replacement of lightening conductor etc.
 - b. In case of mechanical and electrical equipments minor repairs shall mean replacement of HRC fuses, tightening of electric connections, replacement of contacts of starter / OCB, topping up of oils in ATS starters / transformer, replacement of gland packing to valves & VT pumps tightening of foundation bolts of pumps, replacement of cable lugs, replacement of silica gel of transformer, replacement of indicator bulbs, knobs / handles of switches on panel, replacement of gland packing to C/F pump, replacement of bush and couple bolts of C/F pump, replacement of pressure gauges, tightening of lugs and connection of capacitor etc.
20. The Contractor shall comply with all Contractors' obligations mentioned elsewhere in the entire Agreement and Schedules to the Agreement and instructions issued by the Executive Engineer.

C] SPECIAL CONDITIONS OF CONTRACT

1. As there are 33 kV substations with maximum of 33 kV / 3.3 kV capacity transformers, 33 kV VCB's, 33 kV / 3.3 kV feeders, isolators, panels, 3.3 kV motors etc. installed at Dhanegaon & Harangul pumping stations, also there are H.T. substations & higher capacity of motors installed at other pumping stations as described in Schedule A. Hence contractor shall appoint the employees with required skills & qualification in electrical & mechanical field. They shall be trained for safe handling and operations of above equipments. Contractor shall provide required testing and handling tools / equipments for the same. Any mishap during handling and operation of above is the responsibility of contractor.
2. The MJP reserves the right to ask the contractor to discontinue any worker/labour for misbehavior/misconduct or negligence on duty. In any case the workers should not be found intoxicated condition. They should be medically fit and the contractor shall ask a medical fitness certificate from the competent authority before engaging any worker.
3. Executive Engineer shall have the authority to ask the contractor to change any employee who is found physically technically unfit for the job. And the said instructions shall be followed by the Contractor.
4. Contractor shall maintain the record of attendance, wages paid to employees and PF subscription. The record shall be open for verification of MJP Officers as well as the authorities from Govt. Organizations.
5. Employment to the workers, engaged by the contractor, on the work shall be entirely the contractor's responsibility. In any case contractor's employees shall not have any right for employment in Maharashtra Jeevan Pradhikaran. The terms of appointment of the Contractor should address this concern of MJP.
6. Contractor shall maintain instructions book at Water Treatment Plants, pumping stations ESR's to receive the instruction/orders from the Executive Engineer. The instructions/orders, given in the register should be complied immediately.
7. Contractor shall have to observe all safety measure as per the norms of Govt. under various acts and rules. Contractor shall have to maintain all necessary safety equipments, chlorine tonners handling equipments and lifting tools & tackles required for the work in good working condition.
8. Contractor shall have to maintain the record in prescribed form regarding maintenance/repair works (preventive as well as break-down) carried out at all stations. Separate history sheet should be maintained for every equipment/machine.
9. Essential and break-down maintenance/repair works shall have to be carried out continuously irrespective of day and night to put the machines in working order in shortest possible time. If required, in such cases, contractor will have to increase the staff. No extra payment will be made by dept. for increasing the staff, no over time

wages for such extra work will be borne by the dept. During break down maintenance staff shall not leave the premises without permission of Executive Engineer.

10. Contractor shall put gates in position at KT weirs Nagzari and Sai at proper time so that the KT weirs shall be full of water at the end of rainy season
11. Contractor shall maintain the gantry and gates at Nagzari KT weir and all gates at Sai KT weir in working condition for smooth operation.
12. Contractor shall keep essential instruments/ equipments as specified in Schedule C required for day to day checking & testing of Electrical installation at all pumping station.

In case any fault arise in case of laid cables of HT/LT installation, the repairs shall be carried out immediately with all necessary materials as directed by Executive Engineer. Stock of jointing material required for above repairs shall be kept in stock, for round the clock maintenance. Contractor should maintain stock of the above materials for round the clock maintenance.

13. Contractor shall maintain the power factor at 0.95 minimum, at all pumping stations. The Contractor is fully responsible for low power factor penalty.
14. Contractor shall extend full co-operation to Electrical inspector. Deputy Director of factories and any other statutory authority visiting the plant, Contractor shall have to comply the suggestions and directives given by them under the respective act & rules. Contractor shall maintain visit book and inform the Executive Engineer about such visits in writing.
15. Good house keeping shall be maintained in Water Treatment Plant, Head works, pumping station & its premises.
16. Contractor shall have to maintain proper illumination in the premises of all pumping station reservoirs, water treatment plants for above maintenance contractor shall keep in his stock illumination material, such as bulbs, chocks, igniters, cable, switches and required cable.
17. Contractor shall bring all required instruments, tools and tackles as mentioned in Schedule M at each site at his own cost.
18. Contractor shall carry out the major & minor maintenance and repair works in all shifts such as replacement of fuses, glands, packing, oiling, rectification of fault in electrical and electronic circuits, arresting sparking. Gland packing of all sluice valves shall be replace and immediately if any leakage is found. Similarly oil leakage from gear boxes, transformer etc shall be attended immediately.

- 19.** Contractor shall maintain the water treatment plant & pumping machinery in good operational condition clean round the clock, specifically it should be checked that aeration fountain & notches and louvers of clarifier are free from algae and filter bed should not have any mud balls. Back washing should be taken as soon as the head loss of 1.8 mtr is exceeded or once in 24 hours whichever comes first. Alum solution tank & alum solution pipeline should be maintained clean & its machinery should be in operating condition. Alum solution pipeline must be flushed thoroughly after every use.
- 20.** Contractor shall arrange for back washing of filter beds and desludging of clariflocculator as per requirement for which all skilled staff shall be arranged by the contractor.
- 21.** Providing the refilled chlorine tonners to various WTP's is the responsibility of the contractor. Contractor shall observe safety during transportation of tonners from refilling point to WTP site and also during local handling.
- 22.** Contractor should provide following safety equipments for chlorine handling works in good condition. His staff should be well trained in handling safety equipments and the same will have to be demonstrated as per necessity. A Mock drill should be preformed quarterly.

 - i. Emergency kit.
 - II. Self Breathing Apparatus alongwith hand gloves.
 - iii. Chart showing the required activities during hazard.
- 23.** When there is break down in water supply or operation of machinery due to negligence or fault of contractor, the Executive Engineer shall assess the extent of loss. The contractor shall have to restore the loss without disturbing water supply schedule, and the loss will have to be borne by the contractor.
- 24.** Contractor is at liberty to run any number of headworks at a time without affecting the quantum of water supplied to whole town or any part of it. However minimum MSEDCL charges for any idle pumping station shall be paid by the contractor.
- 25.** If Executive Engineer fixes time limit for any repairs / work then contractor will have to complete the work within the fixed time at any cost by deputing staff round the clock. If contractor fails to complete that job within the fixed time, penalty @ Rs. 500/- per hour for delay in time limit will be imposed. In this respect the decision of the Executive Engineer will be final and binding on the contractor.
- 26.** All sundry materials for maintenance and repair, such as cotton waste, rubber packing, gland packing, transformer oil, lubricating oil, Grease, brooms for sweeping will be provided by the contractor. Sufficient stock of these items shall be maintained at all WTPs, pumping stations and substations.

27. After completion of the contract period contractor shall handover the Water Supply and Distribution Assets which was in his possession during the contract period in good & working condition.
28. Contractor shall have to make arrangement of daily patrolling, for checking regularly raw water & pure water pipeline from head work to Water Treatment Plant and gravity main and shall rectify the observed minor as well as major leakages.
29. If any complaint is received from consumer for less water supply, low pressure or about quality of water; contractor will do all necessary repairs of the line or do any alteration fix additional valve or do necessary cross connection from another line or lay required small length of pipe line in consultation with MJP without claiming any extra payment for such improvement.
30. For smooth O&M the Contractor is required to establish offices/ customer service centers at the following indicative locations
- i) Contractors main office in Latur town
 - ii) Zonal Office at Barshi Road E.S.R.
 - iii) Zonal Office at Saraswati Colony, E.S.R.
 - iv) Zonal Office at Ambejogai Road E.S.R.
 - v) Zonal Office at Nanded Naka E.S.R.
 - vi) Zonal Office at Gandhi chowk E.S.R.

The main & Zonal offices should be well equipped with sufficient educated staff necessary furniture telephone connection and P.C. for smooth maintenance of the scheme and proper communication arrangements with the Consumer.

Contractor shall maintain a complaint register at each zonal office and attend the complaint immediately. Contractor shall maintain all registers as mentioned in the Schedule P. Review of such complaints and registers will be taken by the Executive Engineer regularly.

31. Contractor shall maintain suitable arrangement for registering new connection. The actual connection shall be given within 15 days from the receipt of application and before giving, connection he should ensure that necessary deposit specified in Schedule F is received by him, which shall be subsequently deposited to MJP account. Contractor should note that he is not entitled for any commission or fees from this amount.
32. If illegal connections are found, these should be regularized by imposing penalty. The amount of such penalty shall be equivalent, considering as if this connection is given on 1/4/2007 and water charges will be recovered at the rate of Rs. 400/- per month. The amount collected for the period prior to the Commencement Date shall get deposited to the MJP as arrears. Contractor should ensure that all illegal connections are detected by conducting actual survey and these illegal connections are regularized within 6 months

- from the Commencement date. However in case of new pipelines it will be the prime duty of the contractor to see that there shall be no illegal connections.
33. The contractor has to maintain the laboratory. All the glass wares, chemicals and sundry materials required for satisfactory running of the laboratory shall be provided by contractor at his cost. The contractor shall maintain the account of various material consumed by him for performing various tests in the laboratory.
 34. If, due to negligence of the contractor polluted water is supplied to the consumer & due to this outbreak of epidemic occurs, and for consequences of such incidents, contractor is solely responsible. Contractor shall keep MJP indemnified against any judgement, award or decree passed in this respect by any court and competent authority.
 35. Excavation required for removing the burst pipes, shall be of minimum required width and length. Guarding of the excavated trench shall be as per detailed standard specifications (Red Book). Responsibility of accident to any human being or animal due to non-guarding of excavated trenches and if any compensation arising due to such accident, shall be borne by the contractor.
 36. The responsibility of damages to other services like, telephone, electricity, roads, due to leakages or while removing of leakages, lies with the Contractor, & claims of concerned department shall be settled and paid by the Contractor. Prior permission from respective departments for carrying out any work shall be obtained by the Contractor. It includes the payment of charges payable to the concerned department for such permission.
 37. It will be the duty of contractor to collect from distribution system and send the water sample for testing to district laboratory and also to collect the reports. If contractor fails to send the sample / bring the report and the fault is with contractor, penalty @ Rs. 400/- per sample / day will be imposed. Contractor will have to submit reports monthly to Executive Engineer or whenever.
 38. Filtered water should be supplied to all consumers. If the complaint of contaminated water is not attended within 48 Hrs penalty of Rs. 100/- per day will be imposed. Regarding distribution line leakages, if any occurred, should be attended within 12 Hrs. and completed within 48 Hrs. If leakages are not attended within stipulated time a fine of Rs. 25/- per day per leakage will be imposed by the Executive Engineer. Penalty shall be paid along with premium.
 39. If any complaint is received from consumer for less water supply, low pressure or about quality of water; contractor will do all necessary repairs of the pipeline or do any alteration, fix additional valve or do necessary cross connection from another line or lay required small lengths of pipeline in consultation with MJP without claiming any extra payment for such improvement.
 40. MJP at its sole discretion may adopt 24 x 7 water supply pattern and to achieve the same the MJP may undertake further capital investments in the Water Supply and Distribution Assets. The Contractor shall be thereafter responsible for providing water supply to the Consumers on a 24 x 7 pattern. The Contractor shall not make any claims for any additional payments in this regard.

41. The Contractor shall make regular visits to all sub works and undertake routine visits and undertake patrolling of the Water Supply and Distribution Assets. The Contractor shall make use the vehicles provided by the Contractor under the agreement for this purpose. The Contractor shall make alternative vehicle arrangements in the eventuality of non availability of vehicles due to repairs or absence of driver.
42. The Contractor shall paint the external and internal structures immediately after the Commencement Date and thereafter repeat it after 3 ½ years.
43. The contractor shall not set fire to any standing jungle, trees, brush wood or grass without a written permission from the Executive Engineer. When such permit 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.
44. The contractor shall make his own arrangements for drinking water for the labour employed by him and should provide sanitary and other arrangements.
45. The contractor shall provide all necessary personal safety equipment and first aid apparatus available for the use of persons employed on the Water Supply and Distribution Assets and shall maintain the same in good condition suitable for immediate use at any time and shall comply with the following regulation in connection therewith
 - a. The workers shall be required to use the equipment 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 risk of drowning, all necessary steps shall be provided and kept ready for use and all necessary steps shall be taken for the prompt rescue of and 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.
 - d. Where the workers are required to work near machines and are liable to accidents, they should not be allowed to wear loose clothes.
46. The contractor shall be responsible for and shall pay the expenses of providing medical aid to any workmen who may suffer a bodily injury as a result of an accident. If such expenses are incurred by MJP the same shall be recoverable from the Contractor forthwith.
47. The Contractor shall duly comply with the provisions of “The Apprentices Act, 1961” (III of 1961) the rules made there under and the order that may be issued from time to time under the said Act and Said Rules and on his failure or neglect to do so he shall subject to all the said liabilities and penalties provided by the said Act and said Rules.
48. During the term of agreement and at the termination of the agreement the Water Supply and Distribution Assets should be in perfect working conditions. Under no circumstances the contractor should leave any maintenance work unattended while handing over of the scheme. It is obligatory on part of the contractor that.

- a. All mechanical and electrical equipments, machinery and parts viz. pumps, motors, starters, all types of panels, including VCBs, Relays, transformers, vacuum pumps, capacitors, cabling, electric meters with CT / PT units & four pole / two pole structure etc. should be in perfectly working condition at the head work and water treatment plant site.
- b. The civil structures such as approach channel, intake well, connecting main, jack well, approach bridge, water treatment plant, Master balancing reservoirs ESRs are well maintained and no damage to these structures either physical or structural should be caused.
- c. All the pipelines such as raw water rising main, BPT pure water rising main, feeder mains, distribution lines with pipe appurtenances such as sluice valves, scour valves, air valves etc. should be in perfectly working conditions.
- d. All the treatment units including its equipments like motors, gears, valves, gates etc for all units such as aeration fountain, mixing channel, inlet channel, flash mixture flocculators, clarifiers, tube settlers, filters, alum tanks, TCL solution tank, constant dosing apparatus, chlorinators, wash water pumps, constant bleeding arrangement of clarifiers piping arrangement of pure / raw water chlorination, flow meters, pumps for chlorination, airblowers & its piping. Bye pass arrangement, wash water tank and laboratory equipments, recirculation pumps and electric equipments should be in perfect working condition.

SCHEDULE C**SCHEDULE C – FACILITIES TO BE PROVIDED****A] Vehicles**

- | | |
|---|-------|
| a. Jeep of Mahindra or Tata Sumo or Bollero or Trax makes | 2 Nos |
| b. Motor cycles | 2 Nos |

B] Mobile communication facilities

- | | |
|------------------|-------|
| 1. Mobile phones | 8 nos |
|------------------|-------|

C] Consumables

The following consumables are required to be provided as per requirements of the Contractor

1. Cleaning Acid
2. Toilet cleaner
3. Phenyl
4. Air Freshener
5. Washing Power
6. Brooms & Brushes
7. Wire Brushes
8. Duster
9. Brooms with Bamboo's
10. Toilet Soap
11. Cotton Waste
12. Kharata
13. Duster Cloth
14. Degreasing chemicals/ Agents
15. Derusting Chemicals / Agents
16. Plastic Buckets

D] List of tools and tackles and equipment to be provided at each head works, WTP and distribution network

Sr.No	Description	Sai & Nagzari head works	Sai & Warwanti WTP	Dhanegaon head works	Harangul WTP & Pumping station	For distribution network
1	DE Fix Spanner set 6 mm to 32 mm	2 set	2 set	1 set	1 set	1 set
2	Ring Spanner set 6 mm to 32 mm	2 set	2 set	1 set	1 set	1 set
3	Box Spanner set 6 mm to 22 mm	2 set	2 set	1 set	1 set	---
4	Triangular file 300 mm	2 no.	2 no.	1 no.	1 no.	1 no.
5	Half round file 300 mm	2 no.	2 no.	1 no.	1 no.	1 no.
6	Pipe wrench 36"	2 no.	2 no.	1 no.	1 no.	2 no.
7	Pipe wrench 24"	1 no.	1 no.	1 no.	1 no.	2 no.
8	Screw driver 6", 9" & 12" 2 Nos. each	2 set	2 set	1 set	1 set	1 set
9	Insulated Plier 12"	2 no.	2 no.	1 no.	1 no.	1 no.
10	Long Nose plier	2 no.	2 no.	1 no.	1 no.	---
11	Adjustable Screw spanner 12"	2 no.	2 no.	1 no.	1 no.	1 no.
12	Hammer 1 LB	2 no.	2 no.	1 no.	1 no.	---
13	Hammer 2 LB	---	---	1 no.	1 no.	1 no.
14	Electric tester	2 no.	2 no.	1 no.	1 no.	---
15	Hacksaw frame with 6 blades	2 set	2 set	1 set	1 set	1 set
16	Gland nut spanner For VT pump	2 no.	---	2 no.	2 no.	---
17	Steel level 300 mm	2 no.	2 no.	1 no.	1 no.	1 no.
18	Hand gloves 33 /11 kV	4 pairs	4 pairs	2 pairs	2 pairs	--
19	HRC fuse puller	2 no.	2 no.	1 no.	1 no.	---
20	Megger 1000 Volt, 1000 Ohms, Cranking type	1 no.	1 no.	1 no.	1 no.	---

Contractor

Executive Engineer

Sr.No	Description	Sai & Nagzari head works	Sai & Warwanti WTP	Dhanegaon head works	Harangul WTP & Pumping station	For distribution network
21	Tong tester 0-1000 Amps. & 0-600 volts	2 no.	2 no.	1 no.	1 no.	---
22	Multimeter (Electronic) for AC or DC Volts & Ohms.	2 no.	2 no.	1 no.	1 no.	---
23	Earth tester four terminal and accessories (0-10-100-1000-10000 Ohms.)	---	--	---	1 no.	---
24	Crimping tool (hydraulic) with set of dies 6 sq.mm. to 500 sq.mm.	1 no.	1 no.	1 no.	1 no.	---
25	Screw type bearing puller 12"	1 no.	1 no.	1 no.	1 no.	---
26	Earthing rod	2 no.	2 no.	1 no.	1 no.	---
27	MS tool box with locking arrangement (0.5 x 0.5 x 0.3)	2 no.	2 no.	1 no.	1 no.	1 no.
28	Gum boot and Hand gloves for TCL	Nil	2 set	---	1 set	---
29	First aid box	2 no.	2 no.	1 no.	2 no.	1 no.
30	Electric shock treatment charts and instruction charts for pump and filter operator	2 set	2 set	1 set	2 set	---
31	Phowada	---	---	---	2 no.	6 no.
32	Ghamelas (MS)	---	---	---	2 no.	6 no.
33	Tikaw	---	---	---	2 no.	6 no.
34	Vile / Kainchi & all tools for gardening	---	---	--	1 set	---
35	Plastic pipe ½" for gardening	15 mtr	15 mtr	---	30 mtr	---
36	Plastic bucket 5 Lit. Capacity	2 no.	2 no.	2 no.	2 no.	---
37	Plastic bucket 1 Lit. Capacity	---	---	---	1 no.	2 no.
38	GI bucket 10 Lit. Capacity	---	---	---	1 no.	2 no.

Contractor

Executive Engineer

Sr.No	Description	Sai & Nagzari head works	Sai & Warwanti WTP	Dhanegaon head works	Harangul WTP & Pumping station	For distribution network
39	Rope ½” size	---	---	---	---	30 mtr
40	Rope 1” size	----	---	---	---	30 mtr
41	Torch with cells	2 no.	2 no.	1 no.	2 no.	1 no.
42	Grease gun	2 no.	2 no.	1 no.	2 no.	---
43	Crow bars	---	---	---	2 no.	6 no.
44	Chiesles 6”, 12” size	---	---	---	2 no.	6 no.
45	80 mm dia Tripod 6 mtr. adjustable with 2 tone capacity CP block, Chains for binding	---	---	---	---	2 set
46	Wire ropes with hooks	1 set	1 set	1 set	1 set	2 set
47	Sluice valves keys	---	---	--	1 set	1 set
48	Gas Mask for Chlorine plant	Nil	2 set	---	2 set	---
49	Emergency kit for chlorination plant	Nil	1 kit	---	1 kit	---
50	Self breathing apparatus for chlorine room	Nil	1 kit	---	1 kit	---
51	Vibration tester	----	---	---	1 set	---
52	Precision spirit level 3 dimentional	----	---	----	1 no.	---
53	Inside/Outside calipers	---	---	---	1 set	---
54	Caulking tools for lead joints	---	---	---	---	6 no.
55	2 tone Jack with tommy for pipe jointing	---	---	---	--	2 no.
56	Plastic cans 20 Lit. Capacity for Oil	1 no.	1 no.	1 no.	1no.	---
57	Plastic funnel for above	1 no.	1 no.	1 no.	1no.	---

Note :- This is a tentative list given, contractor shall arrange for the required tools as per site situation for attending Operations and maintenance works.

Contractor

Executive Engineer

E] Equipment for testing of Electrical installation at all pumping stations

1. 2.5 KV, 5000 Mega OHM insulation tester (Meggar). – 1 No.
2. Digital Multimeter having the resistance scale suitable for measuring resistance of electric motor AC/DC voltage from 12 volts to 650Volts.-1No.
3. Clamp-on-Ammeter (Tong Tester), digital type, having range 150 Amp. for H.T. installations and upto 500 Amp. for L.T. installations. – 1 No. each.
4. Tacho meter (laser type)- 1 No.
5. Verniers: - 2 No.
6. Magnetic dial gauge: - 2 Nos.
7. Earth tester

E] List of furniture to be provided at each H.W./W.T.P./ Pumping station/ Main office/ Zonal office

Sr. No.	Item	Quantity
1.	Table with side locker 1.2 x 0.6 Mtr. (at main & zonal office, each)	1 No.
2.	Fiber/Steel Chairs.(at main & zonal office, each)	4 Nos.
3.	Ceiling Fan (at main & zonal office, each)	1 No.
4.	Cup-board (at main & zonal office, each)	1 No.
5.	Wooden Bench (at main & zonal office, each)	1 No.
6.	P.C. Pentium - IV with printer. (at main & zonal office, each)	1 No.
7.	Telephone Connection. (at main & zonal office, each)	1 No.
8.	Notice-board at main & zonal office, each.	1 No.
9.	Drinking water arrangement (at main & zonal office)	
10.	Name board at main & zonal office, each.	1 No.
11.	Electric connection at main & zonal office, each.	
12.	Stationery as required.	

SCHEDULE D**SCHEDULE D – SPECIFICATIONS AND STANDARDS****A] Operations and Maintenance standards to be followed**

The operations and maintenance standards shall follow the minimum requirements mentioned herein. These standards comprise of practices recommended in the CPHEEO Manual for water supply and distribution. Where this Agreement is silent on any item, the relevant section of the CPHEEO Manual for water supply and distribution shall be adopted with approval from the Executive Engineer.

1. Maintenance of Headworks situated at Dhanegaon, Nagzari and Sai

- a. It should be ensured that sufficient water level is maintained at headworks in order to ensure drawal of required quantity of water into intake works without vortex formations.
- b. All intake strainers should be cleaned at frequent intervals particularly during monsoon to prevent entry of fish or floating matter into intake works.
- c. All damages to structural components of intake works particularly during floods should be promptly repaired.
- d. Sufficient stocks of rubble should be maintained at intake works site for use to temporarily overcome the problem of scours at spillways and other places.
- e. A schedule of painting of steel and other structural parts of the intake works should be prepared and followed scrupulously to avoid damages to the structure.
- f. All raw water holding structures such as intake wells, jackwells and inspection wells should be desilted during and immediately after monsoon to remove settled silt.

2. Maintenance of Pumps and Pumping Machinery***Requirements***

Planning and operation of a pumping station embraces considerations of the following points :
Providing space, equipment and facilities for :

- a) Substation, for receiving and distributing the power supply
- b) Auxiliary power unit
- c) Control panel
- d) Bays for loading and unloading
- e) Overhauling, repairs and maintenance of pumps and all other equipments
- f) Head room and material handling tackle
- g) Ventilation
- h) Lighting
- i) Safety from fire
- j) Railings, ladders and passages for safe, easy and efficient movement of people
- k) Office and administration areas, including room for lockers, dress change and utilities for sanitary and hygienic needs of the working staff.

Installation of pumps

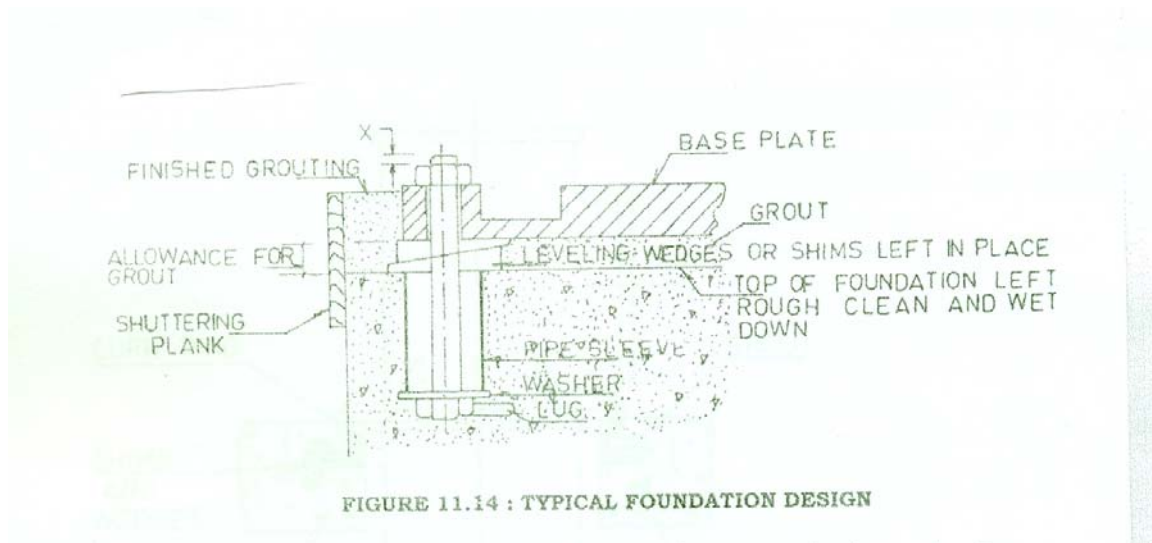
The procedure of installation depends upon whether the pump is to be mounted horizontal or vertical. Most pumps to be mounted horizontal are supplied by the manufactures as a

wholesome, fully assembled unit. However, pumps to be mounted vertically are supplied as sub assemblies. For the installation of these pumps the proper sequence of assembly has to be clearly understood from the manufacturer's drawings.

The installation of a pump should proceed through five stages in the following order :

- i) Preparing the foundation and locating the foundation bolts
- ii) Locating the pump on the foundation bolts, however resting on levelling wedges, which permit not only easy levelling but also space for filling in the groute later on
- iii) Leveling
- iv) Grouting
- v) Alignment

Figure – Typical foundation design



- a) the foundation should be sufficiently substantial to absorb vibrations and to form a permanent, rigid support for the base plate. A typical foundation is illustrated in above.
- b) The capacity of the supporting structure should be adequate to withstand the entire load of the foundation and the dynamic load of the machinery. As mentioned in clause 6.2.2 and 6.2.3 of IS 2974 (Part iv) – 1979 the total load of the pump and the foundation should include the following :

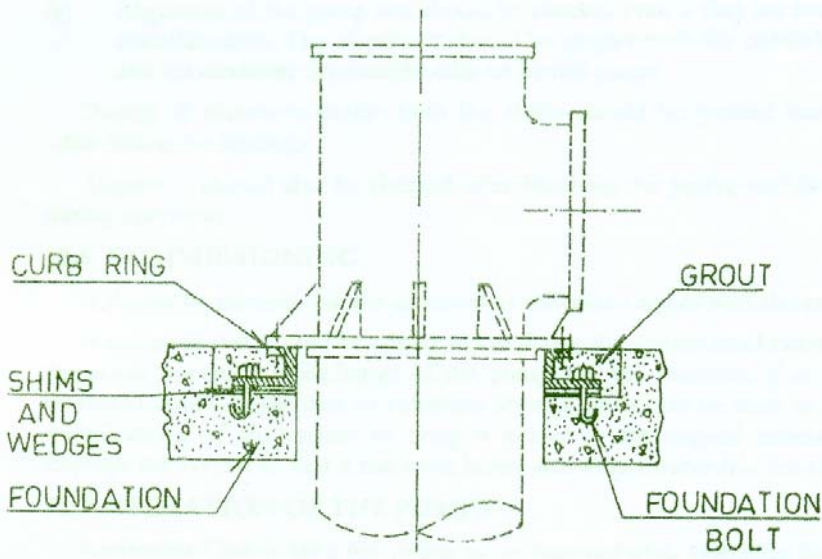
- i) constructional loads
- ii) Three times the weight of the motor
- iii) Weight of water in the column pipe
- iv) Half of the weight of the unsupported pipe connected to the pump flanges

- c) If the pumps are mounted on steel structures, the location of the pump should be nearest as possible to the main members (ie beams or walls) the sections of the structurals should have allowance for corrosion also.

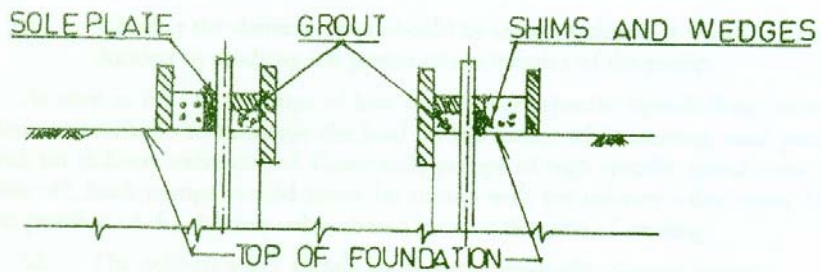
- d) A curb ring or sole plate with machined top should be used as a bearing surface for the support flange of a vertical wet pit pump. The mounting face should be machined because the curb ring or sole plate is used to align the pump. Figure below shows typical arrangement with curb ring and with sole plate.

- e) Pumps kept in storage for a long time should be thoroughly cleaned before installation.

Figure – Foundation for vertical pumps



(a) ROUND TYPE CURBING FOR ABOVE GROUND DISCHARGE VERTICAL PUMP



(b) GROUTING FORM FOR VERTICAL PUMP SOLEPLATE

FIG. 11.15 FOUNDATION FOR VERTICAL PUMPS

f) Alignment of the pump sets should be checked even if they are received aligned by the manufactures. The alignment should be proper both for parallelism (by filler gauge) and verticality.

During all alignment checks both the shafts should be pressed hard, over to one side while taking the readings

Alignment should be checked after fastening the piping and thereafter, periodically during operation.

Commissioning

It should be ensured that the direction of the motor agrees with the arrow on the pump.

A specimen test should be conducted to derive the system head curve and to understand the actual operating point / range of the pump and the variation, if any, from the original estimated duties. In the case of variations some analysis may be done to explore any feasible modifications of the system to bring it nearer to the original estimates or to generally improve the system so that it can work better and work trouble free for long.

Operation Of The Pumps

Summarized below are a few points to be observed while operating the pumps

- a) Dry running of the pumps should be avoided. Centrifugal pumps have to be primed before starting Helical rotor pumps, although they are self priming being of positive displacement type, need the rubber stator to be wetter before starting.
- b) Pumps should be operated only within the recommended range on the H-Q characteristics curve of the pump. Operation near to the shut off head should be avoided, as in the operation near the shut off head, there happens substantial recirculation within the pump which causes over heating.
- c) Whether the delivery valve should be open or closed at the time of starting is to be decided by studying the power characteristics of the pump.

Pumps of low and medium specific speeds draw more power as the flow increases. So to minimize the load on the motor while starting, such pumps are started with the delivery valve closed. Conversely pumps of high specific speed draw more power at shut off. Such pumps should hence be started with the delivery valve open. While stopping, the position of the delivery valve should be as the time of starting.

- d) The delivery valve should be operated gradually to avoid surges
- e) When pumps are to operate in parallel, the pumps should be started and stopped with a time lag between two pumps. The time lag should be adequate to let the pressure gauge stabilize
- f) When the pumps are to operate in series, they should be started and stopped sequentially, but with the minimum time lag as possible. Any pump, next in sequence should be started immediately after the delivery valve of the previous pump is even opened. Due care should be taken to keep the air vent of the pump next in sequence, open before starting that pump
- g) The stuffing box should let a drip of leakage to ensure that no air is passing into the pump and that the packing is getting adequate water for cooling and lubrication. When the stuffing box is grease sealed, adequate refill of the grease should be maintained.

h) The running of the duty pumps and of the standbys should be so scheduled that all pumps are in ready to run condition.

Maintenance of Pumps

Periodic Inspection and test

The maintenance schedule should enlist items to be attended to at different periods, such as daily, quarterly, annually etc.

Daily Observations

A log book should be maintained to record the observations, which should cover the following items :

- i) timings when the pump was run during the previous 24 hours
- ii) at the time of observation, whether the leakage through the stuffing box is all right
- iii) bearing temperature/s
- iv) whether any undue noise or vibrations
- v) readings of pressure, voltage and current

Quarterly inspection

- i) free movement of the gland of the stuffing box
- ii) cleaning and oiling of the gland bolts
- iii) inspection of the packing and repacking, if necessary
- iv) alignment of the pump and the drive
- v) cleaning of oil lubricated bearings and replenishing fresh oil. If bearings are grease lubricated, the condition of the grease should be checked and replaced/replenished to correct quantity. An antifriction bearing should have its housing so packed with grease that to avoid spaces in the bearings and the housing to $\frac{1}{3}$ to $\frac{1}{2}$ filled with greases. A fully packing housing will cause the bearing to overheat and will result in reduced life of the bearing.

Annual Inspection

- i) Cleaning and examination of all bearings for flaws developed, if any
- ii) examination of shaft sleeves for wear or scour
- iii) checking clearances

Clearances at the wearing rings should be within the limits recommended by the manufacturer. Excessive clearances cause a drop in the efficiency of the pump. If the wear is only one side, it is indicative of misalignment. Not only that the misalignment should be set right, but also the causes for the disturbance of the alignment should be investigated. When the clearances have to be redeemed to the values recommended by the manufacturers, some general guidelines detailed in Table 11.6 would come handy.

If the clearance on wear is seen to be 0.2 or 0.25 mm more than the original clearance, the wearing ring should be renewed or replaced to get the original clearance.

In using the tolerance given in Table 11.6, they are to be used unilaterally. For example, while machining the i.d. of the wearing ring of basic size, say 175 mm the limits for machining would

be 175.00 minimum and 175.04 maximum. For the corresponding O.D at the hub of the impeller, the basic size will be with a clearance of 0.35, hence 174.65 mm and the machining limits will be 174.65 maximum and 174.61 minimum.

Table 11.6
Wearing Ring I.D. Diameter Clearance and Machining Tolerance

Inside dia of wearing ring mm	Diametral clearance mm	Machining Tolerance mm
Upto 100	0.3	0.04
100-150	0.35	0.04
150-200	0.4	0.06
200-300	0.45	0.06
300-500	0.55	0.06
500-700	0.58	0.06
750-1200	0.69	0.08
1200-1200	0.79	0.1

iv) Impeller hubs and vane tips should be checked for any pitting or erosion

v) End play of the bearings should be checked

vi) All instruments and flow meters should be recalibrated

vii) Pump should be tested to determine whether proper performance is being obtained. In case of vertical turbine pumps, the inspection can be bi-annual. Annual inspection is not advisable, because it involves disturbing the alignment and clearances.

Facilities for Maintenance and Repairs

1 Consumables and Lubricants

Adequate stock of such items as gland packing, rubber packing, lubricating oils, greases should be maintained

2 Replacement Spares

To avoid downtime, a stock of fast moving spares should be maintained. A set of recommended spares for two years of trouble free operation should be ordered along with the pump.

3 Repair Work Shop

The repair workshop should be equipped with :

- Tools such as bearing, pullers, clamps, pipe wrenches etc
- General purpose machinery such as welding set, grinder, blower, drilling machine etc

4. Trouble Shooting

The check charts detailed in Tables 11.7, 11.8 and 11.9 provide guidelines for diagnosing the causes of troubles likely to arise during the operation of centrifugal, rotary and reciprocating pumps, respectively. As remedial measures, the cause/s of the trouble will have to be corrected.

Table 11.7
Check Chart for Centrifugal Pump Troubles

Symptoms	Possible cause of trouble (Each number is defined in the list below)
Pump does not deliver water	1, 2, 3, 4, 6, 11, 14, 16, 17, 22, 23
Insufficient capacity delivered	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 17, 20, 22, 23, 29, 30, 31
Insufficient pressure developed	5, 14, 16, 17, 20, 22, 29, 30, 31
Pump loses prime after starting	2, 3, 5, 6, 7, 8, 11, 12, 13
Pump requires excessive power	15, 16, 17, 18, 19, 20, 23, 24, 26, 27, 29, 33, 34, 37
Stuffing box leaks excessively	13, 24, 26, 32, 33, 34, 35, 36, 37, 38, 39, 40
Pump vibrates or is noisy	2, 3, 4, 9, 10, 11, 21, 23, 24, 25, 26, 27, 28, 30, 36, 41, 42, 43, 44, 46, 47
Bearings have short life	24, 26, 27, 28, 35, 36, 41, 42, 43, 44, 45, 46, 47
Pump overheats and seizes	1, 4, 21, 22, 24, 27, 28, 35, 36, 41

SUCTION TROUBLES

1. Pump not primed
2. Pump or suction pipe not completely filled with liquid
3. Suction lift too high
4. Insufficient margin between suction pressure and vapour pressure
5. Excessive amount of air or gas in liquid
6. Air pocket in suction line
7. Air leaks into suction line
8. Air leaks into pump through stuffing boxes
9. Foot valve too small
10. Foot valve partially clogged
11. Inlet of suction pipe insufficiently submerged
12. Water seal pipe plugged
13. Seal cage improperly located in stuffing box, preventing sealing fluid from entering space to form the seal.

SYSTEM TROUBLES

14. Speed too low
15. Speed too high
16. Wrong direction of rotation
17. Total head of system higher than design head of pump
18. Total head of system lower than pump design head
19. Specific gravity of liquid different from design
20. Viscosity of liquid different from that for which designed
21. Operation at very low capacity
22. Parallel operation of pumps unsuitable for such operation

MECHANICAL TROUBLES

23. Foreign matter in impeller
24. Misalignment

25. Foundations not rigid
26. Shaft bent
27. Rotating part rubbing on stationary part
28. Bearings worn
29. Wearing rings worn
30. Impeller damaged
31. Casing gasket defective, permitting internal leakage
32. Shaft or shaft sleeves worn or scored at the packing
33. Packing improperly installed
34. Incorrect type of packing for operating conditions
35. Shaft running off centre because worn bearings or misalignment
36. Rotor out of balance, causing vibration
37. Gland too tight, resulting in no flow of liquid to lubricate packing.
38. Failure to provide cooling liquid to water cooled stuffing boxes
39. Excessive clearance at bottom of stuffing box between shaft and casing, causing packing to be forced into pump interior.
40. Dirt or grit in sealing liquid leading to scoring of shaft or shaft sleeve.
41. Excessive thrust caused by a mechanical failure inside the pump or by the failure of the hydraulic balancing device, if any.
42. Excessive grease or oil in antifriction bearing housing or lack of cooling, causing excessive bearing temperature
43. Lack of lubrication
44. Improper installation of anti-friction bearings (damage during assembly, incorrect assembly of stacked bearings, use of unmatched bearings as a pair etc.)
45. Dirt in bearings
46. Rusting of bearings from water in housing
47. Excessive cooling of water cooled bearing, resulting in condensation of moisture from the atmosphere in the bearing housing.

Various functions:

The various functions, which the panel has to serve and corresponding provisions to be made in the panel are detailed below :

1. For receiving the supply – Circuit breaker or switch and fuse units,
2. For distribution – Bus bar, Switch fuse units, circuit breakers,
3. For controls – Starters, level-controls, if needed: Time – delay relays,
4. As protections – Under voltage relay, Over-current relay, Hot fault relay, Single Phasing Preventor.
5. For indications and reading – Phase indicating lamps, voltmeters, Ammeters, Frequency meter, power factor meter, temperature scanners, Indications for state of relays, indications for levels, indications of valve positions, if valves are power actuated.

The scope and extent of provisions to be made on the panel would depend upon the size and importance of the pumping station.

Improvement Of Power Factor:

For improvement of power factor, appropriate capacitors should provided. Capacitors may be located in the control panel or separately.

Some useful guidelines regarding the selection, installation, operation and maintenance of the power capacitors are compiled in the following paragraphs.

Installation Of Capacitors:

While installing a capacitor, ensure following :

- (a) A capacitor should be firmly fixed to a base,
- (b) Cable lugs of appropriate size should be used,
- (c) Two spanners should be used to fasten or loosen capacitor terminals. The lower nut should be held by one spanner and the upper nut should be held by the other to avoid damage to or breakage of terminal bushings and leakage of oil.
- (d) To avoid damage to the bushings, a cable gland should always be used and it should be firmly fixed to the cable-entry hole.
- (e) The capacitor should always be earthed appropriately at the earthing terminal to avoid accidental leakage of the charge.
- (f) There should be a clearance of atleast 75 mm on all sides for every capacitor unit to enable cool running and maximum thermal stability. Ensure good ventilation and avoid proximity to any heat source.

Operation and maintenance of Capacitors:

- (a) The supply voltage at the capacitor bus should always be near about the rated voltage and the supply voltage including the allowable fluctuations should not exceed 110% of the rated voltage of the capacitor.
- (b) Frequent switching of the capacitor should be avoided. There should always be an interval of about 60 seconds between any two switching operations.
- (c) The discharge resistance efficiency should be assessed periodically by sensing, if shorting is required to discharge the capacitor even after one minute of switching off. If the discharge resistance fails to bring down the voltage to 50V in one minute, it needs to be replaced.
- (d) Leakage or breakage should be attended immediately. Care should be taken that no appreciable quantity of impregnate has leaked out.
- (e) Before physically handling the capacitor, short circuit the capacitor terminals one minute after disconnection from the supply to ensure total discharging of the capacitor.

Cables:

Table 11.14 gives guidelines of the types of cables to be used for different voltages.

**TABLE 11.14
TYPES OF CABLES FOR DIFFERENT VOLTAGES**

Sr.No.	Range of Voltage	Type of cable to be used	IS Ref
1)	10-230 V or 30-415 V	PVC insulated, PVC sheathed	IS 1554
2)	Upto 6.6 KV	PVC insulated, PVC sheathed armored Paper insulated, lead sheathed XLPE, Cross linked (E) Grade, Polyethylene Insulated, PVC Sheathed	IS 1554 IS 692 IS 7098
3)	11 KV	Paper insulated, lead sheathed armoured	IS 692
4)	33 KV	PVC insulated, PVC sheathed armored Paper insulated, lead sheathed XLPE, Cross linked (E) Grade, Polyethylene Insulated, PVC Sheathed	IS 1554 IS 692 IS 7098

The size of the cable should be so selected that the total drop in voltage, when calculated as the product of current and resistance of the cable shall not exceed 3%. Values of the resistance of the cable are available from the cable manufacturers.

In selecting the size of the cable the following points should be considered:

- (i) The current carrying capacity should be appropriate for the lower voltage, the lowest power factor and the worst conditions of installation i.e. duct condition.
- (ii) The cable should also be suitable for carrying the short circuit current for the duration of the fault.
- (iii) The duration of the fault should preferably be restricted by 0.1 second by proper relay setting.
- (iv) Appropriate rating factors should be applied when cables are laid in group (parallel) and/or laid below ground.
- (v) For laying cables, suitable trenches or racks should be provided.

Transformer Substation:**ESSENTIAL FEATURES:**

Normally outdoor substations are provided. However, on considerations of public safety and for protection from exposure to environmental pollution, the substations may be indoors.

- (i) Lightning arresters,
- (ii) Gang operated disconnectors (GOD) are provided in outdoor substation. In indoor substation, circuit breakers are provided. In case of outdoor substations of capacities 1000 KVA and above, circuit breakers should be provided in addition to GOD.
- (iii) Drop out fuses for small outdoor substations.
- (iv) Overhead bus bars and insulators,
- (v) Transformer,
- (vi) Current transformer and potential transformer for power measurement,
- (vii) Current transformers and potential transformers for protection in substations of capacity above 1000 KVA.
- (viii) Fencing,
- (ix) Earthing,

Earthing should be very comprehensive, covering every item in the substation and in accordance with IS:3043.

Standby Transformer May Be Provided, Where Installation So Demands

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 two years of trouble free operation should be ordered along with the equipments.

TOOLS AND TEST EQUIPMENTS:

Tools such as crimping tools, soldering iron, brazing and usual electrical tools should be available.

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, annually and bi-annually.

1 Daily:**(i) For Motors**

- (a) Check bearing temperatures,
- (b) Check for any undue noise or vibration.

(ii) For panel, circuit-breaker, starter;

- (a) Check the phase indicating lamps,
- (b) Note readings of voltage, current, frequency etc.
- (c) Note energy meter readings.

(iii) For transformer substation

- (a) Note voltage and current readings.

2 Monthly:**(i) For motor – nothing special other than the daily checks.****(ii) For panel, circuit-breaker, starter.**

- (a) Examine contacts or relay and circuit breaker. Clean, if necessary,
- (b) Check setting of over-current relay, no volt coil and tripping mechanism and oil in the dashpot relay.

(iii) For transformer substation,

- (a) Check the level of the transformer oil,
- (b) Check that the operation of the GOD is okay,
- (c) Check contacts of GOD and of over-current (OC) relay,
- (d) Check temperatures of the oil and windings,
- (e) Clean radiators to be free of dust and scales,
- (f) Pour 3 to 4 buckets of water in each earth-pit.

3 Quarterly:**(i) For motor:**

- (a) Blow away dust and clean any splashing of oil or grease,
- (b) Check wear of slip ring and bushes, smoothen contact-faces or replace, if necessary. Check bush-setting for proper contact on the slip-ring.
- (c) Check cable connections and terminals and insulation of the cable near the lugs, clean all contact, if insulation is damaged by overheating investigate and rectify. All contacts should be fully tight.

(ii) For panel, circuit-breaker, starter, etc.

- (a) Check fixed and moving contacts of the circuit breakers/switches. Check and smoothen contacts with fine glass paper or file.
- (b) Check condition and quantity of oil/liquid in circuit-breaker, auto-transformer starter and rotor-controller.

(ii) For transformer substation;

- (a) Check condition of the H.T. bushing.

Check the condition of the dehydrating breather and replace the silica-gel charge, if necessary. Reactivate old charge for reuse.

4 Semi-Annual**(i) For motor**

- (a) Check condition of oil or grease and replace if necessary. While greasing, avoid excessive greasing.
- (b) Test insulation by megger.

(ii) For panel, etc.

Check for corrosion and take remedial measures. Check by megger the insulation-resistance for switches, busbar, starter-terminals, auto-transformer, etc. for phase-to-earth and phase-to-phase, resistance.

(iii) For transformer substation.

- (a) Check die-electric strength and acid test of transformer oil and filter, if necessary,
- (b) Test insulation by megger,
- (c) Check continuity for proper earth connections.

5. Annual**(i) For motors;**

- (a) Examine bearings for flaws, clean and replace if necessary,
- (b) Check end-play of bearings and reset by lock nuts, wherever provided.

(ii) For panel, etc.

- (a) All indicating meters should be calibrated,

(iii) For transformer substation,

- (a) Check resistance of earth pit/earth electrode.

6 Bi-Annual

- (i) for motor: Same as annual
- (ii) for panel, etc. same as annual
- (iii) for transformer substation

- (a) Complete examination including internal connections, core and windings.

Trouble Shooting For Electrical Equipment

Trouble-shooting comprises detecting the trouble, diagnosing the cause and taking remedial action. Detection of the trouble is prompted by noticing the symptoms. The trouble-shooting details are hence outlined hereunder for various symptoms.

1 MOTOR GETS OVERHEATED

- (i) Check whether voltage is too high or too low. Change tapping of transformer, if HT supply is available. Otherwise approach power supply authorities for correction of the supply voltage.
- (ii) Check whether air ventilation passage of motor is blocked. Clean the passage.
- (iii) Check whether the motor bearings are properly lubricated or damaged. Replace the damaged bearings and provide proper lubrication.
- (iv) Check whether the cable terminals at the motor are loose. Tighten the terminals.

2 MOTOR GETS OVER LOADED: (DRAWING MORE THAN THE RATED CURRENT AT THE RATED VOLTAGE)

- (i) Check any excessive rubbing in the pump or any clogging of the impeller passages,
- (ii) Check whether characteristics of pump (i.e. the related driven equipment) are of the overloading type,
- (iii) Check for any vortices in the sump,
- (iv) Check that there is no short-circuiting or single-phasing,
- (v) Check whether any foreign matter has entered the air-gap, causing obstruction to the smooth running of the motor.

3 STARTER/BREAKER TRIPS:

- (i) Check whether the relay is set properly. Correct, the setting, if necessary.
- (ii) Tripping can also occur, if motor is drawing more than the rated current for which details are mentioned above.
- (iii) Oil in dashpot may be either inadequate or of low viscosity,
- (iv) Check that there are no loose connections,
- (v) Check whether the timer setting of star delta or auto transformer starter is proper.

4 VIBRATION IN MOTOR:

- (i) Check for structural rigidity of supporting frame and foundation,
- (ii) Check alignment of pump and motor,
- (iii) Check that the nuts on foundation bolts are tight,
- (iv) Check if rotor has an imbalance,
- (v) Check the resonance from supporting structure or foundation or from critical speed or rotor or from vibration of adjoining equipment.

5 CABLES GET OVER-HEATED:

- (i) Check whether the cable is undersized. Change the cable or provide another cable in parallel,
- (ii) Check for loose termination or joint. Fasten the termination and make proper joint,
- (iv) Check whether only a few strands of the cable are inserted in the lug. Insert all strand using a new lug, if necessary.

Instrumentation And Controls In Water Treatment Plant

INTRODUCTION:

Instrumentation and control plays an important role in efficient and effective operation of any water treatment plant. In order to monitor the quality and quantity of water produced and to have trouble free operation of water treatment plant, it is desirable to provide proper instrumentation and control system in the plant. The impact of sudden changes in raw water quality, peak demands and seasonal variations require quick responses and proper action. This is possible only if the plant is provided proper instrumentation and control systems.

This chapter covers the general applications of instrumentation and control system in water treatment plant. Water treatment plant equipments are generally of a rugged nature and not prone to much mechanical defects. It may, therefore, not be desirable to go in for complex automatic control systems.

PURPOSE AND OBJECTIVE:

The purpose and objectives of Instrumentation & Control systems in a water treatment plant are:

- (a) To produce water at a lower cost in lesser time,
- (b) To control certain key functions in order to maintain balance in plant processes,
- (c) To obtain plant operating data such as (i) characteristics of raw & treated water, (ii) flow and quantity measurements including the record of consumables,
- (d) To guide the operator by providing all related data for efficient functioning of various units of water treatment plants.

INSTRUMENTS & CONTROL SYSTEMS:

The instruments and control systems when properly applied and used will provide:

- (i) Precision of operation and instantaneous response to changes in important process variables,
- (ii) Indication and recording of key operating data,
- (iii) Means of better utilization of manpower and treatment chemicals and reduction in down time due to disruption in normal operating procedure.

The instruments and control system have been classified in two categories : Essential and optional. Systems which are considered essential from the point of view of safety of chemical dosing, control and operational ease, constitute the essential systems. The essential system should preferably be incorporated in all the plants. Optional items can be considered were the owner intends to use them for data collection and information and are used where skilled manpower is available.

SYSTEMS AVAILABLE:

The most commonly used instrument and control systems in water treatment plants are :

- (i) Mechanical,
- (ii) Pneumatic,
- (iii) Electric,
- (iv) Electropneumatic, and
- (v) Hydropneumatic..

1 MECHANICAL:

These instruments are locally mounted or connected for measurement of parameters at the specific point of measurement. These instruments are operated on mechanical principles by use of floats, pulleys and gears. These include pressure gauges, level indicators and flow indicating devices.

2 PNEUMATIC:

Pneumatically operated instrument and control system uses clean, dry and filtered air for both transmission and power media for activating the control elements. An example is the pneumatically operated valves for filter beds.

3 ELECTRIC:

The electrically operated system employs electrical signal for transmission as well as control signal to the control element. An example for such a system is the motorised valves for filter beds or for sludge withdrawal for clariflocculator.

4 ELECTROPNEUMATIC:

This system employs an electric transducer (with integral transmitter), electric receiver, electric set point and electric controller. The controller send an electric signal to a positioner with a pneumatic four valve to activate a pneumatic operator to final control element. In this system the transmission medium is an electric signal and the power medium is air.

5 HYDROPNEUMATIC:

The system is basically identical to pneumatic system except that power medium is oil or water. The transmission medium is air.

3. Maintenance of Transmission Systems – (All pipes)

- a) Sufficient stock of spare pipes and specials should be maintained for replacement of damaged ones
- b) Regular leak detection surveys should be undertaken particularly for bursting of pipes and leaky joints
- c) A detailed record of break downs and leaks observed and repaired should be maintained sectionwise so that more vulnerable lengths could be identified and special measures to repair/replace them could be undertaken.

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

Problems

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. The problems that may be posed before him may relate to those arising from during operation.

A resourceful operator should be in a position to bring to the notice of the concerned person, any faults in design and execution giving rise to problems during the course of operation and rectify them immediately. The other problems which are to be tackled at the operational stage are mainly those which arise out of :

- a) Fluctuation in the quality of water
- b) Fluctuation in the quantity and changes in the flow pattern
- c) Malfunctioning of the unit(s) and
- d) Mechanical and electrical equipment

4. Master Balancing Reservoirs and Elevated Reservoirs

Important aspects to be considered during maintenance are :

- a) Measurement of inflows and outflows: Whenever measuring devices are provided, 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.
- b) Structural Leakages : All structural damages and leakages should be promptly repaired.
- c) Preventing External Pollution : The manhole opening, ventilating shafts and overflow pipes should be properly closed and protected with wire mesh from external pollution.
- d) General cleanliness in and around the reservoirs should be maintained and observed. A garden around the reservoir structure may be provided.
- e) A programme for periodical cleaning of the reservoirs atleast once a year should be undertaken. During such cleaning process there should be facility to bypass the supply to distribution system.
- f) Appropriate safety measures to prevent climbing of unauthorised persons should be provided. All the railings provided shall be maintained in a safe and firm condition.

5. Distribution System

Important aspects of operation maintenance of distribution system are detection and prevention of wastage due to leakage. The object is to control the waste within reasonable limits. Further incase of intermittent supply, possibility of pollution of empty pipelines cannot be ruled out. Special inspection of pipelines through marshy or high water table areas, crossing across gutter, pipes etc., and in the vicinity of sewers should be carried out at regular intervals. Such areas should be identified on plans and bacteriological tests of tap water in such areas need to be done more frequently and results compared.

A regular programme of leak detection should be undertaken for the entire distribution system such that each section of the system comes up for leak detection atleast once in three years.

Leaks and damages detected should be promptly repaired. The causes of wastage through leakages such as i) high pressures in distribution ii) corrosive soils iii) corrosive water iv) inferior quality of pipes and fittings v) age of pipes vi) gland packings of valves etc should be ascertained. The repair work should tackle those causes as well :

In distribution system complaints are received frequently from consumers about :

- a) Non-availability of required quantity of water
- b) Low pressure at the supply points
- c) Leakages and wastages through valves and pipelines
- d) Unauthorised connections

One of the major causes of wastage is unauthorised connections. Procedures for granting connections need to be streamlined. The officer incharge of operation and maintenance of distribution system should have powers to inspect any household for water supply to know as from where that household is taking water.

The entire distribution system should be divided into sub-zones served preferably of one elevated service reservoir. The maintenance and operation of each zone of distribution system should be entrusted to atleast a junior engineer who should be made the authorised official of the controlling authority to receive and deal with the complaints. Appropriate registers should be maintained by him to record the complaints and to note in it the followup action till the complaint is redressed. If the complaint is such that it cannot be dealt with at his level, he should at once refer the matter to higher authorities under intimation to the complainant. Frequent vigilance checks in the areas having maximum complaints should be made a part of the duty of supervisory staff.

It is preferable to have meters provided by the water works, controlling agency after charging appropriate monthly rentals to the consumer. This enables effective control over defective meters. Meter repair workshops should be established to attend to repairs of meters promptly. Surface boxes and chamber covers of valves should be frequently inspected and kept in proper condition. Billing for an out of order meter for more than three times consecutively should be avoided. All attempts should be made to repair / replace out of order meters once these are detected.

Sufficient stock of meters and spares should be available at hand to keep almost every meter in the field in working order.

Comprehensive water rules should be framed to make the maintenance operation most effective.

The consumers should be made aware of difficulties and shortcomings in the maintenance and operation of water supply system. Adequate publicity and public relations are required to be developed for this purpose.

B] Specifications and standards for water meters

The water meter installed shall be of following standard:

- EEC (European Economic Community) marked inferential multi-jet, straight reading dry dial water meters with magnetic drive of Class B with.
 - Non return valve
 - Facility for retrofitting automatic meter reading interface through wireless modem
- The meter would need to confirm to the following standards
 - IS 779/94 and ISO 4064
- Not more than two makes of meters shall be provided in the Project Area. The meter supplier shall be liable for setting up a workshop for meter repair at Latur.
- Adequate spares for the meter repairs would need to be kept available at all times with the Contractor.
- Prior to the finalization of the make of the meter, the Contractor shall be required to get the meter tested by Fluid Control Research Institute (FCRI)/ CWPRS for type test and life test (accelerated endurance test) as per the requirements of IS 779/94. Random testing process shall be adopted by the Executive Engineer for sample testing, the balance meters would need to be provided with test certificates from the meter manufacturer.
- Testing of meters after repairs has to be done for each such meter for its accuracy of metering by using a meter calibrated by FCRI/ CWPRS in series, all testing facilities shall be set up at Latur itself by the Contractor.

SCHEDULE E**SCHEDULE E –PAYMENT SCHEDULE**

Contract period year (From and To, from commencement date)	Minimum Payment (Rs Lakhs) (i)	Additional payment quoted by the bidder (Rs Lakhs) (ii)	Total Amount (Rs Lakhs) (iii) = (i) + (ii)	Amount payable monthly (iii)/12 (Rs lakhs)	Amount payable monthly in words
1 st month to 12 th month	220.72				
13 th month to 24 th Month	281.70				
25 th Month to 36 th Month	438.41				
37 th Month to 48 th Month	418.82				
49 th Month to 60 th Month	399.35				
Totals	1759.00			>>>>>>>>	>>>>>>>>>>>>

Contractor

Executive Engineer

SCHEDULE F**SCHEDULE F –LEVY AND COLLECTION OF WATER TARIFF****A] Meters are to be fixed by the Contractor, following conditions will apply**

- i) Initial cost of meter and connection shall be borne by the contractor and the contractor can recover the said amount from the Consumers in accordance with this Schedule.
- ii) Contractor is supposed to have 10% meter in his stock as standby units.
- iii) On receipt of the complaint from the consumer the representative of the contractor should visit the connections site with all spares & tested meter and he shall remove the defective meter by replacing the same with the tested one.
- iv) During routine inspection or at the time of scheduled meter reading program, if any of the representative of Contractor or of MJP Representative finds faulty meter the procedure as above in (iii) be followed.
- v) The defective meter shall be replaced at the earliest and in any case within one month.
- vi) Complaint regarding abnormal / subnormal reading shall be treated as defective meter & shall be replaced as above.
- vii) If the factory seal is tampered the meter shall be treated as defective and replaced as above.
- viii) The meters shall be in accordance with the Standards and Specifications for water meters in Schedule D.
- ix) For the period the meter is under repairs the consumers shall be charged according to the average consumption of previous three months.

B] Maximum Water Charges, System of Collection & Payments:

The connections to be given to the consumers are differentiated as per the category of the consumer as below:

- 1) **DOMESTIC CONNECTION:** The connection serving the people for the need of only domestic purposes like drinking, cooking, bathing, washing cleaning & flushing of toilets, household gardening and individual air conditioning; is termed as domestic connection,

- 2) **INSTITUTIONAL CONNECTION:** The connection serving the institutes like schools, colleges, Govt. & semi Govt. offices, Govt. Hospitals, charitable trusts, Public gardens and institutions not run for profit; is termed as institutional connection.
- 3) **COMMERCIAL CONNECTION:** The connection serving any institute / proprietor / organization like Hostels, Shop's, Theatres, Laundries, Community halls, private hospitals, Hotels etc. which are being run for profit; is termed as commercial connection.
- 4) **INDUSTRIAL CONNECTION :** The connection serving industries like oil mills, dal mills, paper mills, ice factories, service stations, workshops, foundries packaging industries or any other industry which consumes water for producing the final product directly or for the purpose of serving domestic needs of the people working or staying in the premises of industries; is termed as industrial connection.
- 5) **CONSUMER AGREEMENT:** Every consumer would need to enter into an Agreement with MJP for supply of water to its premises (Consumer Agreement). The Contractor shall facilitate the signing of this Consumer Agreement. The Consumer Agreement shall be as per the form of agreement enclosed in this Schedule.
- 6) **MAXIMUM CHARGEABLE WATER TARIFFS**

The maximum water tariff chargeable to the consumers shall be as under:

No.	Consumer Category	Rates Rs/ 1000 liters		
		2006 – 07 & 2007 – 08	2008 – 09 & 2009 – 10	2010 – 11 & onwards
1	Domestic	8.80	9.60	10.60
2	Institutions	17.00	18.70	20.50
3	Industrial and commercial	40.00	42.00	44.00

The following fixed rates would be chargeable for non-metered connection during the period of implementation of Schedule K. The following tariff shall also be applicable for Consumers who have applied for water supply connections and awaiting installation of meters by the Contractor.

No.	Consumer Category	Rates Rs/ per month		
		15mm	20 mm	25 mm
1	Domestic	150	300	578
2	Institutions	300	594	1188
3	Industrial and commercial	751	1502	3011

The following fixed rates would be chargeable for non-metered connection for the first year after the Commencement Date. The following rates would be compounded @ 18% per annum for the latter years.

No.	Consumer Category	Rates Rs/ per month		
		15mm	20 mm	25 mm
1	Domestic	300	600	1156
2	Institutions	600	1188	2376
3	Industrial and commercial	1502	3004	6022

C] Application for water supply connection by Consumers:-

- 1.1 Any person or consumer intending to have a new connection of water supply or transfer of existing connection or alternation in the existing connection shall apply by making an application to the Contractor duly countersigned by a licensed Plumber.
- 1.2 In the case of bulk supply of water to any consumer, the supply shall be regulated by an agreement subject to the provisions of the Act, Byelaws and the rules made there under.
- 1.3 An application for supply of water for construction activities shall be considered depending on the availability of water.

- 1.4 The application shall be accompanied by certified extracts from the city survey register, 7/12 extract or certified extract of Government or Assistant Registrar or such other documents to prove the title to the property.
- 1.5 The Contractor shall grant a new connection to tenant after submission of no objection certificate obtained from the owner of the premises subject to the provisions of the Act Rules and bye-laws.
- 1.6 When the existing connection to the owner is cut off for any reason, an occupier can apply for a new connection with or without the consent of the owner, provided that he submits the rent receipt of the last month or a certificate indicating that the payment of the amount of rent has been made to the court.
- 1.7 If any consumer intends to close the water connections, he shall inform in writing to authority concerned, at least 15 days in advance, from the date on which he intends to close the connection. He shall pay all amounts due in advance along with the bill for the current month.
- 1.8 The Contractor may reconnect the water supply disconnected under sub-section (1) of Section-44 of the Bye Laws after approval of Executive Engineer subject to the provisions of these bye-laws and the following terms and condition namely.
 - a. The consumer shall pay the reconnection charges at Rs. 2000/- fixed for a new connection.
 - b. All the arrears and dues outstanding against the connection are paid.
 - c. The Executive Engineer/ Contractor is satisfied that the reason or reasons for which the water supply was disconnected is removed.

D] Meter Connection:

- 2.1 No new connection for water supply shall be given unless a meter of appropriate size for recording the volume of water consumed is installed by the Contractor at the cost of Consumer, if the meter is not available with the Contractor; the Consumer has to arrange for its installation of EEC marked inferential multijet dry dial straight reading type and coupled with magnetic drive tested meter of any of the approved makes of MJP.
- 2.2 In case of existing connection to which the meter has not been installed, the house owner or consumer shall provide EEC marked inferential multijet dry dial straight reading type and coupled with magnetic drive tested meter of any of the approved makes of MJP within a period of three months from the date of issue of notice to him by the Executive Engineer or his authorized officer or Contractor of the MJP. If the consumer fails to provide the meter after the expiry of the stipulated period of three months, the MJP or the

authorised agency reserves the right to install its own meter, subject to recovery of prescribed charges in accordance with this agreement.

- 2.3 In the case of water supply to bulk consumers such as Co-operative society or Association of apartment owners, water meter of a suitable size shall be installed by the Contractor at the cost of Co-operative society or Association of apartment owners.
- 2.4 In the case of public standposts and in slum areas the following shall be applicable

All standposts shall be disconnected in a period of 4 months from the date of Agreement. The affected persons shall be motivated for taking individual/ group connections. Group connections shall be for apartments/ tenants upto 4 households. One of the Consumer shall be chosen as the group leader who shall be responsible for payment for fixing meters and water consumption charges. The tap under group connection shall be a single tap located outside the apartment/ tenants at the ground level in the premises of one of the group members and shall be located so that it is accessible to everyone. The application for group connection shall be similar to the one under individual connection and shall include the plan showing apartments/ tenants benefiting from it along with their names. The Group leader will be responsible for collecting all the dues from group members and making payment to the Contractor. The percentage distribution of charges among the benefiting consumers shall be shown in the application. If the group leader fails to pay for water consumption charges, then the connection is liable for disconnection as per the rules applicable for individual connections. In the event of such disconnection the consumers covered in the group shall not be eligible for new individual connections unless the arrears from the consumers covered in the earlier group are paid.

E] Meter Charges:

Where the water meter is provided by the Contractor, the cost of meter shall be charged at the rates respectively specified as below.

Contractor can recover the amount of the meter provided and cost towards its fixing including the cost of G.I. pipe with specials, ferule, saddle piece & labour required for it by any of the following methods.

E 1 - FOR NEW CONNECTIONS

I. IN ONE LUMPSUM AT THE TIME OF FIXING THE METER AS UNDER.

Dia of Connection	15 mm	20 mm	25 mm	40 mm	50 mm
Cost for connection (in Rs.)	1700	2758	5370	7831	13698

II. IN INSTALLMENTS WITHIN A PERIOD OF SIX MONTHS.

Dia of Connection	15 mm	20 mm	25 mm	40 mm	50 mm
EMI with interest (in Rs.)	312	506	984	1436	2511

III. HALF IN ADVANCE AND HALF WITHIN A PERIOD OF SIX MONTHS

Dia of Connection	15 mm	20 mm	25 mm	40 mm	50 mm
Advance	850	1379	2685	3916	6849
EMI with interest (in Rs.)	156	253	492	718	1256

IV. EQUATED MONTHLY INSTALLMENT FOR FOUR YEARS AS UNDER.

Dia of Connection	15 mm	20 mm	25 mm	40 mm	50 mm
EMI with interest (in Rs.)	64	103	201	294	514

- a) The cost of 3 m long G.I. pipe is considered in above cost. If for a particular connection required G.I. pipe is more than 3.0 m. the Consumer shall bear the cost of surplus G.I. pipe.
- b) If for a particular connection Government./LMC's road is to be cut or excavated, the consumer shall bear the permission charges and the cost of restoring the road surface.

E 2 – CHARGES FOR CONVERSION OF EXISTING UNMETERED CONNECTIONS TO METERED CONNECTIONS**I. IN ONE LUMPSUM AT THE TIME OF FIXING THE METER AS UNDER.**

Dia of Connection	15 mm	20 mm	25 mm	40 mm	50 mm
Cost for connection (in Rs.)	1500	2518	5082	7485	13283

II. IN INSTALLMENTS WITHIN A PERIOD OF SIX MONTHS.

Dia of Connection	15 mm	20 mm	25 mm	40 mm	50 mm
EMI with interest (in Rs.)	275	462	932	1372	2435

III. HALF IN ADVANCE AND HALF WITHIN A PERIOD OF SIX MONTHS

Dia of Connection	15 mm	20 mm	25 mm	40 mm	50 mm
Advance	750	1259	2541	3743	6642
EMI with interest (in Rs.)	138	231	466	686	1218

IV. EQUATED MONTHLY INSTALLMENT FOR FOUR YEARS AS UNDER.

Dia of Connection	15 mm	20 mm	25 mm	40 mm	50 mm
EMI with interest (in Rs.)	56	94	191	281	498

F] Other Charges:**I] INITIAL SECURITY DEPOSIT TO BE RECOVERED FROM CONSUMERS:**

Initial deposits to be recovered from consumer and paid in full to MJP.

No.	Connection size in mm	Deposits for connection (Rs.)		
		Domestic	Institutional	Non domestic Commercial & Industrial)
1	15	500	1000	2500
2	20	750	1500	3750
3	25	1250	2500	6250
4	40	5000	10000	25000
5	50	10000	20000	50000
6	80	20000	40000	100000

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II] FEES FOR DISCONNECTION/ RECONNECTION TO CONSUMERS:

Fees for disconnection/ reconnection to consumers to be retained by the Contractor

No.	Connection size in mm	Fees for disconnection/ reconnection (Rs)
1	15	100
2	20	125
3	25	150
4	40	175
5	50 and above	200

III] FEES FOR TESTING OF WATER METERS:

Fees for testing of water meter to be retained by the Contractor

No.	Connection size in mm	Testing and installation Fees (Rs)
1	15	55
2	20	75
3	25	95
4	40	115
5	50	155
6	80	200

IV] COST OF REPLACEMENT WATER METERS:

The cost of new meters fixed in place of earlier meter of Contractor damaged by the Consumer.

Dia of Connection	15 mm	20 mm	25 mm	40 mm	50 mm
Cost for connection (in Rs.)	1325	2313	4839	7195	12944

Contractor

Executive Engineer

G] Connections to Consumers:

- 1 All service pipes and fittings from the connection on the water main to any premises shall be laid by the Contractor through a licensed plumber as per specifications of the MJP and the drawings approved by Contractor which shall be submitted by the consumer along with the application. The connection pipe shall be laid in the ground and shall not be less than 45 cm below the surface unless laid inside a building. All pipes shall be laid or fixed in such a manner as not to be exposed to the heat and not to cause any damage to any consumers pipes and fitting and there should not be any risk of mixing waste water or cause contamination of water. All pipes there after laid or fixed inside any building shall be assessable to the staff of the MJP or Contractor on duty. In every case the Contactor shall carry out the reasonable requirements as per the instructions of the MJP Representative. The material of the pipes and fittings shall be got approved from the MJP Representative before use. The water supply shall not be started unless the work of providing and laying of the same is approved by the MJP Representative and is found to be watertight. The position of the stop cock on the connection pipe shall be decided by the Contractor.
- 2 All cocks and taps fitted to the service pipes in any premises shall be of a screw down pattern and of quality approved as per bye-laws / rules of MJP.
- 3 No pipes and fittings of the connections shall be removed, altered, extended or replaced by the Consumer without obtaining the prior approval in writing from the Contractor.
- 4 No pipe used for the conveyance of water shall be laid or fixed which shall run through any drain or any place where water through such pipes is liable to become polluted or contaminated or where the pipe is likely to get damaged. However, in unavoidable cases, such consumer's pipe may pass through an exterior air tight and water tight pipe or jacket of cost iron or other material approved by the Executive Engineer of sufficient length and strength and of such construction as would provide adequate protection to the inner pipes. The cost of which is to be borne by the Consumer.
- 5 Every premises supplied with water shall have its own specific connection pipe and no connection pipe shall be used to supply water to more than one premises.
Provided that in the case of a group or block of premises, water charges of which are paid by one owner, the said owner may have option for one connection pipe of adequate size sufficient for such group or block as approved by the Contractor.
- 6 The position of stop cock on the connection pipe shall be decided by the Contractor who shall have exclusive control over this stop cock and its operation.
- 7 For connections of sizes 25 mm and above, the stop cock will be fitted with a crutch of spindle head of specific design to suit a key or wheel kept by the Contractor.

- 8 No consumer's tap shall be fixed outside, the premises of the consumer. No tap shall be fixed I or in close proximity to the open drains or places where injurious gases are likely to be produced. No tap or cock or connection to any tank or reservoir shall be so fixed as to allow any part of the container of the said tank or reservoir to siphon back into the connection pipes.
- 9 A consumer acting in contravention of the provisions of the Bye-laws, shall be required to rectify the defects at his own cost within one month of the date of the notice served on him by the Contractor failing which the connection shall be liable to be disconnected without any further notice to the consumer.
10. The leakages upto the stop cock or up to the meter without stop cock shall be removed by contractor at his cost while the leakage beyond this point shall be removed by consumer at his cost. If consumer fails to remove the leakage beyond this point, the MJP / contractor reserves the right to remove or rectify the defects or deficiencies at the cost of the consumer.
11. The MJP reserves the right to remove or rectify the defects or deficiencies at the cost of the consumer.

H] Installation of Meter:

- 1.1 The meter shall be installed within the premises and at the location shown in the drawings attached with the application by the consumer for sanction and the consumers shall be responsible for safety of the meter against pilferage or damage misuse or mis-handling. The consumer shall keep the meter and fittings in chamber and the fitting in clean condition. If he fails to do so inspite of a notice from the Contractor, within seven days, the Contractor may get the meter, chamber and fittings cleane at the cost and risk of the consumer.
- 1.2 If the meter goes out of order the consumer shall replace the same either by a new one or by a meter repaired at the workshop of the Contractor or the meter shall be got tested at the workshop of the Contractor within two months from the date of the notice given by the Consumer.
- 1.3 Where a consumer does not repair or replace his defective meter within a prescribed period of two months, The Contractor reserves the right to fix the Contractors tested water meter temporarily, in which event the water meter of the consumer shall be repaired and refixed at the cost of the consumer. The charges for fixing the meter shall be recovered through bills from consumer.
- 1.4 The meter should be installed in such a way that it shall always be full of water and partial flow shall not occur.
- 1.5 The Contractor shall replace all existing meters in phases and install meters owned by the Contractor as per F (IV) above.

I] Action To Be Taken When Meter Is Out Of Order

If on examination, any meter is found to be out of order, the quantity of water consumed during the period commencing from the date of last reading to the date on which the meter is repaired and fixed or a new meter is installed shall be reckoned at the maximum of the quantities worked out in the following manner namely: -

- a) On the actual consumption recorded by the meter if the same is found, on testing, to register upto and including five percent, slow or fast;
- b) On the average of the actual reading for the immediately preceding or succeeding three months period;
- c) On discharging capacity of the connection considering its size, length, hours of supply etc. but not exceeding twice the maximum monthly consumption recorded during the previous twelve months.

9.2 A meter shall be deemed to be out of order under the following circumstances, namely: -

- a) If it is found on test to be registering either more than five percent, fast or more than five percent, slow;
- b) If it is found on inspection to have been damaged or tampered with.
- c) If it is failed to register consumption of water drawn through it;
- d) When the total consumption recorded by the main meter is lower than the total of the consumption recorded by the connected subsidiary meters by more than 5 percent;
- e) When there is apparent error in recoding of the consumption by the meter.

J] Testing of Meter:

1.1 The contractor shall establish a workshop for repairing and testing of meters and keep adequate stock of spares parts. If, at any time after the installation of the meter, the consumer desires that the meter fixed to his connection should be tested, he shall submit an application in writing to the Contractor and pay the prescribed testing fees in advance and submit the receipt therefore with the application, After testing the meter at the workshop of the Contractor. If it is found to run fast by more than 5 percent, the deposit or testing fees shall be refunded to the Consumer and the water bills shall be revised on the basis of the consumption recorded by the repaired meter with retrospective, effect from the date on which a written complaint was filed by the Consumer in respect of excess water bill or the credit will be recorded in the name of the consumer for adjustment from the next bill. If the meter is found to be fast or slow within five percent, limit, the testing fees shall be forfeited.

1.2 If the Contractor has reason to believe that the meter is running slow, Contractor shall get the meter tested through the workshop of the Contractor within thirty days from the

date of such notice, Contractor reserves the right to carryout repairs at the cost of the consumer if the meter has been tampered by the consumer.

- 1.3 The consumer shall get his meter serviced at the workshop of the Contractor every four years if the meter was fixed at the cost of consumer.
- 1.4 The consumer shall be liable to pay the Contractor transport charges for transporting the meter to and from the workshop of the Contractor for testing, repairing or servicing purposes.
- 1.5 If in the opinion of the Contractor, the meter owned by the consumer has outdated its life or is beyond repair, he reserves the right to direct the consumer in writing to replace the said meter by a new meter within a period of three months from the date of intimation failing which his connection shall be disconnected without further notice.

K] Damage and Pilferage of Meter:

Where a meter fixed by the contactor is found during inspection to be in damaged condition, the consumer shall be liable to pay the following charges, namely:

- a) if the seal if found removed or broken or the meter is partially damaged, an amount of Rs. 25/- shall be charged as resealing fees to a retail consumes and Rs. 100/- to a bulk consumer in addition to the repairing charges assessed by the Contractor.
- b) If the meter becomes unserviceable due to willful damage, full cost of the meter as per the current market rate shall be recovered from the consumer in addition to the resealing fees as specified in point (a). The cost of the meter shall be as specified in the previous sections;
- c) The repaired meter will be tested by the contactor before installation at the cost of the consumer.
- d) In the case of the theft of the water meter, action will be taken under the points (b) and (c) above, in addition to any other action prescribed in rules in force.

L] Payment of Bills:

- 1) A bimonthly bill showing the consumption of water as recorded on the meter at prevailing water rates, and the cost of meter shall be issued by the contactor after every two months. Whenever any dues, meter repairing charge or any other charges under these conditions are recoverable such charges shall also be included in the bimonthly bill.

- 2) In the case of any dispute where the consumer feels that the charges are more, he shall first make the payment of the bill under protest and then file a complaint to the MJP Representative or Contractor.

M] Receipt of Bill by the consumer:

If the water bill is lost, it shall be the responsibility of the consumer to approach the Contractor for the collection of duplicate copy of the water bill. The Contractor shall not extend the period for the payment of water charges on the ground of lost bill and the water bill shall be deemed to have been received within three days of the date mentioned on the bill.

N] Refund:

Except in the case of connections which are closed, refunds, if any due shall be adjusted against future bills and shall not be paid in cash.

O] Restriction on pumping water by a consumer to an overhead tank:

- a) The supply of water to be made under these conditions by the Contractor shall be at the pressure as available. No direct drawal of water from a connection to an overhead tank shall be allowed. The consumer or group of consumers or owner, as the case may be shall if they so desire, arrange at their cost for the construction of a sump, at the ground level to lift water to an overhead tank. All these arrangements shall be provided by the consumer, after obtaining water from the MJP's main at the ground level.
- b) In no case a direct boosting from the water main owned by the MJP or even by the consumer shall be allowed to be used by employing hand pump or electric pump or oil driven pump.

P] Recovery from the Defaulter:

If water supply is disconnected for any reason in contravention of the provisions of the Act or rules or these conditions, water charges shall be levied for the whole month and recovered from the defaulter on the basis of the average consumption of water during the preceding three months.

Q] Validity of New Connection after Sanction:

After obtaining the sanction for a new connection, the consumer shall obtain a connection to the main within a period of six months from the date of sanction. The sanction shall be treated as cancelled and become invalid if the new connection is not connected to the main within the period of six months. In such case, the consumer shall have to submit a fresh form of connection.

R] Closure of Connection:

Where water is not drawn through a connection for a period of more than one year, the connection shall be treated as closed.

S] Charges for Unauthorized Uses of Water :

In pursuance of the provisions under section-45 of byelaws, water shall be used only for the purpose for which the connection is given. Any consumer found misusing water for purposes other than the purpose for which the connection is given, shall render himself liable to pay the charges at double the normal rate in respect of the quantity of water so misused.

T] Proper Disposal of Waste Water:

The consumer or owner or group of consumers shall make proper arrangements for the disposal of waste water after using water from his or their connection. The consumer or owner or group of consumers shall be bound to take such action as required under the relevant rules of the local body.

U] Road Cutting:

After the grant of connection the consumer or owner or group of consumers are required to obtain the permission for the opening of the road from the Department of the Government or the local bodies concerned. He shall be liable to pay the prescribed charges to such authorisation for opening of the road, and for restoring them to their original condition as per direction of such authorities. Such permission shall be submitted to the Contractor in writing before opening up of the road and before jointing his connection pipe to the main.

V] Supply by Zoning:

The MJP/Contractor reserves the right to supply water to the consumer by zoning system at the timings fixed by the MJP Representative after the publication in local newspapers or by public announcement.

[See Bye-law 3 (1)] [FORM SHALL BE IN MARATHI AND ENGLISH]

APPLICATION FOR WATER SUPPLY CONNECTION

Form issued to : _____

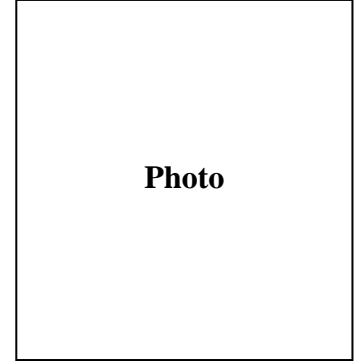
Case No. : _____

Last date of submission of the form: _____

To,

The Executive Engineer
Maharashtra Jeevan Pradhikaran Works
Sub Division No. 2, Latur.

The Deputy Engineer
Maharashtra Jeevan Pradhikaran Works
Sub Division No. 2, Latur.



Sir,

Kindly grant me _____ dia water supply connection

Plot No. : _____

Street Name. : _____ Ward No. : _____

In Town : Latur

[The connection is required for Domestic/Non-Domestic purpose (Classification of use)]

A] For this purpose I agree to pay the required charges as below:

- Initial deposit for domestic / non domestic use : Rs. _____
- Drilling and tapping charges to water supply main pipelines Rs. _____
- Additional deposit (If consumer is a tenant) Rs. _____
- Other charges Rs. _____
- Total Rs. _____

B] I am aware of water supply bye-laws and shall abide by them, as modified from time to time I agree to pay old dues / fees as per prevailing rates.

I am the rightful owner / authorized tenant of the premises for which connection is asked for which following attested documents are enclosed.

- 1) Sale Deed / Sanad / Index-I
- 2) Death Certificate if applicable.
- 3) Plan in quadruplicate

Contractor

Executive Engineer

- 4) N.O.C. of owner in case applicant is tenant (Rs 100/- stamp paper)
- 5) Form No. 7/12, Abstract or revenue department / abstract from city survey register (whichever is applicable)

C] I hereby declare that :

- a) I am fully aware that I am likely to get water at available pressure and at specified timings and I shall not complain about pressure, timing and quantity of water supply.
- b) I am responsible for correctness and authenticity of the documents produced by me.
- c) I shall carryout connection work through the agency of _____ who is licenced plumber and boring on departmental main shall be taken only through the authorized person of the department.
- d) I shall obtain connection after securing Road cutting permission from concerned local body and I shall construct permanent gutter for disposing waste water.
- e) I am aware that I am responsible for keeping meter in working condition to the satisfaction of the MJP. In case meter is faulty in the opinion of the MJP, I undertake to replace the same within a month of the date of receipt of a bill stating so or a written notice to that effect.

I understand that my failure to replace the out of order meter by a meter duly tested from MJP's meter shop shall make my connection liable for disconnection. Removing and refixing of the meter shall be done under intimation and supervision of the MJP/Contractor Staff.

Your's Faithfully,

(Signature of the applicant)

Applicant has signed in my presence

Name: _____ Signature

Name: _____ Signature

Signature of Plumber _____

Date _____

Licence No. _____

Name _____

Agreement to be entered into by MJP and Consumer

This agreement for getting water supply connection from Latur water supply scheme entered into this day Of Between .

Shriresiding at
..... In Latur town herein after called as Consumer as a first party and Executive Engineer, Maharashtra Jeevan Pradhikaran works Division No.2 Latur on behalf of Maharashtra Jeevan Pradhikaran which is statutory under taking of Govt, of Maharashtra entered under the provisions of Maharashtra Jeevan Act 1976 and having its office at Express Towers, Nariman point Mumbai – 400021 here in after called as Maharashtra Jeevan Pradhikaran as the second party.

I hereby entering into agreement as I agree with the following terms and conditions of this agreement.

- 1 I / we here by agree as a consumer the rules in forces (Dejure) of Maharashtra Jeevan Pradhikaran which will be implemented by the Maharashtra Jeevan Pradhikaran / Authorised Management Contractor / person authorized by Maharashtra Jeevan Pradhikaran.
- 2 I / we here by agree to pay the water bills as per the water tariffs as and when fixed by Maharashtra Jeevan Pradhikaran as per the notification passed by Maharashtra Jeevan Pradhikaran as per clause No.35 (i) of Maharashtra Jeevan Pradhikaran. Act 1976.
- 3 Any dues on account of water bills if pending with me for a period of 4 months or more than the deposits Maharashtra Jeevan Pradhikaran has right to disconnect my connection without prior intimation and I will be solely responsible for this disconnection.
- 4 I /we hereby agree that Maharashtra Jeevan Pradhikaran / Authorised Management Contractor is empowered to impose revenue recovery through District Collector, Latur by informing my office for deduction through my pay and salaries and or by attachment of my movable or immovable property against the pending water bills.
- 5 I / we will not complain for non supply of water as per schedule fixed by Maharashtra Jeevan Pradhikaran less water supply, water supply with low pressure or due to any unavoidable reasons / situations.
- 6 I will not complain for non supply of water due to any force majeure like natural calamities and power supply breakdown or fault in pumping machinery and electrical installation.
- 7 I / we hereby agree that in case the water is used for the purpose other than the purpose for which the connection is given, I will pay double the amount as per water tariff fixed for the purpose of water used or disconnection of my connection by Maharashtra Jeevan Pradhikaran / Authorized Mangement Contractor.
- 8 I /we hereby agree to pay water bills meter rents if any other due payments and DPC within 30 days from the date of receipt of water bills if not paid 1% interest per month as DPC will be paid by me. Water bills will be rounded to Rupee one.

Contractor

Executive Engineer

- 9 I /we hereby guarantee that (a) It will be my sole responsibility as a Consumer for maintenance and repairs of service pipeline laid of rigid PVC or G.I pipes from the ferrule fixed for the connection on Maharashtra Jeevan Pradhikaran pipe line (b) The service pipeline will not be laid through any drain or gutters. (c) In unavoidable situations if the service pipeline is laid thorough drains or gutters it will be covered by an exterior airtight and watertight pipe or jacket of GI pipe equivalent to double the diameter of connection pipe and I will be solely responsible if the connection is contaminated by the water from the gutter drain (d) I am aware that leakage on service pipeline if not rectified by me within time Maharashtra Jeevan Pradhikaran / Authorised Management Contractor has right to disconnect my connection without any prior intimation.
- 10 I / we hereby agree that the pipes used for services connection has average life of 15 years . For that reason it is the responsibility of consumer to get the connection pipe replaced after every 15 years and I guarantee for that (Circular of Govt of Maharashtra UDD, Mantralaya Mumbai – 1093 / 02/L.No.02/93/UD-28Dt.8/1/1993)
- 11 I / we hereby agree that there is no any dues against water supply bills on the property or part their of if at all any dues if found in future. I will be solely responsible for the payment of such full dues.
- 12 The sole liability / responsibility lies with me if at all any road of MC or PWD needs to be cut / open / dug for laying of services pipeline and I will be liable to obtain permission for such excavation and to pay the prescribed charges for restoring them to their original condition.
- 13 I am ready to pay the deposits for water connection as prescribed by Maharashtra Jeevan Pradhikaran
- 14 I / we hereby guarantee that if any connection is disconnected due to violation of any rules in Maharashtra Jeevan Pradhikaran bye laws, I will pay the bill for the entire month at the rate worked out on the average of bills of past three months.
- 15 I / we hereby agree to pay the charges for the disconnection / re-connection as prescribed by Maharashtra Jeevan Pradhikaran or Authorised Management Contractor.
- 16 If water meters are not available with Maharashtra Jeevan Pradhikaran / Authorised Management Contractor, I will purchase at my cost water meter from the manufactures approved by Maharashtra Jeevan Pradhikaran and it will be my responsibility to maintain the water meter in good condition
- 17 It will be my sole responsibility as a Consumer to protect and to keep the water meter in working condition, if Maharashtra Jeevan Pradhikaran / Authorised Contractor finds the seal of water meter damaged / Intentionally closed , I agree that water supply to my property will be disconnected by Maharashtra Jeevan Pradhikaran further I agree that it is mandatory on my part to pay the cost of repair of water meter.
- 18 I /we hereby agree as a Consumer that if the water meter is found closed for more than 3 months period I will pay the water bills maximum of the average or flat rate as per Maharashtra Jeevan Pradhikaran rules.

- 19 I will fix metallic meter box or construct chamber in brick work for protection of water meter at my own cost.
- 20 Initially the cost of house connection and fixing of water meter will be incurred by the Authorized Contractor, I agree to pay under this agreement the expenditure incurred by them through one of the following mode. (Please tick mark the preferred payment option)

In one installment at the time of connection.	
Half the amount at the time of connection and remaining half in equated monthly installments during period of six months through bimonthly water bills.	
The full cost of house connection in equated monthly installments during period of six months through bimonthly water bills.	
The full cost of house connection in equated monthly installments during the period of four years through bimonthly bills	

- 21 I /we hereby agree that Maharashtra Jeevan Pradhikaran officers / Authorized contractor are empowered to inspect the water meter at any time.
- 22 If any complaint / objection arises about bills, I / we hereby agree to pay the full amount of the bill immediately. I agree that the amount due after the redressal of complaint will be adjusted in the next bill.
- 23 I will not draw water directly from the connection by deploying electric motor pump, I agree that if found so Maharashtra Jeevan Pradhikaran / Authorised Mangement contractor reserves the right to take action like attach the electric motor / to impose penal action . to disconnect the water connection, So also I will be fully responsible for damage to meter due to deployment of electric motor and payment of charges towards repair or replacement of meter.
- 24 I will not make any alteration or modification in my connection without prior permission of Maharashtra Jeevan Pradhikaran / Authorised Contractor . If found so, Maharashtra Jeevan Pradhikaran / Authorised Contractor reserves the right to disconnect my connection.
- 25 If on examination by Maharashtra Jeevan Pradhikaran / Authorised Contractor any meter is found to be out of order due to any reason the quantity of water consumed during the period commencing from the date of last reading to the date of which the meter is replaced and fixed or a new meter is installed shall be reckoned at the max of the quantities worked out in the following manner namely,
- 25.1 On the actual consumption recorded by the meter if the same is found on testing to register up to and including five per cent slow or fast.
- 25.2 On average of the actual reading for the immediately preceding or succeeding three months period.

25.3 On Discharging capacity of the connection considering its size length hours of supply etc. but not exceeding twice the max monthly consumption recorded during previous twelve months.

As I agreed clauses one to twenty five of above agreement this agreement is legally binding on me and as a consumer I will not file any complaint in the court of law.

First Party

Second party

Signature of the Consumer
(Name full address)

Executive Engineer
Maharashtra Jeevan Pradhikaran
Works Division no. 2, Latur

Witness (Name & Signature)

- 1 .
- 2..

SCHEDULE G

SCHEDULE G– APPLICABLE PERMITS

- Government Resolution ratifying the transfer of water supply scheme from LMC to MJP for a period of 30 years
- MJP Board approval for executing the operations and maintenance of water supply through a private sector contractor
- No Objection Certificate from the Bankers of Latur Municipal Council for transfer of Water Supply and Distribution assets to MJP without transfer of loan liability

SCHEDULE H**SCHEDULE H– SERVICE LEVELS****A) Minimum service level:**

- 1) It is the responsibility of the contractor to ensure and maintain the distribution system in such a way that, the consumer can draw water on an average at 100 LPCD with minimum @ 80 LPCD in supply hours. If there are public complains to MJP, MJP is free to measure the quantity of water supply at any remote connection. In such measuring, if it is found that some of the connections are getting less than required quantity of water, during supply hours, then if asked it is mandatory to the contractor to investigate the reasons and rectify them in such a fashion that consumers can get required quantity of water. The required repairing / rectification should be completed within 3 days of complaint at his cost. The required extension of existing pipeline upto 1 km. per year shall be the responsibility of the contractor. The required pipes will be supplied by the department free of cost. The cost of jointing material and labour charges shall be borne by the contractor.
- 2) The Executive Engineer at his discretion or in response to complaints of short supply of water from Consumers in a particular area or zone shall assess the quantity of water supplied to the area or zone served by an ESR in accordance with the following:

The Executive Engineer shall assess the quantity of water supplied to the zone for a continuous period of 7 (seven) days. The quantity of water supplied to the zone shall be considered based on the daily meter readings on the outlet points of the ESR. The Average Daily Quantity shall be compared with the Benchmark Quantity assessed as under:

$$\text{Benchmark Quantity} = \frac{\text{Required Quantity}}{(1 - \text{Distribution Loss}\%)} + \text{Bulk quantity}$$

Where:

Required quantity (liters) = Number of households x 7 x 100

Distribution loss = Distribution loss for the ESR covering the area/ zone under evaluation calculated in accordance with Clause 11.3 for the pervious month

$$\text{Bulk quantity} = \frac{\text{Actual consumption for the pervious month}}{\text{Number of days in the month}}$$

In the event of Average Daily Quantity being between 70 to 80 % of the Benchmark Quantity then a penalty of Rs. 500/- (Five Hundred) per day shall be levied.

In the event of Average Daily Quantity supplied is between 50 to 70% of the Benchmark Quantity then a penalty of Rs. 1000/- (One thousand) per day shall be levied.

In the event of Average Daily Quantity supplied is less than 50% of the Benchmark Quantity then a penalty of Rs. 2500/- (Two thousand five hundred) per day shall be levied.

- 3) The Contractor shall record on daily basis the meter reading of the bulk water meters connected to the inlet or outlet points of the ESR. For better working of the Bulk meters the meters are fixed on the inlets of the ESRs for which single outlet is provided. The consumption from such ESR is to be determined by knowing the consumption from the meter on the inlet and the quantity of water available in the ESR at the beginning of the supply and at the close of the supply of the day.
- 4) All the unmetered connections shall be converted into metered connections as per MJP Specifications at the cost of consumer. The new connections shall be metered one and shall be at the cost of consumer.
- 3) It is the prime duty of the contractor to maintain water quality standards mentioned in this Schedule. Contractor shall get water samples tested from public health laboratory by paying required fees to the laboratory. Contractor shall maintain a proper record of such tests. Moreover he shall take OT test in distribution system (1 sample per day per zone). The record of such tests should be presented to MJP. If he fails to maintain the required water quality standards, it will be the sole responsibility of the contractor for legal consequences if raised. If he fails to maintain the water quality standards as per CPHEEO norms within 24 hours, MJP is free to rectify the necessary defects at the risk and cost of the contractor.
- 4) If, due to negligence of the contractor polluted water is supplied to the consumer & due to this outbreak of epidemic occurs, and for consequences of such incidents, contractor is solely responsible. In case if any claim arises, then contractor is responsible for payment of compensation to the affected person.
- 5) Contractor shall arrange pumping in such a way that the sump and reservoirs will not overflow. However, required pressure in distribution system shall be maintained properly.
- 6) Performance standards for losses in the system shall be as under:

Performance measurement	Limits
Raw water transmission losses	Upto 1%
WTP Losses	Upto 3%
Pure water transmission losses	Upto 0.5%
Total maximum limit measured on a monthly basis	Upto 4.5%

B] Tests To Be Carried Out For Raw Water, Settled Water And Treated Water.

No.	Parameter/Test	Raw Water	Clarified Water	Filtered Water	Pure Water
1.	pH	Daily	Daily	Daily	Daily
2.	Turbidity	Daily	Daily	Daily	Daily
3.	Residual Chlorine	-----	-----	-----	Hourly
4.	Colour	Hourly	Hourly	Hourly	Hourly
5.	Odour	Hourly	Hourly	Hourly	Hourly
6.	Alkalinity	Once Daily	Once Daily	Once Daily	Once Daily
7.	Chloride	Once Daily	Once Daily	Once Daily	Once Daily
8.	Hardness	Once Daily	Once Daily	Once Daily	Once Daily
9.	D.O.	Once Daily	Once Daily	Once Daily	Once Daily
10.	T.D.S.	Once Daily	Once Daily	Once Daily	Once Daily
11.	T.S.S.	Once Daily	Once Daily	Once Daily	Once Daily
12.	Conductivity	Once Daily	Once Daily	Once Daily	Once Daily
13.	C.O.D.	Once Daily	Once Daily	Once Daily	Once Daily
14.	Jar Test	Once Daily & when turbidity varies.	-----	-----	-----
15.	Bacteriological Test	-----	-----	-----	Once Daily

Additional test, if any, are to be conducted as per instruction of Executive Engineer.

C] Physical And Chemical Standards Of Potable Water

The Contractor shall be responsible for maintaining the standards of water supplied to Consumers as under:

S. No.	Characteristics	Acceptable Range upto
1.	Turbidity (Units on JTU Scale)	2.5
2.	Colour (Units on platinum cobalt scale)	5.00
3.	Taste & odour	Agreeable
4.	pH (Range)	7.0 to 8.5
5.	Total dissolved solids (mg/l)	500
6.	Total hardness (mg/l) (as CaCO ₃)	200
7.	Chlorides (mg/l) (As Cl)	200
8.	Fluorides (as F) (mg/l)	1.00
9.	Sulphates (as SO ₄) (mg/l)	200
10.	Nitrates (as NO ₃) (mg/l)	45
11.	Calcium (as Ca) (mg/l)	75
12.	Magnesium (as Mg) (mg/l)	30
13.	Iron (as Fe) (mg/l)	0.1
14.	Manganese (as Mn) (mg/l)	0.05
15.	Copper (as Cu) (mg / l)	0.05
16.	Zinc (as Zn) (mg/l)	5.0
17.	Phenolic compounds (as phenol) (mg/l)	0.001
18.	Anionic detergents (as MBAS) (mg /l)	0.2
19.	Mineral Oil (mg/l)	0.01

Bacteriological Standards

- 1) Water entering the distribution system Coliform count in any sample of 100 ml should be zero.
- 2) E Coli count in 100 ml at any sample should be zero.

Bacteriological quality of drinking water

Organism	Guideline value
All water intended for drinking E- Coli or thermo tolerant coliform Bacteria b, c	Must not be detectable In any 100 ml sample
Treated water entering the distribution system E- Coli or thermo tolerant coliform Bacteria b	Must not be detectable In any 100 ml sample
Total coliform bacteria	Must not be detectable In any 100 ml sample
Treated water in the distribution system E- Coli or thermo tolerant coliform Bacteria b	Must not be detectable In any 100 ml sample
Total coliform Bacteria	Must not be detectable In any 100 ml sample In case of large supplies, where sufficient samples are examined. Must not be present in 95% of sample taken throughout any 12 month period.

D] QUALITY OF FILTER WATER :

1. Contractor shall provide liquid chlorine at all WTPs and administer it to achieve 4 PPM residual chlorine at WTP and minimum 0.2 PPM residual chlorine at farthest end points in distribution system. Contractor shall provide lime dosing as per requirement so as to continuously get pH of 7 to 8.5 at WTP sump of every WTP.

The through out quality of filtrate at every WTP be maintained at 1 NTU by administering alum and coagulant aid. Water samples in this regard to be taken and tested as per frequency given in CPHEEO manual an appropriate record be continuously maintained. Required samples as per frequency given in CPHEEO manual be tested in Dist. P.H. laboratory. Necessary pre-chlorination be also done at all WTPs. As a safety precaution stock of bleaching powder to the extent of achieving above chlorination for a period of 1 week be always maintained by contractor, at each WTP. A stock of 2 months requirement of alum be always maintained at each WTP.

A penalty of Rs. 500/ Hr. will be levied for supplying of water without chlorination at any plant. A penalty of Rs. 200/ Hr. will be levied for supplying of water with inadequate residual chlorine at any WTP.

2. Required dose of alum be administered & it should not be less than 25 mg./lit. so also the wash water consumption at each WTP be not less than 2%. If filtrate quality is found to have more than 3 NTU turbidity a penalty of Rs. 500/ hr. will be levied for each erring WTP. A penalty of Rs. 1000/- for each sample with less than 0.2 PPM residual chlorine will be levied. A penalty of Rs. 5000/- for each sample of filtrate at WTP which shows presence of E-Coli will be levied. Decision of Executive Engineer towards these penalties will be final & binding on Contractor.

E] Time Schedule For Major & Minor Repairs Of Civil Works & Liquidated Damages

No.	Nature of repairs	Maximum time limit for carrying out repairs	Penalty for failure to attend within the time limit
1	Leakage on 80 to 300 mm dia AC pipeline	12 hours	Rs. 100/ hour
2	Leakage on 80 to 200 mm dia CI/ DI pipeline	12 hours	Rs. 250/ hour
3	Leakage on 250 to 600 mm dia CI/ DI pipeline	24 hours	Rs. 250/ hour
4	Leakage on 323 to 1219 mm dia MS pipeline	24 hours	Rs. 500/ hour

F] Penalty points for Non performance of Service Standards

Sr No.	Reasons for action	Penalty
1	Supply of non chlorinated water at any WTP	Rs. 500/ hr
2	Supply of water with inadequate residual chlorine at any WTP	Rs. 200/ hr
3	Filtrate quality > 3 NTU	Rs. 500/ hr
4	Sample having residual chlorine < 0.2 ppm	Rs. 1000/ sample
5	Presence of E Coli at any point	Rs. 5000/ sample
6	Collection of water sample and collection of report after testing if not followed	Rs. 400/ sample
7	If complaint of contaminated water supply is not attended within 48 hours	Rs. 100/ day
8	Failure to comply with pressure measurement as per clause 11.4	Rs. 25/ day/ complaint
9	Failure to supply required quantity of water as per A -2 of this Schedule and supplied quantity is in the range of 70% to 80% of the Benchmark quantity	Rs. 500/ day
10	Failure to supply required quantity of water as per A -2 of this Schedule and supplied quantity is in the range of 50% to 70% of the Benchmark quantity	Rs. 1000/ day
11	Failure to supply required quantity of water as per A -2 of this Schedule and supplied quantity is less than 50% of the Benchmark quantity	Rs. 2500/ day

SCHEDULE I**SCHEDULE I – INVESTMENT PLAN BY MJP**

The MJP will make the following investments in the Project Area as per the following schedule

A] During first year after the agreement date

- Meters of appropriate type at outlet points on the ESR - 14 nos.
- Following works at Warwanti WTP
 - Replacement of filter media
 - Replacement of pipe gallery
 - Replacement or repair of four leaking valves
- Following works at Sai WTP
 - Replacement of clarifloculator drain valve
 - Replacement of 4 sluice gates

Only if found necessary in the opinion of the Executive Engineer, the MJP may undertake some major repairs of the Water Supply and Distribution at the time of handing over the Water Supply and Distribution Assets to the Contractor.

The major repairs mentioned above refers to the following:

- In case of civil structure it means replacement of cracked pipes of all subworks, leakages in civil structure, crackas in civil structure, construction / alteration of a structure as per requirement, replacement of the sand in filter, replacement of valves of any kind / type, missing water level indicator etc.
- In case of mechanical /electrical equipments it means overhauling of VT pump or C/F pump, rewinding of transformer / motor, repairing out of order VCB, OCB, ATS starters.

For identification of the differentiation of major and minor repairs, the Superintending Engineer, MJP shall be the final authority and the decision given by the superintending Engineer shall be final and binding on Contractor.

B] During term of agreement

- Extension of the water distribution system by 1 kms every year, pipes will be provided to the Contractor and the labour for works shall be provided by the Contractor

SCHEDULE J**SCHEDULE J – MINIMUM CAPITAL EXPENDITURE PLAN BY CONTRACTOR**

The Contractor shall make the following minimum capital expenditure in the Project in the Project Area;

- Vehicles - 2 Jeeps and 2 Motorcycles
- Offices to be provided - Setup zonal offices as per specifications
- 3 phase Diesel Generator set - 1 no. (25 KVA)
- 3 phase welding machine - 1 no. (40 Amp)
- Dewatering set driven by 10 HP diesel engines - 1 no.
- Dewatering set driven by 5 HP diesel engines - 1 no.
- Reverse pumping machine - 2 nos. (0.5 HP)
- Computerised Billing system
 - Hardware specifications for computerized billing and database management system as per the specifications given below –
 - Computer – Intel p4 – 524, Supporting H.T Technology, 3.06 G Hz, 512 MB FSB, 533 MHZ DDR 2 SD RAM, 80 GB Serial ATA Type hard disk (Samsung/ LG) with Ethernet
 - Monitor – Colour Monitor 15” (TFT)
 - Printer – 80 Column Dot Matrix printer
 - Server – Win 2003 Advance server with server o/s
 - One computer for each zonal office
 - One server at main office
 - One computer at Divisional office of MJP
 - One computer at Circle office of MJP
 - Software specifications for the computerized billing system
 - Front end – Visual Basic
 - Database – SQL Server 2005 Database
 - Net (DOTNET) – Transend Software with recovery, outstanding and accounting
 - Wide Area Networking through RF Band
 - Software should be browser based.

SCHEDULE K**SCHEDULE K – WATER METERING AND CONNECTIONS REGULARISATION PLAN****Introduction**

The Contractor and the MJP shall perform the tasks in accordance with this Schedule for the period commencing from the date of taking over of the Water Supply and Distribution Assets from LMC to the completion of 6 (six) months or an extended period in accordance with Clause 2.5 of Agreement.

The LMC levies water charges on an annual basis, with the water bill for the year 2006 – 07 served on Consumers during December 2006. The water payments due to the LMC for the water supplied by them in the financial year 2006 – 07 shall be collected by LMC along with past arrears if any. The Contractor shall be responsible for making collections for the water supplied from April 01, 2007. The water charges towards the water supplied by LMC from April 01, 2007 till the date of Agreement is to be recovered by the Contractor at the prevailing tariffs of LMC and transferred to MJP.

The MJP after the date of signing of the Agreement but not later than the date of taking over the Water Supply and Distribution Assets from LMC shall notify a Water Metering and Connections Regularisation Drive (Drive). This Drive shall be notified in all major news papers of the Project Area. The cost for the notification in major newspapers would be shared by MJP and Contractor in proportion of 25% and 75% respectively.

The Drive shall inter-alia notify the following to the citizens in the Project Area:

1. The Water Supply and Distribution System of LMC shall be taken over by MJP; with brief information on the taking over.
2. MJP shall from the date of taking over operate and maintain the water supply system would operate and maintain it through the Contractor.
3. Notify the tariff rates that shall be applicable with effect of MJP taking over.
4. The advantages to Consumers due to introduction of volumetric metering of water supply.
5. Invite consumers of LMC to convert their water supply connections to metered water supply connections.
6. Announce an amnesty plan for regularizing illegal water connections free of past dues and penalties and installing water meters within a period of 3 months from its notification. The consumer regularizing his water connection would be liable for payment of connection charges, security deposit and the cost meters. The amnesty plan shall prescribe the penalties that would be levied beyond the amnesty period.

The key tasks to be performed by the Parties in accordance with this Schedule are:

Key tasks to be performed by MJP:

1. MJP after taking over the Water Supply and Distribution Assets from LMC allow the staff and labour of the Contractor to enter upon the water supply and distribution assets and operate and maintain it in accordance with this schedule
2. Supervise the operations and maintenance of the water supply and distribution assets by the Contractor.
3. Collect from LMC a copy of its list of consumers, billing address and details of security deposits etc and provide a copy of the same to the Contractor
4. Provide supervisory support to the staff and labour of the Contractor in serving notices to Consumers for regularizing their water supply connections.
5. Provide supervisory support to the staff and labour of the Contractor in serving notices to Consumers for converting the water supply connections to metered water supply connections.
6. Provide supervisory support to the staff and labour of the Contractor in installing water meters at Consumer premises.
7. Provide assistance to the staff and labour of the contractor by settling disputes connected with Consumers not agreeing to install water meters.
8. Retain all the payments and collections from the Consumers towards water consumed during the said period.
9. Transfer the amount due to the Contractor for installing meters at consumer premises and paid by the Consumer as per the Water Supply Bill during the said period.
10. Make payments to MSEDCL for electricity consumed and to Water Resources Department for the water drawn from the Manjra River.

Key tasks to be performed by the Contractor:

1. Enter upon the water supply and distribution assets on permission from MJP for the purpose of operating and maintaining it in accordance with this Schedule.
2. Deploy its operations and maintenance staff and labour for operations and maintenance of water supply and distribution assets under supervision of MJP.
3. Provide staff and labour for serving notices to Consumers for regularizing their water supply connections.
4. Provide staff and labour for serving notices to Consumers for converting the water supply connections to metered water supply connections.
5. Provide staff and labour for providing water supply and installing meters at Consumer premises.

6. Provide necessary assistance including legal assistance to MJP for settling disputes with Consumers not agreeing to install water meters.
7. Provide and install meters in accordance with Schedule D at Contractors expense at Consumer premises.
8. Ensure adequate supply of water meters and labour for achieving a meter installation and level of operations to the tune of atleast 6000 meters per month.
9. Set up a functional Billing system for raising bills on consumers and collecting payments from Consumers. The Bills raised by the Contractor shall clearly delineate the payment due from Consumer under two heads viz.
 - a. Component A – Towards the water consumed for the billing period either volumetric or fixed charge in accordance with the tariff mentioned in Schedule F.
 - b. Component B – Towards cost of meters installed to the extent recoverable from the Consumers in accordance with Schedule F.
10. Bill to Consumers for the water supplied in accordance with Schedule F.
11. Recover and collect payments from Consumers due from April 01, 2007 onwards and deposit the said amount in a designated bank account of MJP.
12. Collect the payments due to the Contractor from MJP for installing meters and paid by Consumers as per the Water Supply Bill during the said period for meters installed at Consumer premises.
13. Maintain records of consumers regularized, consumers metered, consumption billed, payments made and arrears in connections.
14. Undertake all tasks at Contractors cost and expense during the said period including but not limited salaries and wages of the MJP and LMC staff on service with the Contractor as per Schedule L, salaries and wages of Contractor employees, cost of operating and maintaining the Water Supply and Distribution Assets, cost of chemicals and consumables required for smooth O&M of the Water Supply and Distribution System.

Joint obligations of the parties

1. To ensure atleast 25,000 Consumers are identified and meters installed at Consumers premises during the said period.
2. To ensure that meter installation and water supply improvements go hand in hand such that quality of service to Consumers is demonstrated to precipitate interest in Consumers for installing meters. In this regard the MJP and Contractor could mutually agree on operational strategies.

(Clarification: The strategy may involve forming a demonstration zone that has maximum metered connections and the water supply to that zone is at higher service levels than rest of the Project Area, however not compromising on equity and more as a marketing strategy. To achieve this Contractor and MJP may agree to install water meters on a zonal basis or agree to provide atleast 50% of the meters in a single zone and balance in rest of the Project Area).

3. Towards the end of the said period, prepare a statement of arrears in connection with the amount of water billed, the payments made by Consumers, payments outstanding to MJP by Consumers and payments outstanding to Contractor by Consumers.

Notwithstanding anything to the contrary contained in this Schedule, the Contractor is only entitled for payments made by Consumers for the meters installed at Consumer premises during the said period. MJP shall transfer the amount paid by Consumers and deposited by the Contractor (Component B) in the Designated Bank Account of MJP for the meters installed at Consumer premises.

MJP shall only undertake to make payments to MSEDCL and Water Resources Department for the bills raised by the respective companies. No other payments shall be made by the MJP to any agency including the Contractor during the said period.

SCHEDULE L**SCHEDULE L – MJP AND LMC EMPLOYEE SERVICE TERMS AND CONDITIONS**

MJP shall provide the services of the following MJP and LMC staff members to the Contractor for the purpose of Project. The details of the MJP and LMC employees are as under:

Sr.No.	Name of Post	Staff to be provided to the Contractor	Fixed salary in Rs to be paid to MJP/LMC staff by the contractor (per month)	Yearwise expected total salary of MJP staff, fixed service charge to be paid by Contractor and balance to be paid by MJP (Rs in Lakhs)														
				2006-07			2007-08			2008-09			2009-10			2010-11		
				Total Salary	To be paid by Contractor	To be paid by MJP	Total Salary	To be paid by Contractor	To be paid by MJP	Total Salary	To be paid by Contractor	To be paid by MJP	Total Salary	To be paid by Contractor	To be paid by MJP	Total Salary	To be paid by Contractor	To be paid by MJP
1	Technical Assistant	2	3500	1.55	0.84	0.71	1.67	0.84	0.83	1.8	0.84	0.96	1.94	0.84	1.1	2.1	0.84	1.26
2	Clerk	2	3500	1.55	0.84	0.71	1.67	0.84	0.83	1.80	0.84	0.96	1.94	0.84	1.1	2.10	0.84	1.26
3	Pump operator	10	3500	7.02	4.2	2.82	7.58	4.2	3.38	8.20	4.2	4	8.86	4.2	4.66	9.57	4.2	5.37
4	Electrician	3	3500	3.08	1.26	1.82	3.33	1.26	2.07	3.60	1.26	2.34	3.89	1.26	2.63	4.20	1.26	2.94
5	Fitter	7	3000	5.44	2.52	2.92	5.88	2.52	3.36	6.35	2.52	3.83	6.86	2.52	4.34	7.40	2.52	4.88
6	WTP Operator	3	3000	3.04	1.08	1.96	3.28	1.08	2.2	3.54	1.08	2.46	3.82	1.08	2.74	4.13	1.08	3.05
7	Meter Reader	15	3000	11.66	5.4	6.26	12.59	5.4	7.19	13.60	5.4	8.2	14.69	5.4	9.29	15.86	5.4	10.46
8	Chowkidar	28	2500	19	8.4	10.6	20.52	8.4	12.12	22.16	8.4	13.76	23.93	8.4	15.53	25.84	8.4	17.44
9	Mazdoor																	
10	Valveman																	
	Total	70		52.34	24.54	27.80	56.52	24.54	31.98	83.21	24.54	58.67	65.93	24.54	41.39	71.20	24.54	46.66

The MJP and LMC employee service terms and conditions shall be as under:

Period of Service:

The period of service of the staff to the Contractor shall be co-terminus with the term of the agreement.

Provided in case the services of Employee are required by MJP and/ or LMC, MJP has a right to recall the Employee prior to the completion of service period with the consent of the Contractor.

MJP shall also have the right to recall the employees on service in case of vigilance enquiries or departmental proceedings are pending against him or are initiated any time during the tenure of his service with the Contractor.

Pay and Allowances:

During the period of service, the employee on service to Contractor shall draw the pay in the pay scale which he as holding prior to the service with MJP/ LMC, with all other allowances or any increase in the pay and allowances from time to time for whatsoever reasons, had he been continued with the MJP/ LMC. The expenditure on this account shall be borne by the Contractor to the extent of Rs. 24,54,000/- (Rupees Twenty Four Lakhs Fifty Four Thousand) only. Their balance salary shall be payable by MJP. The details of the payment to be made to the staff on service are indicated in the table above.

The monthly salary bills of the staff provided to the Contractor will be prepared and passed by the Executive Engineer and the passed bills showing the gross salary and net salary will be handed over to Contractor on the last date of every month. Along with the bill the Executive Engineer will give the amount by cheque towards difference of net salary and fixed service charge to be borne by the Contractor. It is binding to the Contractor to pay their salary on 1st day of next month by cheque or by instructing bankers to pay to individuals on the lines of MJP's current practice. The passed bills will show clearly the net payment to be paid to the employee and standard deductions from his salary. The paid A-rolls duly signed by the MJP/ LMC employee shall be returned to the Executive Engineer within 10 days. Contractor is required to pay to the MJP/ LMC employee the net payment shown on the bills.

Other terms and conditions

Earned leave, medical leave, LTC bills & bills of medical expenditure shall be borne and paid by MJP directly. The Contractor shall pay the MJP/ LMC staff for overtime as per MJP rules in-force from time to time.

Contractor is empowered to fix the head quarters of MJP/ LMC staff and after fixing such head quarters their T.A. bills for travel beyond 8 kms from head quarters are to be borne

and paid by Contractor at MJP's rates of T.A. & D. A. bills. Upto 8 kms no T.A. / D.A. is payable to MJP Staff. Once the head quarters are fixed at the beginning of term of the Agreement, no change in them is expected for first two years. There after the Contractor is empowered to change the head quarters of 1/3rd staff every year. For changing of head quarters contractor has to pay T.T.A. bills to them as per rules inforce of MJP. Change of head quarters should normally be done in summer.

On recommendation of Contractor Executive Engineer shall sanction the earned leave, medical leave, leave without pay to MJP/ LMC staff. In the period of absence of MJP/ LMC staff on leave it will not binding for the MJP to provide a substitute to Contractor. The Contractor shall make his own arrangements for alternative staff at his cost and expenses. The staff service charge is not payable by the Contractor for the period of such absence of MJP/ LMC staff.

MJP staff (CRP / CRT)is entitled for 8 days casual leave, four national holidays and holidays on all Sundays. Contractor is empowered to sanction casual leave on request from MJP staff [CRT / CRP] as per rules in-force followed by MJP. Fixed salaries for the period of casual leave, national holidays (26th Jan, 1st May, 15th Aug. & 2nd Oct.) and Sunday is payable by the contractor.

Insurance Coverage

During the period of service, the MJP/ LMC staff shall be covered under insurance policy. The risk coverage and other facilities under the policy shall be in line with the provisions of Workmen's Compensation act, 1923 and any other Labour Law, if any, in force or coming in existence in future. The amount of premium paid towards the policy to be borne by the Contractor.

General

If departmental enquiry is to be instituted against the any of the MJP/ LMC staff for major acts of misconduct he shall be repatriated to the MJP and the departmental action will be taken by the concerned Competent Authority in MJP.

If the MJP/ LMC staff submits resignation or seeks voluntary retirement then such application shall be forwarded by the Contractor to MJP for taking decision in the matter.

The Contractor may frame/ revise the rules/regulations regarding the service conditions, financial matters and other pecuniary benefits pertaining to its organization. However, the same shall not in anyway, be inferior to those applicable to the MJP/ LMC staff, immediately before his provision of service to the Contractor.

SCHEDULE M**SCHEDULE M – MINIMUM LEVEL OF CURRENT ASSETS AND OPERATING SPARES**

The Contractor shall at all times during the term of the agreement maintain a minimum inventory of the following consumables at each water treatment plant:

Sr No,	Required Spares / Consumable	Qty
1.	Alum (three month stock)	108.00 MT
2.	Chlorine tonners connected and rest in stock i) At Arvi Boosters ii) At Warwanti plant iii) At Harangul WTP	2 nos 6 nos 9 nos
3.	Bleaching powder (one month stock)	20 MT
4.	Chemical required in testing LAB i) O.T Solution ii) Distilled water at each WTP iii) Buffer solution	1 Ltr @ each ESR and WTPsite. 10 ltrs 3 bottles.
5.	Spindles and check nuts for each size of value	6 nos.

The Contractor shall at all times during the term of the agreement maintain a minimum inventory of the following consumables and spares for Electrical and Mechanical equipments at Dhanegaon Pumping site;

Names of the required spares	Qty
1. Porcelain disc type insulator with hardware suitable for 33kv line	3 nos
2. Porcelain pin type insulator with hardware suitable for 33kv line	3 nos
3. Fuse barrel suitable for 33 KV line	1 set
4. D.O fuse	4 set
5. Lightning arrestor suitable for 33 kv	1 set

Contractor

Executive Engineer

Names of the required spares	Qty
6. Transformer oil	200 lit
7. Breather gel	1 kg
8. Single phase double core CTs of ratio 75/5 Amp or suitable with 100 VA burden and of class 10 P 10 for protection and class 1 for metering	3 nos
9. Double core 3 phase potential transformer 33 KV/ 110V/ 100 VA burden with fuse and test block	3 nos.
10. TP IDMTL relay suitable for 33 kv	1 nos
11. Over voltage relay and time delay relay suitable for 33 kv	1 nos
12. 200 Amp HRC fuses suitable for 33 kv line power supply	6 nos
13. 100 Amp HRC fuse suitable for 33 kv power supply	6 nos
14. 63 Amp HRC fuse suitable for 33 kv power supply	6 nos
15. 200 amp HRC fuses suitable for LT supply.	6 nos
16. 100 Amp HRC fuses suitable for LT supply	6 nos
17. 63 Amp HRC fuses suitable for LT supply	6 nos.
18. Indoor/outdoor termination kit for 33 kv (CE) XLPE 3 core cable for following sizes (heat shrink type) a 185 sq mm b 120 sq mm c 300 sq mm	4 nos 4 nos 4 nos
19. Aluminum lugs for 33 kv (E) XLPE 3 core cable a 185 sq mm b 120 sq mm c 300 sq mm	12 nos 12 nos 12 nos
20. Closing coils rated for 110 volt DC and suitable for operation at 85% to 110 % of rated voltage (for VCB)	2
21. Trip coil rated for 110 volt DC and suitable for operation on 70% to 110 % of rated voltage for VCB	2 nos

Contractor

Executive Engineer

Names of the required spares	Qty
22. Volt meter / ammeter suitable for 33 kv supply	2 nos
23. 40 watt fluorescent tube	5 nos
24. Control HRC fuses 20 Amp, 10 Amp 5 Amp	12 nos each

The Contractor shall at all times during the term of the agreement maintain a minimum inventory of the following consumables for electrical and mechanical equipments at the water treatment plant at Harangul.

Name of the required spares	Qty
1) Porcelain disc type insulator with hardware suitable for 33 kv line.	3 nos
2) Porcelain pin type insulator with hard ware suitable for 33 kv line	3 nos
3) Fuse barrel suitable for 33 kv line.	1 set
4) DO Fuses	4 set
5) Lightning arrestor suitable for 33 kv line	1 set
6) Transformer oil	200 ltr
7) Breather gel	1 kgs
8) Single phase double core CTs of ratio 75/5 amp or suitable with 100 VA burden and of class 10 upto P 10 for protection and class 1 for metering	3 nos
9). Double core 3 phase PT 33 kv / 110 V/ 100 VA burden with fuse and test block.	3 nos
10). TP IDMTL relay	1
11) Over voltage relay and time delay relay suitable for 33 kv	1 nos
12) 200 Amp HRC fuses suitable for 33 kv supply	6 nos
13) 100 Amp HRC fuses suitable for 33 kv power supply	6 nos

Contractor

Executive Engineer

Name of the required spares	Qty
14) 63 Amp HRC fuses suitable for 33 KV power supply	6 nos
15) 200 Amp HRC fuses suitable for LT supply	6 nos
16) 100 Amp HRC fuses suitable for LT supply	6 nos
17) 63 Amp HRC fuses suitable for LT supply	6 nos
18) Indoor/ outdoor termination kit for 33 KV XLPE 3 core cable for following sizes heat shrink type a) 300 sq mm b) 185 sq mm c) 95 sq mm	4 nos 4 nos 4 nos
19) Aluminum lugs for 33 KV (E) XLPE 3 core cable for following sizes a) 300 sq mm b) 185 sqmm c) 95) sq mm	12 nos 12 nos 12 nos
20) Closing coils rated for 110 volt DC and suitable for operation at 85% to 110% of rated voltage for VCB	2 nos
21) Trip coil rated for 110 volt DC and suitable for operation on 70% to 110 % of rated voltage. For VCB	2 nos
22) Volt meter / ammeter suitable for 33 kv supply	2 nos
23) 40 watt fluorescent tube	5 nos
24) Control HRC fuses 20 Amp / 10 Amp / 5 Amp etc	12 nos each

SCHEDULE N**SCHEDULE N – COMPUTATION RULES FOR COMPENSATION/ RECOVERY FOR VARIATION IN ELECTRICITY RATES**

The Contractor shall either receive compensation for increase in Evaluated Electricity Rate for electricity consumed or make payment to MJP (recovery) for reduction in Evaluated Electricity Rate for electricity consumed at Designated Locations in accordance with this Schedule.

1. The Compensation/ recovery for variation of electricity rates shall be computed as under on a monthly basis:

Note: The MSEDCL bill for a month may cover two calendar months in such an event the month under consideration shall mean the month which has over 15 days in the billing period.

Step 1 – Computing the EER

Evaluated Electricity Rate (EER)=
$$\frac{\text{Total bill amount at designated locations}}{\text{Total units consumed at designated locations}}$$

Step 2 – Comparison with EER range prescribed

The EER evaluated above shall be compared with the EER range prescribed for the month as indicated in this Schedule.

Step 3 – Computing Compensation/ recovery

In event the EER is within the EER range prescribed for the month then the Compensation/ recovery is Rs. 0/- (Zero).

In event the EER is not within the EER range prescribed for the month then the following will apply:

- a. *If the EER is below the lower end of the range (Lx)*

Recovery = $(Lx - EER) \times \text{Total number of units consumed at designated locations}$

- b. *If the EER is above the higher end of the range (Hx)*

Compensation = $(EER - Hx) \times \text{Total number of units consumed at designated locations}$

2. The following is applicable based on the resultant figure arrived at pursuant to computation made in accordance with the preceding sub – clause

Resultant	Applicability
Zero	No Compensation/ recovery is payable
Recovery	Shall be the amount payable by the Contractor to MJP
Compensation	Shall be the amount payable by the MJP to Contractor

3. The Contractor on a monthly basis after the Electricity Bills are paid would prepare the following Compensation/ Recovery Statement and calculate the Compensation/ recovery and submit it to the Executive Engineer alongwith copies of relevant bills.

Month - _____

Location	Bill amount	Units Consumed	Remarks
Total			

Enclosure – Copies of bills raised by MSEDCL and payment proof

Computation of Compensation/ recovery

EER _____

Comparison with range _____

Calculation of Compensation/ recovery

Amount payable to/ by MJP Rs. _____

4. The Executive Engineer after verification of the above shall pass a Compensation/ Recovery order, which will be binding on the Contractor and the payment shall be

Contractor

Executive Engineer

made by MJP in event of Compensation or the Contractor shall make a payment in event of Recovery within 30 days of passing such order by Executive Engineer.

5. The table for prescribed EER range

Month from commencement date		EER Range (Rs)	
From	To	Lx	Hx
1	6	6.52	6.69
7	12	6.69	6.86
13	18	6.86	7.03
19	24	7.03	7.20
25	30	7.20	7.38
31	36	7.38	7.57
37	42	7.57	7.76
43	48	7.76	7.95
49	54	7.95	8.15
55	60	8.15	8.35
61	66	8.35	8.56
67	72	8.56	8.78

SCHEDULE O**SCHEDULE O – OPERATIONS AND MAINTENANCE SCHEDULES****A] DETAILED SPECIFICATIONS FOR O. & M. OF CIVIL WORKS****1] Head Works:-**

The item includes operation, maintenance & routine repairs as under

- 1.1) Approach channel: - When water level in Manjra dam falls below than RL 636 M. then water is required to be taken through intake well. Before operating intake well gates, it is necessary to collect the floating material in the approach channel & dispose them beyond submergence area of dam. This operation is continuously needed as and when required till the next monsoon.
- 1.2) Intake well & Connecting main: - Contractor shall ensure the free flow of water towards Jack well through intake well & Connecting pipe. If any obstructions found, these shall be removed immediately. Greasing & Oiling to the gates of intake well shall be carried out before monsoon for smooth operation of the gates.
- 1.3) Jack well & Pump house: - There are two gates installed for incoming flow of raw water in main Jack well at Dhanegaon head works. These gates shall be greased for smooth operation. All raw water holding structure such as intake well & jack well i.e. at Dhanegaon, nagazari and Sai shall be desilted at the end of every summer. It should be ensured that sufficient water level is maintained in jack well to avoid vortex formation.
- 1.31) All intake strainers shall be cleaned at frequent interval particularly during monsoon to prevent entry of any floating material in intake structures. The floating material on the surface of water near the open gate of Jack well shall be removed regularly. Epoxy paints to the gates of Jack well and intake wells and metallic parts should be applied once in two years. Black anti-corrosive paint should be applied to pump delivery piping, valve, railing, ladders, jalli on openings, girders, and all other iron structures, as directed, once in two years. A schedule of painting of steel & other structural parts of the intake works should be prepared & followed scrupulously to avoid damages to these structures.
- 1.32) Contractor should watch & replace the broken glasses of ventilators, windows etc. to avoid rain water entering inside the pump house to safeguard electrical installation.
- 1.33) The job includes watching & maintaining lightening conductor, over the pump house. If the aluminum tape is observed disconnected / damaged / theft, it is the responsibility of contractor to replace it.

2) **Operation & Maintenance of K.T. weirs at Sai & Nagzari:-**

- 2.1) The Operation & Maintenance of K.T. weir comprises of, maintaining all civil works, in good condition, installing gates at weir or storing them at pump house including erecting & lifting operations.
- 2.2) The schedule of installation of gates shall be carried out as per irrigation Norms. The Lifting arrangement i.e. overhead gantry, crane with trolley, chain pulley block, etc. shall be kept in good working condition in all seasons for this purpose, periodical overhauling, oiling, greasing shall be attended to.
- 2.3) Anti-corrosive paint shall be applied to the gates and all metallic parts, once in two years. The gate shall be checked for leak proof working and if required corrective measures shall be taken.
- 2.4) All the pump houses shall be maintained neat & clean for giving pleasant appearance. Sweeping, Cleaning and washing all floor area of pump house buildings including cleaning walls, ceiling, grill work of windows, doors and windows and ladders regularly.

3) **OPERATION & MAINTENANCE OF RISING MAIN, GRAVITY MAIN & DISTRIBUTION SYSTEM :-**

The contract includes maintenance & repairs of the pipeline, sluice valves, scour valves, butterfly valves and various appurtenances and accessories on this pipeline as and when they arise. The item also includes making lead joints, tyton joints, CID joints, collar joints, replacement of rubber gasket, nut bolts etc. The work also includes excavation, refilling, dewatering at the time of repairs. This also includes the cost of all jointing material such as lead, rubber gasket, CID joint, collars, cement, leak repair clamps, mechanical joint or any other material required as directed by Executive Engineer.

The work includes caulking of lead joints, tightening of nut bolts of flanged joint / CID joint, jiffy joints, Expansion joint, replacing of gland packing / rubber packing, welding and guarding of excavated trenches / pits etc. Providing manpower to repair all leakages and operate necessary valves, patrolling and guarding the pipeline is also included in this job. This also includes timely reporting about leakages to the department. Sufficient stock of required jointing material shall be maintained at the contractor's store yard.

If any valve is kept stand – still for years together then this valve will be of no use due to rusting. It will be impossible to open or close this valve, when required. Therefore, such idle valves shall be operated, periodically.

All scour valves shall be opened and closed once in a month. Contractor shall keep close watch on the working of air valves. In case any air valve is found

leaking, the leakage shall be rectified by replacing necessary spares of valves it self if required, at his cost.

Whenever a leakage is detected at any sluice valve, scour valve, it shall be rectified within 24 hours. If number of leakages are noticed at same time then the contractor has to employ additional labour and has to remove all the leakages without claiming any extra cost, even if those may be at various places it is binding on the contractor to rectify all leakages at once.

While patrolling it is necessary to see that nobody is drawing / attempting to draw water illegally, from the transmission / feeder / pumping or any mains. Such instance if noticed shall be promptly communicated orally and / or in writing on the same day to the Executive Engineer. It is the responsibility of the agency to stop such illegal drawl within 24 hours.

Any incidence of encroachment or attempt of such encroachment in the premises of property of water supply scheme shall be removed immediately and the matter shall be reported to the Executive Engineer by any patrolling person, valve man or any representative of the contactor.

General Instructions :-

- a) Cutting the damaged pipes into pieces of suitable size to remove out of the trench manually as required and replacing it with the new pipe, as directed by Executive Engineer.
- b) Jointing of new pipes / specials / distance pieces shall be done without disturbing the original alignment of existing pipe line. Type of joint shall be chosen as per site condition i.e. lead joint, tyton joint, jiffy joint, coller joint, welding joint & CID joint. All jointing work shall be carried out as per respective standard specifications.
- c) Refilling the excavated trenches shall be done with available excavated stuff immediately after repair work is completed as per detailed specifications laid down in the standard specifications for the item of refilling.
- d) This item includes the removal of broken, damaged, burst pipe from that place and site clearance. Contractor shall be owner of the scrap.

All activities as above shall be completed as scheduled as per Table E of Schedule H.

- e) After removal of leakages, the joints shall be absolutely water tight.

Specification for Lowering, Laying and jointing A.C., / C.I. / D.I. pipes for rectification of leakages.**1) Stacking of materials**

Each pipe, special etc. shall be got checked for its soundness (not cracked and not damaged) before laying. The contractor shall have to make his own arrangements for obtaining permission for storing and stacking of pipes and specials etc. by the road side from landowners and concerned Government department, Municipalities local bodies private land owners etc.

The work of pipe laying shall be carried out as per IS:6530:1972 or its latest revision. Before the work of pipe laying is taken up the pipes and specials shall be arranged lengthwise by the side of the excavated trench, without causing any obstruction to the traffic. If necessary the pipe shall be got cut by the contractor at his own cost to accommodate materials on fitting coming along the alignment without any extra claim. The contractor is fully responsible for safety of materials at site.

2) Preparation of pipes:

The pipes shall be brushed throughout to remove any soil deposited or stone therein. Particularly each end of the pipe inside or outside i.e. socket and spigot shall be carefully cleaned, where jointing is to be done. Cutting of pipes or specials shall be done in workman like manner and with proper tools. The cut end shall be made in line and level and finished like as original one without any extra claim.

3) Laying

Before lowering, the pipe trench section shall have sufficient working space beside the pipe for laying and jointing work. The contractor shall have to provide and maintain site rails and boning rods wherever required till the completion of work. The pipe shall be laid in reasonably dry condition and under no circumstances they shall rest on slushy bedding.

The pipes shall be lowered slowly into the trench by means of chain pulley block and tripod stand or with the help of ropes and suitable size of wooden bullies. They shall be brought to the required level by giving packing with wooden sleeper pieces and ultimately with well consolidated hard murum if required. The chain pulley block and tripod stand shall be strong enough to lift the pipe and specials etc. Under no circumstances pipes shall be allowed to be thrown into the trenches.

3.1 Jointing with tyton joints

The rubber gasket shall be inserted into the groove in the socket. The spigot and socket shall be lubricated with good quality of grease, or oil. Then the spigot shall

be slipped into the socket by means of jack on the other end. The lubricating grease or oil shall be of approved make and shall be got approved from the Executive Engineer by the Contractor. The socket ends of all pipes shall face up hill irrespective of the direction of water flow. Any deviation either in plan or elevation of less than $11\frac{1}{4}$ degree angle shall usually be effected by laying straight pipes round a flat curve of such radius that rubber gasket shall not be disturbed in its place.

Wherever new pipes laid are to be jointed with existing pipe line, first pipe laying work of new pipes are to be completed. Jointing of new pipe line with existing pipe line has to be completed within a stipulated time as per the instructions of Executive Engineer to keep ready distribution system to supply water to the city. No extra payment will be made for this time bound urgent work, unless otherwise separately provided in the tender.

3.2 Jointing with flanged joints

All materials such as nuts bolts, rubber packing washers, and white paint etc. required for jointing flanged pipes, specials including valves etc. shall be provided by the contractor at his cost. The jointing material shall be of standard specification and shall be got approved from the Executive Engineer before use. The nuts and bolts shall conform IS:1364 and the rubber packing shall conform IS: 638.

The flanged pipes and specials shall be lowered in the trench carefully, so that no part is damaged during lowering operation. The rubber packing shall be three ply and of approved thickness. The packing shall be of full diameter of the flange with necessary holes and the pipe hole. It shall be even at both the inner and outer edges.

After placing the packing nut and bolts shall be inserted and tightened to make the joint.

Each flange bolt shall be tightened a little at a time taking care to tighten diametrically opposite bolts alternatively.

3.3 Jiffy Joints / Leak repair joint

Fixing of jiffy joints to C.I. / A.C. pipes of all diameters including the cost of all material of jointing and all labour charges etc completed.

3.4 C.I. Detachable joints:

Before the pipes are lowered into the trench one C.I. ring and one rubber ring shall be mounted at each end of the pipe with collar at one end. The rubber ring shall be evenly placed on the end of the pipes at uniform distance as required from the edge of the pipe cone shall be used to mount rubber rings. This distance shall be checked by means of gauge provided by the contractor for this purpose.

In the final position, the rubber ring shall be free from any twist. Painted line shall be drawn from the ends of the pipes to check, the junction of the adjacent pipe being kept centrally.

The end of pipe with C.I. joint and rubber ring mounted thereon shall be leveled against the end of the preceding pipe position of which the C.I. ring and rubber ring previously mounted with C.I. central collar of joint inserted between the ends.

The pipes shall then be placed in proper alignment and the grade checked by the appropriate boning rod. The two flanges shall then be brought together and bolt and nuts be inserted. The rubber rings shall rest evenly against the central collars before assembling the flanges. The final tightness of the bolts shall be done after inspecting the assembled joints. After the joints have been assembled coating of hot bitumen shall be applied to collar joint if paint is damaged without any extra claim to prevent corrosion.

No pipeline shall be jointed on ground and be lowered into the trench. The specials shall be connected to the pipes with detachable joints / A.C. couplers in the manner specified. After the specials have been jointed, suitable anchoring shall be provided for the specials to prevent any movements during the hydraulic test.

3.5 Jointing with lead joints

After arranging in proper alignment each pipe shall be properly jacked and spigot end shall be perfectly fixed into the socket. The socket ends of all pipes shall face up hill irrespective of the direction of water flow. Any deviation, either in plan or elevation of less than $11\frac{1}{4}$ degree angle shall usually be effected by laying the straight pipes round a flat curving of radius that the minimum thickness of lead at the face of the socket shall not be reduced below 6 mm or the opening between point. The spigot shall carefully centered into the socket by one or more laps of spun yarn sufficient yarn shall be forced into the socket to leave a depth for lead as shown in IS. The proper depth of each joint shall be tested before pouring the lead.

The pipes shall be again examined for line and level and the space left in the socket shall be filled in by pouring in melted hot lead. This may be done best by using proper leading rings and if these are not available by wrapping a ring of hemp rope covered with clay round the pipe at the end of the socket leaving a hole into which the lead shall be poured. The lead shall be rendered thoroughly fluid and each joint shall be filled by pouring. If the pipe is too large then two or more leads shall be used for joint to be filled. The lead used shall be soft and free from admixture of tin and of best make and of approved quality.

Caulking

After a section of convenient length has been leaded caulking shall be commenced. The extra lead shall be removed from the pipe outside of the socket of the other pipe with a flat chisel and then caulked round 3 separate line with the proper caulking tools of increasing thickness and a hammer 2 to 3 kg. In such a manner also make the joint sound and water tight. After being well and evenly set up the joint is to be flush neat and even with the socket.

Joints under water shall be made with lead wool inserted in strings not less than 6 mm thick and every string caulked.

4) Dewatering

Dewatering should be done by means of pumps having required HP and be as per site condition to carryout and complete the work as per specification in the Red book volume No. Bd-A-9/. The job includes charges of operators with services, fuel charges etc. complete and shall be borne by the Contractor.

Additional specification for lowering, laying and jointing of M.S. pipes for rectification of leakages.

General: The specification lays down for lowering, laying including welding M.S. joints, to lay the pipes in horizontal position, & refilling the trenches.

Material: The required quantity of M.S. pipes (Spiral or ERW) and specials their of shall confirm to IS- 3589 & 5504 & of grade Fe 410.

Staking of material: Each pipe shall be got checked for its soundness. contractor shall have to make his own arrangements for obtaining permission for starting and stacking of pipes & specials their of etc. by the road side from land owners concerned Govt. department, municipal corporation or any other local body concerned.

Laying: The work of pipe laying shall be carried out as per IS 5822 of 1986 of its latest revision, before lowering the pipe, the trench section shall be got approved from the Executive Engineer. The contractor shall provide necessary barricating or railings till the completion of the work, the pipe shall be laid in reasonable dry condition and under no circumstances they shall rest on slushy bedding. The pipes shall be lowered into trenches by means of chain pulley block, tripods stand or with the help of ropes and pulley or with the help of crane without claiming any extra for the same. Under no circumstances pipes shall be allowed to throw into the trenches.

Welding: Welding for jointing of the pipes shall confirm to IS 822 and 823, the electrodes/ welding rods shall confirm IS 814. Necessary welding butt or tack shall be used as per site condition.

5) O. & M. of MBR / ESR / GSR /Sump:-

Contractor should maintain the premises of the reservoirs clean. Lightening conductor & water level indicator should be in working condition. Unauthorized persons should be prohibited in the premises. The reservoirs should be washed once in year. The sluice valves should be maintained properly and observed leak

proof. Whenever any valve is required to repair, it shall be taken out by breaking out the chambers get it repaired & reinstall in its original position properly. The broken BBM Chamber should be reconstructed to its original shape & size.

The grass and bushes from total area of MBR and ESR's / GSR's is to be removed and disposed as directed. Grass bush cutting on acquired land from is included in this item and also cleaning of is included in this item.

Washing and cleaning of all MBRs, ESRs, GSRs once in a year is included in this item and the certificate from concerned Engineer must be produced yearly in original with no correction in the certificate.

All ESR's / GSR's are having separate washout arrangements, but for some ESR's outlet and washout are combined and only one additional sluice valve is provided before outlet sluice valve, on the branch, washing and cleaning of the ESR's / GSR's to be carried out once in a year at suitable time preferably within complete shutdown period.

All internal walls to ESR should be completely brushed with soft brush and cleaned and then washed by bleaching powder solution and then completely washed and cleaned in all respect. All dirty water has to be drained out by opening washout valve and before that outlet valve should be completely closed. After completing all above process the washout valve should be completely closed and inlet valve can be opened to start filling the ESR / GSR. The process is same for all MBR, ESR / GSR, for ascertaining the work done the departmental person should be informed in advance about the programme of cleaning of reservoir, the work done should be shown to the departmental person as well as local authorized person and certificate should be obtained by the contractor. The work of cleaning of ESR / GSR should be done to the satisfaction of the department.

The valve man has to report the quantity of water supplied to ESR by:-

- 1) Reporting average supply to ESR or by reporting water levels in ESR (Daily report).
- 2) Information under signature of person authorized by Executive Engineer for that ESR stating daily quantity of water received.

The valve man has to take test of residual chlorine on every day of water from each ESR / GSR and inform to Supervisor who will be attending to collect such information daily and report to Department.

B] DETAILED SPECIFICATIONS FOR O & M OF MECHANICAL AND ELECTRICAL WORKS.

- a) The pumping station is on Dhanegaon dam source and there is 33 KV Substation at Dhanegaon head works with 2500 kVA, 33/ 3.3 kV transformers with indoor substation. There are 33 kV incoming and outgoing VCB, Isolator panel in indoor substation. The panel board in pump house is connected with HT cables from substation. HT panel board in pump house is equipped with 3.3 kV incoming & outgoing VCB's. The 700 HP pump sets with 3.3 kV HT motors are connected by HT cables, through capacitors. There is separate panel of metering and relays. Also there is one LT panel for LT operations.

The Raw water from Dhanegaon pumping station is taken at 80 MLD WTP Harangul through BPT shaft.

The HT substation with 1600 kVA transformers and all other accessories indoor 33 kV VCB etc. are installed. This substation is connected to 442 HP pump sets with 3.3 kV HT motors in pump house with HT cable. Also there is HT and LT panel board with capacitors installed in pump house.

- b) There are water supply system (old) from K.T. weir as source on Manjara River at Nagzari. (1) The water is pumped from this source with 250 HP V.T. pump with necessary transformer, substation, panel board etc. to 19.2 MLD Warwanti WTP. (2) Also Water from K.T. weir source at Sai, is pumped by using 35 HP V.T. pump from Jackwell to sump and 150 HP C/F pumps from sump to 9.4 MLD WTP at Arvi booster, with required transformer, substation, and panel board etc.
- c) This being the essential service, water is to be produced and supplied daily even on holidays and water supply operation should be un-interrupted.

The item includes the Operation, Maintenance and periodic, breakdown, preventive and routine maintenance as under -

(1) OPERATION AND MAINTENANCE OF K.T. WEIR AT SAI / NAGZARI -

The Operation and Maintenance of K.T. Weir comprises, all civil works in good condition, transporting M.S. gates from Raw water pump house to K.T. Weir for installing whenever required, taking out these gates from K.T. Weir and storing them,

The walkway shall be cleaned and maintaining it in good condition during fair season.

The installation and removing of gates shall be carried out in consultation with Water Resources Department.

(2) RAW WATER PUMP HOUSE :

Special care shall be taken for such operations. The lifting arrangement i.e. overhead gantry crane with trolley, C P block shall be kept good working condition in all season.

Sweeping, cleaning and washing of all floor area including cleaning walls, ceiling of sump and pump house building including sump, cleaning of ladder, windows, glass etc.

The floating material obstruction observed at raw water inlet channel in river bed or sump shall be removed as and when required.

H.T. Sub-station maintenance including timely cutting of grass shrubs, weeds in the sub-station yard disposing off etc.

(3) RAW AND PURE WATER PUMPING MACHINERY :

Operation and maintenance of Raw Water Pumps and Pure water pump at W.T.P. with all other relevant electrical and mechanical equipment as under.

Extent of Work :

Under this items the work of operation, periodical maintenance, cleaning, check-up, testing for serviceability and routine rectification of the equipment under Operation schedule and periodical maintenance schedule is included. The operation of Raw water and Pure Water Pumping to supply water will be in required shifts and maintenance, routine rectification, check up, testing and repairs will be carried out without affecting the pumping hours.

(A) OPERATION SCHEDULE :**Raw Water Pumping Machinery :**

List of machinery installed is enclosed as per ANNEXURE No I-A & I-B

Pure Water Pumping Machinery :

List of machinery installed is enclosed as per ANNEXURE No I-A & I-B

Principle and procedure for operation should be as under:-

- i) Pumps shall be operated in such a manner that operation hours for each pump are maintained in proportion, that stand by pump shall be operated only for 20% of days/month, so as to keep at least one stand by pump comparatively in new condition than working pump..
- ii) Starting and stopping shall be kept to minimum.
- iii) Running: the number of pumps required for supply of raw water to W.T.P will be as per requirement of water in W.T.P., which should be got confirmed time to time through co-ordination of staff.

Occasionally used machinery like compressor for air vessel etc. shall be operated once in a week for at least an hour or as and when required to keep the machinery in order.

Stationary electrical equipment panel component/AB switch except capacitor and cable should not be idle for more than 7 days.

Rotating electrical equipment without heaters should not be idle for more than 7 days.

Rotating electrical equipment having space heater should not be idle for more than 14 days.

Operations of gantry shall be carried once in a week during non-operation period.

PERIODICAL MAINTENANCE SCHEDULE :

The Contractor shall carry out periodic maintenance as per maintenance schedule enclosed. Periodic maintenance shall also include daily observation and cleaning of equipments. Periodic maintenance schedule appended (Annexure II-B, III, and IV-A, B, C) to this Schedule are tentative and shall be subject to modification as deemed necessary by the Executive Engineer. The Contractor shall follow such modified maintenance schedule without any extra cost. All oil, grease, lubricant, gland and battery filling acid/distilled water shall be supplied by the contractor, calibration checking and testing of relays, earthing etc. shall be included in periodical maintenance without any extra cost.

Testing:-

Test as under will be carried out to ensure service utility and proper performance of the equipment.

i) Pump-Motor Sets:

Performance test shall be carried out once in six months. The test shall include determination of discharge and efficiency of the pump motor set. The discharge shall be measured by increasing level in clariflocculator Sump/MB.R. and power by watt meters. The tests shall be conducted by running one pump. or pumps in combination. All the test equipment required for testing shall be arranged by the Contractor. The observations and results of tests shall be submitted in triplicate.

Contractor should check the discharge of each pump six monthly. During the measurement of discharge if the discharge is found short by more than 10% than the rated discharge of the pumps, then he should check all the parameters affecting the discharge & should arrange to rectify the same.

Relays :

The relays should be tested for required standards by every year. The contractor may appoint a reputed and expert agency in relay testing filed, for yearly testing of relays and calibration of same. This agency should be finalized in consultation

with MJP. Necessary rectification shall be carried out if necessary or relay may be replaced if it is found irreparable.

- a) Motor bearing temperature relay.
- b) Motor winding temperature relay.
- c) Short circuit relay and all other relays.

Earthing System :

The earthing system shall be checked quarterly for following conditions / values.

- a) Continuity
- b) Earth Resistance.

iv) **Routine Rectification :**

Minor rectification works listed below and similar minor works shall be included in routine rectification labour & material considered.

- a) Topping up of oil/lubricants of bearings gear box upto transformer etc.
- b) Tightening of lugs and checking glands of all cable.
- c) Rectifying loose connections.
- d) Repairs/Replacement of pilot lamps, annunciation windows.
- e) Replacement of fuses including D.O. fuses.
- f) Cleaning and replacement of contacts.
- g) Cleaning and replacement of bearing.
- h) Replacement of pressure gauges.
- i) Replacement of coupling pin and bushes of flexible coupling.
- j) Spot welding and brazing and soldering.
- k) Replacement of limit switches of crane and valve actuator.

ADDITIONAL SPECIFICATION :

1. All Meters such as Volt Meter, Ampere Meter, Frequency Meter, Power Factor Meter and all other such meters including the meters used as tools by the Agency shall be calibrated once in six months and the Calibration Certificate shall be kept on record in main site office of the contractor.
2. The relay testing shall be carried out from reputed professionals approved by the Pradhikaran once in a year and the Test Certificate shall be kept on record in main site office of the contractor..
3. The agency shall submit to the Executive Engineer MJP, the statement of machinery repaired every month along with details of repairs carried out, in the form of history sheet – format prescribed.
4. The Agency shall carry out all repairs as scheduled only.

B) WATER TREATMENT PLANT :

R.C.C. Raw water intake, raw water channel, flash mixer, clariflocculator, settle water channel, filter house, pure water channel, C.C.T. and pure water sump, pump house, all by pass arrangements, chemical house, administrative block, laboratory, chlorine house, blower room, area lighting and all electrical mechanical equipments installed for satisfactory performance of water Treatment Plant. The operation for various components of clariflocculator is given in Annexure No. III In addition to this operation maintenance of water treatment plant comprises as detailed below.

- i) Periodical cleaning of all the components mentioned above.
- ii) Proper administering of alum solution and bleaching powder solutions and coagulant aid at raw water channel including transportation of alum and bleaching powder solution, Preparation of alum solution and bleaching powder solution adjusting the flow of alum solution and bleaching powder solution as required, filling the alum solution and bleaching solution and replacement of pipes provided for carrying the alum solution.

FLASH MIXER :

Maintaining electrical / mechanical equipments used for flash mixer alongwith its day to day use for satisfactory performance of the flash mixer. Desludging of the flash mixer, whenever required. The maintenance of electrical panel board installed for flash mixer in proper and good condition. The Contractor shall replace the various spare parts required for this panel board. The necessary spares shall be procured by the agency.

CLARIFLOCCULATOR :

- i) The Contractor shall maintain electrical mechanical equipments of clariflocculator in proper and good condition. All the replacement to the mechanical / electrical equipments of clariflocculator shall be done by the Contractor at his cost. The periodical electrical / mechanical maintenance for clariflocculator are given in Annexure III.
- ii) The Contractor shall arrange to desludge periodically the clariflocculator such that after bleeding of sludge, clear water will come out through the desludging valve. Under no circumstances the Contractor shall be allowed operations which may cause difficulty in smooth operation of clarifier bridge.
- iii) The Contractor shall operate the flocculating devices in such a way that the flock will be formed in the flocculator zone slowly. All the replacement to the reduction gears, gear oil, electrical driving devices shall be made by the Contractor at his cost including cost of necessary spares gear oil etc.
- iv) Algae growth and removing of impurities from Flocculation zone is to be done time to time.

FILTERS:

The settle water is collected and taken through R.C.C. channel to the various filter beds. The filter beds provided with under drain systems, back washing system with air/water and waste water disposals system.

The maintenance and operation of filter house comprises.

- i) Contractor has to ensure that all valves i.e. inlet, outlet wash water inlet and outlet, waste drain are closed.
- ii) Set the rate setter to zero flow and lower the filter float to its lowest position.
- iii) Open the filter inlet valve to allow the clarified water to flow into the filter beds.
- iv) Allow the water level in the filter beds to reach the top water level.
- v) Open the outlet valve slightly and allow the controller float to rise and close the outlet control valve.
- vi) Set the rate setter to designed flow through the filters.
- vii) Open the outlet valves completely.
- viii) As the filter is put into operation, the head loss goes on increasing from the initial 20 c.m. as more solids are retained.
- ix) When the loss of head reaches 1.8 mtr or the filter run reaches 24 hours (whichever is earlier) the Contractor has to back wash the filter as per the procedure laid down in the manual kept in the water treatment plant. The Contractor shall get acquainted with this manual as he has to perform various functions in accordance with water treatment manual.
- x) The air blowers and back washing pumping sets shall be kept in good and proper condition by the contractor at his cost. Minor repairs by replacement of spare parts with regular operation and periodical maintenance shall have to be carried out by the contractor at his cost whenever required.
- xi) The devices such as venturi meter, loss of head indicators and rate of filter flow indicator shall be kept in working condition whenever required minor repairs by replacement of the spares should be done by the contractor at his cost.
- xii) There shall be no leakages through any valves provided for filter inlet, filter outlet and waste water outlet etc. Whenever, there are leakages, they shall be rectified immediately by the contractor at his cost.
- xiii) The filter beds are open to sky and therefore there will be algae growth on walls and channels. These are to be removed periodically and also filter sand raking by mechanical means/ manually are to be done from time to time.

- xiv) It is the responsibility of contractor to maintain the proper level of filter sand in the filter bed by addition of approved grade of Godra River sand in required quantity. It is his responsibility to keep sufficient quantity of sand in stock, for this purpose at his cost.
- xv) It is required that contractor should check uniformity coefficient (UC) of sand / gravel for WTP at Arvi and Warwanti, at the beginning of contract. Besides this the contractor shall check the U.C. at all WTPs after period of three years. If U.C. is observed to be less than required, the necessary corrective actions shall be taken by the contractor immediately at his cost with prior intimation to MJP. The decision of Executive Engineer, MJP with regards proper grade will be final and binding.

D) CHLORINATION:

- i) The chlorinators shall be always kept in working condition. The spares required for replacement shall be kept in ready stock by the contractor.
- ii) For disinfection, the chlorine tonner having 900 Kg. chlorine gas is being utilized. these empty tonners will be available at W.T.P. site. These tonners shall get refilled by contractor at his cost. These tonners will have to be connected to the chlorinator plant by the contractor. The necessary precautions to avoid the accidents due to leakages of chlorine gas will have to be observed by the Contractor. The contractor shall have to observe the rules and regulations laid by explosive department of Government of India. In respect of operation and maintenance of chlorine gas tonners.
- iii) The contractor shall fix an agency who is specialized in the filed of chlorination and chlorination system / equipment. For annual maintenance. The agency shall enter in to agreement. This agency shall be got approved from MJP within a month from the date of workorder. The terms of Annual Maintenance Contract (AMC) shall be decided by the contractor. The AMC agency should visit at least once in a month to the work site. In addition to that the AMC agency shall attend the site as and when called and during problem arises. In case, if contractor intents to employ skilled persons for chlorination instead of fixing the agency, the same person shall be interviewed and got approved from MJP, before his employment. His experience certificate and qualification should be submitted to MJP.

(E) CHEMICAL HOUSE & ADMINISTRATIVE BLOCK :

The operation and maintenance of chemical house and administrative block comprises.

Alumina ferric (Grade-I IS 299 of 1989 (IV) Revision)) in the form of cakes / blocks / crushed pieces and T.C.L. 34% available chlorine, I.S. 1065 of 1989 (second revision) in powder form in bags will be brought by the contractor at his cost as per availability in market. The handling of these chemicals should be done in required fashion by contractor. Before use desired strength solution of alum and T.C.L. are to be prepared in tanks and dosing of these are to be economically on the basis of laboratory test results, neatness and cleanliness is a must in handling these chemicals without wastage. Coagulant aid as per suggestions given by chief chemist after conducting proper testing should be used.

The contractor has to provide, use and maintain account of consumption of alum, chlorine, coagulant aid, lime and bleaching powder. The consumption of alum and bleaching powder shall be worked out from dose of alum/bleaching powder solution - quantity of water treated by alum/bleaching powder solution.

(F) PLANT MONITORING :

The contractor has to maintain the laboratory. All the glass wares, chemicals and sundry materials required for satisfactory running of the laboratory shall be provided by contractor at his cost. The contractor has to maintain the account of various material consumed by him on performing various tests in the laboratory. He shall maintain the record register in prescribed format for various parameters as indicated below :-

(a) TURBIDITY :

- i) Raw Water.
- ii) Settled water.
- iii) Filtered Water.
- iv) Pure Water.

(b) PH -

- i) Raw Water
- ii) Settled Water.
- iii) Filtered Water.
- iv) Pure Water.

- (c) Dose of alum solution on the basis of Jar Test.
- (d) Dose of bleaching powder solution.
- (e) Chlorine dose to the filter water.

- (f) Trial alum dose for day to day Conductivity of Water.
- (g) Conductivity of water.
 - i) Raw Water.
 - ii) Settled Water.
 - iii) Filtered Water.
 - iv) Pure Water.

The contractor has to arrange for periodical water sampling at head works, W.T.P, M.B.R., ESR and distribution system for chemical and bacteriological analysis. The sampling for chemical analysis and the sampling for bacteriological analysis shall be as per annexure attached. The contractor shall have to bear the cost of taking samples, transporting to District Public, Health Laboratory and delivering the samples to the in-charge of laboratory.

Charges of the testing shall be borne by contractor. Chemicals like alum, chlorine gas tonners, bleaching powder, alum coagulant and chemicals required for laboratory, testing and preparation of standard solutions will be Contractor's responsibility.

The laboratory is well established at Harangul W.T.P. contractor is required to employ one chief chemist as in-charge of this laboratory wherein all testing connected to water shall be conducted in addition to water sample testing at District Laboratory.

(G) PURE WATER SUMP & PUMP HOUSE :

The operation and maintenance of pure water sump and pump house comprises :-

- i) The contractor has to maintain all the civil works in proper and good condition.
- ii) The contractor has to arrange to clean the C.C.T. and pure water sump as and when felt necessary to the Executive Engineer.
- iii) The contractor has to keep a watch on overflowing of pure water sump under no circumstances the pure water sump shall be allowed to over flow. If such overflow takes place the contractor shall have to bear the cost of damages caused to the surrounding properties under the influence where this overflow water spreads.
- iv) Pure water sump has been provided with central ventilation arrangements. The contractor has to maintain this ventilator in clean and good condition.

(H) RECIRCULATION SUMP (At Harangul W.T.P.) :

The waste discharge from filter and clariflocculator is let into this sump in order to recycle and reuse. Agency has to remove the choke up of pipelines used for

recycling purpose. Contractor should take necessary care to keep recirculation arrangement in operation / in working condition all the time. In unavoidable circumstances wash water shall flow in normal drain.

(I) AREA LIGHTING :

The premises of various works under this contract are provided with mercury / sodium vapour lamps and florescent tubes. Also ceiling fans / exhaust fans are provided inside the various structures under this contract.

The operation and maintenance of area Lighting etc. comprises...

- i) Daily on-off operation and routine cleaning of mercury / sodium vapour lamps and florescent tubes, ceiling fans/ exhaust fans above cited electric fittings.
- ii) All the above cited electric fittings shall be in working condition. The Contractor has to remove all the electrical defects for satisfactory performance of the above cited electric fittings, on priority at his cost. Earthing to the electrical installation shall be kept in working condition.
- iii) Greasing/oiling rewinding replacement of bearing and jointing to ceiling fans/exhaust fans shall be carried by contractor at his cost.

(J) GARDENING ETC. :

MJP desires to develop gardens at all W.T.P. Nagzari / Sai Head Works, M.B.R., E.S.R. and proposed to develop garden / lawns and plantation in above cited premises. The contractors shall employ one Mali for above purpose. The equipments required for maintenance of garden and lawns shall be provided by the contractor at his cost. The scope of gardening work includes development of gardens at Harangul WTP, Warwanti WTP & Sai WTP. The approximate area to be developed are as below.

- i) At Harangul WTP 6900 Sqm.
- ii) At Warwati WTP 4014 Sqm
- iii) At Sai WTP 600 Sqm.

Required piping, spraying etc. shall be provided by the Contractor at his cost. Required plants / seeds / manure / fertilizers will be supplied by contractor at his cost.

General requirements

- i) The item also includes sweeping, cleaning and washing all floor areas of all structures such as pump house, W.T.P., E.S.R. staff quarters campus and other building and all fenced area under this contract including cleaning walls, ceilings, ladder, window glasses pumping machineries, railings, panels etc.

- ii) The cleaning material such as brushes, brooms, kharata, dusters, washing solution, detergent, phenyl, air freshener, toilet soap, etc. shall be provided by contractor at his cost.

All toilets and bathroom shall be kept clean, washed daily by using sanitary solutions and air fresheners at the Contractor's cost.

- iii) All other electrical and mechanical equipment which are part and parcel of the works covered in this contract but not mentioned in this tender may be deemed to be included under the scope of this contract. The contractor has to operate and maintains all such electrical mechanical equipment as per relevant standards and as directed by Executive Engineer.

iv) The item also includes providing following facilities etc. to the workmen deployed:-

- a) One apron to each Chemist, two pair of Hand gloves at pumping station for Pump Operators and two pair of Hand gloves and gumboots at each Water Treatment plant one for pump house and one for electrician. The hand gloves should be suitable for 33 KV. At least six pairs of hand gloves and gumboots should be provided in Chemical house for handling of alum. These should be provided immediately from the date of taking the work of operation and maintenance.

v) The item also includes:-

- (a) Cleaning of stilling chamber, flash mixers, clariflocculators by emptying it before and after monsoon.
- (b) Algae removal from walls of stilling chamber, flume channel, flash mixer, settle water channel, clariflocculators, filters as and when instructed by the Executive Engineer.
- (c) Racking and mechanical mixing of filter media sand, with T.C.L. if required, also as and when instructed by Executive Engineer.
- (d) Removing and disposing shrubs from the premises of Pump House at all head works and water treatment plant, M.B.R. at Harangul and all ESRs as and when instructed by Executive Engineer.

(vi) The item also includes:-

- (a) To calculate the power factor at all pumping stations.
- (b) Weekly power factor duly signed by Resident Engineer, & report should be submitted on every month in the office of Executive Engineer MJP.
- (c) If power factor goes below 0.95 then the same should be corrected immediately by taking necessary action. The contractor will be responsible for any penalty towards P.F.

(vii) The item also includes:-

- 1) Providing cleaning consumable each month at each pumping station.

- 2) Providing cleaning consumable each month at each Water Treatment plant.
- 3) Providing tools and tackles for operation and maintenance at all pumping stations.
- 4) Providing, tools and tackles for Operation & Maintenance at all W.T.P's. Contractor shall have at his disposal the cleaning material, tools and tackles.

The tools and tackles listed in annexure are to be procured and made available at site of work by the Contractor.

The tools shall be kept on the plant in the custody of Resident Engineer for all the 24 Hours and in any case no tool shall be taken out of plant.

The list of tools given in Schedule C is bare minimum and it is the responsibility of the contractor to provide additional / special tools if required for tendered work, as required from time to time.

It is the responsibility of the Contractor to keep safe custody of tools,. Maharashtra Jeevan Pradhikaran will not take any responsibility against theft, damage etc.

O -1 OPERATION REQUIRED FOR VARIOUS UNITS
OF WATER TREATMENT PLANT

UNIT OPERATION:

These unit operation processes are designed/ designated for 80 mld WTP at Harangul (BK). At the other WTPs viz. Arvi and Warwanti the unit operation processes may be slightly different depending on specific aspects of the plants.

- A) Aeration fountain Vee Notch etc.
- B) Flow Measurement
- C) Flash Mixing
- D) Flocculation and sedimentation
- E) Filtration
- F) Chlorination

UNIT OPERATION -

A) Aeration Fountain

Function: To act as a receiving point for the pumped Raw Water.

Operation: Drain daily in monsoon season and weekly in fair season.

B) Flow Measurement / Flow Meter -

Function: To measure the flow coming to the plant locally at the flume channel and to record and integrate the flow.

Specification: Mechanically operated flow meter with flow indication on dial gauge.

Operation: Drain stilling chamber once a week.

C) Flash Mixing with Motor and Reduction Gear Box -

Function: To enable rapid dissolution of the coagulants into the raw water, as intimate mixing of the coagulants is required for this purpose mechanical mixing is provided.

Specification: Sixty seconds detention period of the design flow of 927.77 Liter /Sec. Two flash mixer chambers of equal capacity are provided. The shaft of mixer is of stainless steel.

Description :

Flash mixer of cubic meters to dealt with a flow of 927.77 Liter/Sec.

To enable the Flash Mixer to be by passed to enable routine maintenance on the equipment a bypass channel is provided alongside. Gates are provided to divert the flow either to the Flash Mixers or to the by pass channel and then to filters.

For uniform distribution of the flow to the clariflocculator equal length pipelines are taken to the Clariflocculators.

D) CLARIFLOCCULATOR: Two units

Function: To obtain gentle flocculation of the chemically dosed water, so as to agglomerate the flocs into a large size followed by the precipitation of the same in the sedimentation chamber, thus enabling clear liquid to flow to the Filters.

Specification: One Unit with the following design criteria at a flow of Liters/Sec/

Flocculation period -	30 Minutes.
Sedimentation period -	150 Minutes
Overflow rate -	$33.37 \text{ M}^3 / \text{M}^2 / \text{Day}$.
Weir Rate -	$296.58 \text{ M}^3 / \text{R.M.} / \text{Day}$.

Description : One RCC circular tank with launder outside, of 43 meter diameter x 3.5 Meters side water depth with flocculation chamber 17.5 Meter diameter.

- * Floor slope of 1:12
 - * Sludge pocket at center with 323 mm dia C.I. sludge line discharging pipe.-
 - * Telescopic sludge discharge device to enable visual inspection of sludge accumulation.
 - * Four flocculator paddles, two mounted on a cross bridge revolving on flocculator wall, two mounted on main bridge revolving on outer wall and central hollow pier.
- Scrapper arm with scrapper blade and squeezers are mounted on main bridge.

Operation: During periods of low turbidity coagulant dose is small and consequently turbid matter settling on floor is less. Sludge may be discharged through telescope valve keeping small level difference between water level in unit and water level in telescopic pipe. Alternately sludge can be discharged from direct valve once in every 12 hours.

During periods of high turbidity, sludge discharged through telescopic valve with greater water level difference. If discharged through direct drain valve, once every four hours.

As quality of sludge discharged from telescopic valve is visible, the setting on the telescopic valve can be adjusted at all times to ensure that clear water is not sent to drain. Bridge should be run only one round prior to desludging. Operation of paddles may be followed depending on the raw water turbidity as shown here under:-

Raw Water Turbidity, Paddle Operation:

Below	100 NTU	No paddle to be operated.
	100-200 NTU	One paddle to be operated.
More than	200 NTU	Two paddles to be operated.

However, the above operation may be modified according to the condition of turbidity.

E) FILTRATION:

Function: To remove all turbidity and suspended solids from the settled water.

- To reduce bacterial load.

Specification: 10 filter beds designed for a flow through rate of 6000 Lit/sq.mtr / hours.

- Sand 750 mm depth.

- Gravel depth of 600 mm i.e. total 1350 mm depth.

- A.C. Laterals in under drain system. Backwash water at a rate of 33.75 Cum/Min per filter bed.

- Airwash capacity with standby at a rate of 2025 Cum/Hr. per square meter filter area.

Description : 10 filter beds each of size 56.25 square meters giving a flow through rate of 6 m³/ hours with 80 mm dia A. C. laterals with 8 mm dia at 120 mm c/c holes at bottom 6 mm dia at 300 mm c/c holes at top.

- Quartz sand of 750 mm depth.

- Gravel graded in four layers of total depth 600 mm.

- Rate of flow and loss of head gauges for each filter.

- Double flanged control valve for each filter.

- Two air blowers each of 2025 m³ / hours. Complete range of filter piping and valves. One working at a time other standby.

- Two wash water pump sets of 50 m³ / hours at 15 m. head.

Operation: Settled water enters the filters through the settled water channel running along both sides of the filters. It then enters the main trough and cross trough and falls on the sand. It filters through the sand and gravel and collected by the under drain pipes and is led to the pure water channel via the controller chamber, as the sediment starts depositing on the sand the resistance to filtration builds up. This resistance is recorded by the loss of head gauge when the loss of head reaches 1.80 meters the filter is to be backwashed. Under normal operation, the following is the position of the valves / gates.

- Inlet gate open

- Outlet valve open

- Backwash valve closed

- Backwash water valve closed
- Air valve closed

Backwashing of the filters is done by:

Blowing air under pressure through the underdrain and thus loosening the bed.

Forcing water after air blowing is completed through the underdrains, thus introducing a scrubbing action of the sand grains which frees the dirty matter. This dirty matter is then lifted by the rising water into the water trough from where it goes to the final disposal point.

During backwash operation the following is the position of valves / gates.

Inlet valve	- Closed
Outlet valve	- Closed
Air Valve	- Open.
Backwash valve	- Open
Dirty water valve	- Open

The suggested time for backwash and filter return to operation Air wash – 5 min and hard wash – 10 min.

CAUTION: Before initiating a backwash cycle raise the float in the filter which is connected to the controllers.

Before restarting filter kindly ensure that the air release cocks on air line are opened and all trapped air removed.

F) CHEMICAL DOSING -

a) Alum Dosing: Tanks, 3 working, 3 standby

Function: To act as a coagulant in the water to facilitate rapid formation of floc to enable proper settling of all impurities.

Specification: Three alum solution tanks capable of a continuous dose rate of 30 mg / l. For a flow rate of 927.77 l./ sec. At a concentration of 10% each tank is to be lined with three coats of epoxy treatment and provided with constant dosing apparatus.

- Two constant head tanks.
- Two rotameters.

Other facilities

- One tonne capacity hoist.
- One lifting pan.
- One weighing platform of 1000Kg Capacity.

Each tank is equipped with a stainless steel agitator, outlet pipe from tanks to constant head and to dosing points.

Operation: Depending on the dose finalized after laboratory tests the requisite amount of alum solution is to be added to the water. Required quantity of alum to be added.

- The tank to be filled with water and the mixers started, mixing is to be done till the entire contents are homogenous.

In the fair season a dose of 25 - 30 mg/ lit. is estimated and in the monsoon season a dose of 40-60 mg/ lit. is estimated.

- a) TCL dosing, Lime dosing
- b) Chlorine Dosing:

Function: The function of chlorine dosing is.

- a) To act as killer of algae in raw water, when it is dosed for prechlorination.
- b) To kill all bacteria in filtered water when it is dosed for post chlorination.

Specification: Vacuum type chlorinator each of 5 mg/l capacity sufficient for designed flow.

Description: The chlorine dosing system comprise of:

- 4 Vacuum type chlorinators each of 15 Kg/hr. capacity and out of four 2 Number are for pre chlorination and other two for post chlorination. For pre & post one chlorinator will remain standby.
- Panels with reading gauges. .
- Necessary piping for carrying solution.
- Necessary piping up to dosing points.

Operation: Post chlorination is required all throughout the year on all days. The dose is to be determined such that residual chlorine of about 4 mg/l would be available at all times in the water leaving the plant. For this purpose sample of water are collected in beakers and dosed with varying quantities of chlorine solution. The samples are then analyzed for residual chlorine after 30 minutes time interval. That dose is maintained which shows not less than 4 mg/litre residual chlorine at plant area.

The table below gives the setting required on chlorinator panel for a dose determined after trial for a design flow.

Note: In addition to above all other works required to be carried out for smooth operation of W.T.P. are deemed to be included in this schedule.

Dose mg/ litre	Setting required to be done on chlorinator panel kgm/ hour.
0.7	1.84
0.8	2.10
0.9	2.36
1.0	2.63
1.2	3.15
1.4	3.68
1.6	4.20
1.8	4.73
2.0	5.25
3.0	7.80
4.0	10.52
5.0	13.14

Annexure I-A**LIST OF SUB-WORKS OF LATUR WATER SUPPLY SCHEME TO BE MAINTAINED BY THE CONTRACTOR**

The contractor has to maintain following subworks of Latur Water Supply Scheme.

A) Dhanegaon Dam Source**I] Head works**

1. Approach Channel: - Length 660 Rmt. Maximum depth 8 mtr.
2. Intake well: - 1 No. size – 6m x 4m Elliptical shape.
3. Inspection well: - 2 Nos. – 6m x 2m Elliptical shape.
4. Connecting pipes: - Total length 92.50 mtr. 1800 mm dia 2 Nos. RCC pipes & 1.5m x 1.5m RCC box conduit.
5. Jack well: - 6.35 x 17.15m Elliptical shapes. Depth 21.50 m.
6. Pump house: - 11.50 x 23.5 m. height 10.75 m.
7. Raw water pumps: - 700 HP V.T. pumps 3 Nos. (2 + 1)
8. Raw water rising main: - 965 mm dia M.S. pipes 9.5 mm thick, length = 4250 m.
9. Break pressure shaft: - Internal Dia. - 950 mm dia
M.S. pipes height = 15.52 mtr. Outer dia. = 1500 mm dia.
M.S. pipes height = 17.00 mtr.
10. Raw water gravity main :- from BPT @ Dhaba Pati to Harangul WTP, Warwanti WTP & Sai WTP. 1219 mm dia M.S. pipes 7.9 mm thick, L. = 44.40 km. . 1118 mm dia M.S. pipes 7.9 mm thick, L. = 3.10 km. 610 mm dia M.S. pipes 7.9 mm thick, L. = 2.65 km. and 500 mm dia D.I.K-7 pipes L = 5.25 km.
11. WTP :- Capacity 80 MLD at Harangul
12. Pure Water pumps: - 442 HP V.T. pumps 3 Nos. (2 + 1)
13. Pure water rising main: - 762 mm dia M.S. pipes 9.5 mm thick L= 1.35 km.
14. MBR :- 2 Nos. Capacity 31.25 Lack Lit. each
15. Pure water gravity main: - 1158, 1118, & 1016 mm dia M.S. pipe line 7.9 mm thick Total L= 10. km. from MBR to Gandhi chowk. 610, 559, 457 Length 2.59 km M.S. pipe gravity main from Gandhi Chowk to Nanded Naka ESR. 457 and 323.90 mm dia M.S. pipe gravity main from Shivaji Chowk to Sarswati colony & Basweshwar Colony ESR Length 1.8 km

B) Nagazari weir source

- 1) KT weir on manjra river
- 2) Intake works :- Intake well 3mtr. Dia connecting pipes 700 mm dia L=57 m
- 3) Raw water pumps :- 250 HP V.T. Pumps 2 Nos. with 11 kv / 0.433 kv substation with accessories and 315 kVA transformer = 2 Nos. with panel board etc.
- 4) Raw water rising main :- 600 mm dia CILA Class, L=5160 m
- 5) WTP :- Capacity 19.20 MLD at Warwanti
- 6) Pure water pumps at Warwanti WTP, 350 HP C/F pumps 2 Nos., 500 kVA transformers 2 Nos., 11/0.433 kv substation with accessories.

- 7) Pure water rising main :- 600 mm dia CIA class , L= 4700 m.
- 8) RCC ESR at MJP office :- Capacity 14 Lakh Ltr.
- 9) Pure water gravity main from MJP office to Gandhi chowk GSR :- 600 mm dia BWSC & 600 mm dia M.S. pipes L= 3 km.

C) Sai weir source

- 1) KT weir on manjra river :- L=52.20 mtr.
- 2) Intake works :- 8' ft. Dia, CR Masonry. 45' Depth
- 3) Raw water pumps :- 150 HP Centrifugal pumps 2 Nos. and 35 HP V.T. pumps 2 Nos. with 200 kVA transformer 2 Nos. with 11 / 0.433 kv substation with accessories, panel board starter etc.
- 4) Raw water rising main :- 450 mm dia CI pipe line L= 6.075 km
- 5) WTP :- Capacity 9.84 MLD at Arvi Road.
- 6) Pure water Pumping machinery :- 150 HP C/F Pumps 2 Nos. with 1 No. of 200 kVA transformer with 11/0.433 kv substation with accessories, panel board starter etc.
- 7) Pure water rising main from Arvi Road WTP to GSR at Gandhi Chowk :- 450 mm dia CI pipe line L=2575 mtr.

D) Other works in town

- 1] Following RCC ESR's / GSR's
 - i) RCC ESR at Government quarters Capacity 21 Lakh Liters
 - ii) RCC ESR at Sarswati Colony Capacity 41 lakh liters.
 - iii) RCC ESR at Basweshwar Colony Capacity 21 lakh liters.
 - iv) RCC ESR at Ambejogai Road Capacity 35 Lakh liters.
 - v) RCC ESR at Rajdhani Hotel Capacity 21 Lakh liters.
 - vi) RCC ESR at Gandhi Chouk Capacity 18 lakh liters.
 - vii) GSR at Gandhi Chouk Capacity 22.72 lakh liters.
 - viii) RCC ESR at Dalda Factory Capacity 17 lakh liters.
 - ix) RCC ESR at Nanded Naka Capacity 14 Lakh liters (old).
 - x) RCC ESR at Nanded Naka Capacity 40 Lakh liters (new).

2] DISTRIBUTION SYSTEM

Distribution system comprising of 600 mm dia. to 80 mm dia. CI / DI / AC/ RCC pipes of approximate total length 476 km.

ANNEXURE I-B**LIST OF MECHANICAL & ELECTRICAL COMPONENTS TO BE MAINTAINED.****1) HEAD WORK DHANEGAON****(A) Sub-Station:-**

- | | | | |
|-----|---|----|-------------------------------|
| (1) | HT transformers - 33 kv/3.3 kv-2500 kva | :- | 2 Nos. |
| (2) | LT transformers - 3.3/0.433 kv-100 kva | :- | 2 Nos. |
| (3) | Two pole structure | :- | 1 No. |
| | a) 33 kv-GOD-I set | :- | 1 set |
| | b) 33kv-D.O. fuses - | :- | 1 set |
| | c) 33 kv- Lightning arrestor | :- | 1 Set (3 Nos.) |
| | d) 33kv- Disc insulators | :- | 3 nos |
| | e) 33kv- Pin insulators | :- | 6 nos |
| 4) | a) 33kv H.T. cable-I85 sqmm -XLPE (E)
(MSEB incoming to 33kv VCB panel in sub station. | :- | 75 Mtr. |
| | b) 33kv H.T. Cable kits & Lugs | :- | 6 nos kits and 18 no.
lugs |
| 5) | 33 kv VCB panel- 3 Nos. (in sub station)
& Isolator panels - | :- | 2 Sets (3 VCB in
each) |
| 6) | 3 KV A UPS-System for 33 KV-
VCB panel with Batteries | :- | 2 Nos. |
| 7) | Earthing plate type- | :- | 50 Nos. |
| 8) | H.T. Capacitors in sub station | :- | 100 kVAR – 4 Nos. |

(B) Raw Water Pump House

- | | | | |
|----|--|----|--------|
| a) | V.T. Pumps - WPIL make | :- | 3 Nos. |
| | Water lubricated Q- 473 Ips, H-77 mtrs.
HP-700 No. of stages-5 | :- | |
| | With Bronze impellers, stainless steel shaft, | | |
| b) | 3.3 KV VSS motors | :- | 3 Nos. |
| | HP - 700 HP, KW-510, Make- Alstom | | |
| c) | Sluice valves cast steel- 500 mm dia | :- | 3 Nos. |
| | PN 1.6 double flanged with actuators
Make- Mayur | | |
| d) | Non-return valves- Cast Steel- 500 mm dia | :- | 3 Nos. |
| | PN 1.6 double flanged, | | |
| e) | Butterfly Valves | | |
| | i) 500 mm dia, PN 1.6, Cast steel, | :- | 3 Nos. |
| | ii) 900 mm dia, PN 1.6, Cast steel | :- | 1 Nos. |
| f) | M.S. D/F pipes & specials - 500 mm. dia | | |
| g) | M.S. D/F dismantling joints.
500 mm dia 30 kg/cm2 test pressure | :- | 3 Nos. |

- h) Kinetic Air Valves with cast steel sluice valves- 100 mm dia PN 1.6 :- 3 Nos.
- i) EOT crane for lifting machinery Capacity -**10 MT** :- 1 No.
Make- Hercules with Travelling Trolley- 10 MT,
Chain pulley block- 10 MT, Longitudinal Travel - 23 mtr.
- j) Remote metering & scanner panel (Control panel)
- k) 3.3 KV motor control switch gear panel (feeder panel) :- 1 No.
- l) 440 Volt. L.T. panel board :- 1 No.
- m) All HT/ and LT cables power cable & accessories i.e. cable kits etc. :- 1 lot
- n) Control cable and their accessories like lugs etc.
- o) Capacitors :- 100 KVAR :- 4 Nos.
- p) Fire fighting system :- lot
- q) Internal & External electrification and ventilation arrangement.

2) Water Treatment plant @ Harangul

Capacity - 80 MLD

Type- Conventional

a) Sub station -

- 1) HT Transformer 33 KV / 3.3 KV-1600 KV A :- 2 Nos.
- 2) LT Transformer 3.3 / 0.433 KV-315 KV A :- 2 Nos.
- 3) Two pole structure with 33 KV GOD DO Fuses, lightning arrestor, Disc insulators, pin insulators etc. :- 1 set.
- 4) a) 33 KV x 185 sq.mm HT XLPE cable from MSEB two pole structure :-40 m
b) 33 KV HT cable kit.
- 5) 33 KV VCB panel in sub station :- 6 Nos.
33 KV and 3.3 KV isolator panel in sub station.
- 6) 3 KV A UPS-System for 33 KV VCB panel with Batteries - 2 sets.
- 7) Plate type earthing :- 50 nos
- 8) HT Capacitors in sub station 100 KVAR :- 4 Nos.

B) Pure Water Pumping Machinery

- a) Water lubricated VT Pump make-WPIL Q-312lps H-67mtr stages- 3 Nos. with bronze impellers S/S shaft. :- 3 nos
- b) 3.3kv VSS motors- HP-442, kw-330 Make-Alstom :- 3 nos
- c) Sluice valves cast steel- 400 mm dia PN 1.60 double flanged with actuators :- 3 Nos.
- d) Non-return valves- Cast Steel- 400 mm dia PN 1.60 double flanged, :- 3 Nos.
- e) Butterfly Valves
i) 400 mm dia , PN 1.6 Cast steel- :- 3 Nos.
ii) 750 mm Dia, PN 1.6, Cast steel, :- 1 No.
- f) M.S. D/F pipes & specials - 400 mm dia :- Job

- M.S. D/F dissmantalling Joints :- 3 Nos.
 400 mm dia /30kg/cm2 test pressure
- g) Kinetic Air Valves with cast steel sluice valves- 100 mm
 dia PN 1.60 : 3 Nos.
- h) EOT crane for lifting machinery Capacity-7.M. T
 Make- Hercules with Travelling Trolley- 7.5 MT,
 Chain pulley block. :- 1 No.
- i) Remote metering & scanner panel (Control panel) :1 No.
- j) 3.3 KV motor control switch gear panel (feeder panel) :- 1 No.
- k) 440 Volt. L.T. panel board :- 1 No.
- l) All HT/ and LT cables power cable & accessories
 i.e. cable kits etc.
- m) Control cable and accessories :- lot
- n) H.T. Capacitors:-100 KVAR :- 4 Nos.
- o) Fire fighting system.
- p) Internal & External electrification and ventilation arrangement.

3) ELECTRICAL / MECHANICAL EQUIPMENTS MACHINERY at 80 MLD WTP

D) Flow meter

- D) Flow meter** :- 1 No.
- i) MS gate of WTP :- 13 Nos.
- (i) Flash mixer -20 HP :- 1 No.
 with gear box, stainless steel shaft, stainless steel
 blades with L T control panel etc. :- 1 No.
- (ii) Clari flocculators :- 2 Nos.
- a) Flocculator agitators 3 HP x4 Nos.
 x 2 flocculators :- 8 Nos.
 with MS shafts & MS blades.
- b) Bridge motor - 3 HP :- 2 Nos
 (1 No. x 2 clari fire) with gear box chain etc.
- c) MS fabricated bridge with rails, walkway
 Scraper blades, rubbers etc. :-2 nos
- (iii) LT control panel for controlling flocculator :- 2 Nos.
 Motor and bridge motor.
- (iv) Filters** :- 10 Nos.
- a) Filter media of gravels.
- b) Laterals and manifold.
- c) Pipe gallery with sluice valves, etc.
- d) Air piping with sluice valves and reflux valves.
- e) Loss of head indicators.
- f) Flow rate controller.
- (v) Wash water pump and accessories**
- a) Centrifugal coupled pump -40 HP :- 2 Nos.
 with MS D/F piping sluice valves, Reflux valves
 & LT panel board with vacuum pumps -2 Nos. 5 HP

(vi) Air blower- with 50 HP motor with sluice valve :- 2 sets.

Reflux valve piping & L T Panel board

(vii) Chlorination Arrangement/panel etc.

- a) Alum tanks :- 6 Nos.
Electrically operated agitators 1 HP with
Gear box, stainless steel shafts & blades with
LT control panel board with PVC piping & vales.
- b) TCL tank- :- 4 Nos.
Electrically operated agitators 1 HP
with Gear box, stainless steel shafts & blades
with LT control panel board with PVC piping
& Valves.
- c) Lime tanks with gear box & motor etc. :- 2 nos
- d) Alum lifting arrangement with chain pulley block Cap. :- 1 No.
- e) weighing balancing machine. :- 1 no.

(viii) Chlorinator -

Chlorine tonner 900kg - 9 Nos.

CL panel - 4 Nos.

Chlorinator with booster motor pumpset

Panel make Aqua guard

Chlorine Panel 2 working + 2 stand by

(2 working + 2 stand by) with lifting arrangement
for chlorine tonners.**(ix) Internal & External electrification of WTP****(x) Tools & furniture****(xi) Lab equipments****(xii) Fire fighting arrangement****(xiii) Drainage arrangement of WTP :-****4) LIST OF PUMPING MACHINERY INSTALLED AT NAGZARI**

List of components to be maintained

- 1) K.T. weir with gates
 - 2) HT Sub-station : 11kV / 0.433 kV
 1. LT transformer – 11/0.433 kV – 315 KVA : 2 No.
(1 running + 1 Standby)
 2. Two pole structure : 2 Nos.
with accessories as :
 - a) 11 kV – AB switch.
 - b) 11 kV – Do fuses
 - c) 11 kV – Lightening arrestors.
 - d) 11 kV – Disc insulators.
 - e) 11 kV – Pin insulators.
- 3 Core x 185 sqmm. HT XLPE cable for incoming supply.
a) 1.1 kV LT cable 400 Sq.mm. Aluminum Armoured.

- Two cables from each transformers up to incomer of OCB 800 Amp. Easun make in substation panel.
- 3) Cable from OCB in substation to main incomer OCB in pump house.
1 core x 240 sq.mm. Aluminum armoured cables – 90 m.
 - 4) Incomer 800 Amp. OCB Easun make – 1 No.
 - 5) 600 Amp. OCB Easun make for each pump set – 2 No.
 - 6) Pannel board suitable for 250 HP VT pumps with 200 Amp. SFU 125 Amp. SFU and change over switch for incomer busbar wiring etc complete with all switches. – 1 No.
 - 7) Capacitors 5 KVAR x 5 Nos. x 6 Unit. = 150 KVAR
 - 8) 250 HP ATS starters = 2 Nos.
 - 9) 250 HP VT pumps = 2 Nos. (1+1)
 - 10) Pressure gauges 150 mm dia range = 0 - 17.5 kg/cm² = 2 Nos.
 - 11) 300 mm dia sluice valves (IVI – make) = 2 Nos.
 - 12) 300 mm dia reflux valve (IVI – make) = 2 Nos.
 - 13) 250 HP VHS motors = 2 Nos.
 - 16) MS pipes & specials for all pumps = Lot.
 - 17) 5 MT HOT crane with 5 MT CP block = 1 set
All above are installed with necessary earthings, safety equipments, internal & external electrification.
 - 18) Lifting arrangement for KT weir gates with traveling gantry with CP block

5) LIST OF PUMPING MACHINERY INSTALLED AT WARWANTI 19.2 MLD WTP.

List of Components to be maintained

- 1) Substation 11 / 0.433 kV with 630 kVA transformer – 2 Nos. (1+1) with 2 Nos. of two pole structures with accessories as under :
 - a) AB switches
 - b) DO – sets
 - c) Lightning arrestors.
 - d) Disc insulators
 - e) Pin insulators & busbar etc.
- 2) 3 core x 185 sq.mm. XLPE cable for incoming supply.
- 3) Cable from OCB in substation to main incomer OCB in pump house.
1C x 630 sq.mm. Aluminum armoured cable – 100 mtr.
1C x 300 sq.mm. Aluminum armoured cable – 40 mtr.
1C x 500 sq.mm. Aluminum armoured cable – 270 mtr.
- 4) 2 Nos. of 800 Amp. OCB Easun make installed for power supply from transformer to OCB's installed in isolating panel in substation.
- 5) 600 Amp. Easun, make OCB – 3 Nos.
- 6) Incoming & outgoing switches, capacitors switches, lighting switch etc. & outgoing connections for WTP. Main panel is equipped with busbars, wiring & 150 kVAR capacitors.
- 7) Slip ring motor starters – 2 Nos. MEI – make, 500 Amp. type N-3 = 2 Nos. suitable for 350 HP.

- 8) Horizontal split casing C / F pump 350 HP M&P make type 8 / 10 CME Head – 65 mtr. Discharge 799.2 m³ / hr. = 2 Nos.
- 9) Pressure gauges range 0 to 17.5 kg / cm² = 2Nos.
- 10) 300 mm dia sluice valves (IVI – make) = 2 Nos.
- 11) 300 mm dia reflux valves (IVI – make) = 2 Nos.
- 12) Motors – 350 HP Slip ring motors make kirloskar = 2 Nos.
- 13) MS pipes & specials for all pumps = Lot.
- 14) HOT crane 3 tonne capacity with CP block = 1 set
- 15) All above with necessary earthings, safety equipments and internal / external electrification.
- 16) DV 40 Vacuum pump make – kirloskar= 2 Set

6) List of components to be maintained at Warwanti 19.2 MLD WTP

- 1) Aeration fountain.
- 2) TCL stirrer mechanism with panel board etc. = 2 Units
- 3) Flash mixer 3 HP with stirrer mechanism with electrical panel board starter etc. = 1 Unit
- 4) Clariflocculator bridge with 4 Nos. of flocculator 2 HP and end carriage mechanism 3 HP = 1 Unit
- 5) Alum mixing system unit with panel board = 1 Nos.
- 6) Lime mixing system with tanks = 2 Nos.
- 7) Wash Water pump sets 15 HP with piping and valves, with pannel board = 2 Nos. (1 + 1)
- 8) Air blowers 25 HP with piping and valve = 2 Nos.
Make gurudit with rotary blower unit pannel board etc = (1+1)
- 9) Filters 3 Nos. x 2 = 6 beds with filter gallery piping valves, filter gates.
- 10) Flow meter.
- 11) Head loss indicators
- 12) Rate of flow indicators.
- 13) 900 kg. Chlorine tonners, with pannels with lifting arrangement etc.
- 14) Internal / External electrification.
- 15) Laboratory with equipments for water sample testing.

7) List of Pumping machinery installed at Sai Head Works.

- 1) K.T. weir with gates
- 2) 11 / 0.433 KV substation = 1 No.
With two pole structure with accessories as :
 - a) AB Switches
 - b) DO – Sets
 - c) Lightening arrestors.
 - d) Disc insulators
 - e) Pin insulators and busbar etc.
- 3) 300 kVA Pactil make transformers = 2 Nos.
- 4) In coming power supply cable from Transformer to 600 Amp OCB - 1 No.
- 5) Incoming power supply cable from above main OCB to main panel board for 150 HP C/F pumps and 35 HP VT pumps.

- 6) Main panel board suitable for 150 HP C/F pump sets with incoming 400 A OCB outgoing switches and capacitor etc.– 1 No.
- 8) Main panel board suitable for 35 HP VT pumps with required switches capacitors etc. = 1 No.
- 9) 2 Nos. of 150 HP C/F coupled pump sets make jyoti total three number (1 No. old) out of above only one pump running other stand by
- 10) ATS starters suitable for 150 HP pumps total 3 Nos. (1 No. old) = 3 Nos.
- 11) VT pumps 35 HP oil lubricated = 2 Nos.
- 12) Vacuum pump sets = 2 Nos.
- 13) All above installations are with earthing, safety equipment and Internal / external electrification.

8) List of Pumping machinery at Arvi Booster 9.84 MLD WTP.

- 1) 11 KV Two pole structure for incoming power supply with :
 - a) AB switches
 - b) DO sets
 - c) Lightening arrestors
 - d) Disc insulators
 - e) Pin insulators and busbars etc.
- 2) 200 KVA pactil make transformer = 1 No.
- 3) Cables form Transformer to main panel board in pump house.
- 4) Main panel board suitable for 150 HP C/F pumps with OCB 300 Amp and panel board with incoming & outgoing switches & 60 KVAR capacitors & outgoing connections for Water Treatment Plant = 1 set.
- 5) ATS starter suitable for 150 HP C/F pumps = 2 Nos.
- 6) 150 HP Jyoti make C/F pump sets Type – HSDC, Discharge 6900 LPM, Head – 50 mtr. = 2 Nos.
- 7) Pressure gauge 0 – 17.5 kg/cm² = 2 Nos.
- 8) 250 mm dia sluice valves = 2 Nos.
- 9) 250 mm dia reflux valves = 2 Nos.
- 10) MS pipes and specials = Lot

9) List of components to be maintained at Arvi Booster WTP 9.84 MLD

- 1) Aeration fountain
- 2) Flash Mixer Unit = 1 No. 3 HP with gear box & panel board etc. complete.
- 3) Air Blowers 5 HP = 2 Nos with electric motor panel board starter etc., and with pipes and valves.
- 4) Wash water pumps 5 HP = 2 Nos. with electrical panel board, pipes and valves etc.
- 5) Clariflocculator bridge with two flocculator 2 HP with Stirrer mechanism, end carriage mechanism with gear box and motor etc. complete with panel board etc. = 1 Unit
- 6) Filter 2 Nos. x 2 = 4 beds, with filter under drains and valves
- 7) Alum stirrers = 2 Nos.
- 8) TCL stirrers = 3 Nos.

- 9) Lime stirrers – 2 Nos.
- 10) Panel board for above.
- 11) 900 kg Chlorine tonners with lifting arrangement and pannel.
- 12) Internal / External electrification to plant.

Note:- All materials, items, accessories, components etc. if omitted in the above list but are provided on site of work shall be deemed to be included in the scope for Operation & Maintenance and routine rectification.

ANNEXURE I-C
TIME SCHEDULE FOR MAJOR & MINOR REPAIRS TO BE ATTENDED FOR
MECHANICAL AND ELECTRICAL EQUIPMENTS AT VARIOUS PUMPING
STATIONS.

Sr. No.	Particular of repairs to be attended	Time limit for minor repairs	Time limit for major repairs	Remarks and time limit for repairing of certain items
1	Repairs to V.T. pump * Dhanegaon H/W, *Harungul P/S *Nagzari H/W *Sai H/W	12 Hours	15 Days	Overhauling of pumps- 15 days
2	Repairs to Sluice valve, Reflux Valve and butter fly valves, Air Valves for pump at all P/S	12 Hours	3 Days	
3	Repairs of M.S. pipes and Special for delivery of pumps for welding joints etc.	12 Hours	24 Hours	
4	Repairs to EOT and HOT crane with CP block and trolley	6 Hours	12 Hours	
5	Repairs to HT and LT motors	12 Hours	15 Days	
6	Repairs to Power transformers 33/3.3 Kv, 11/0.4 Kv and 3.3/0.4 Kv	12 Hours	15 Days	
7	Repairs to H.T. substation 33 or 11 Kv, with accessories	12 Hours	24 Hours	
8	Repairs to 33 Kv and 3.3. kv VCB at Dhanegaon and Harngul P/s and all LT panels, Remote and Scanner Panels	12 Hours	15 days	
9	Repairs to HT and LT cables, Joints etc	6 hours	12 Hours	
10	Repairs to HT and LT capacitors	2 Hours	6 Hours	Replace the failed capacitor immediately
11	Repairs to UPS system	2 Hours	6 Hours	

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Sr. No.	Particular of repairs to be attended	Time limit for minor repairs	Time limit for major repairs	Remarks and time limit for repairing of certain items
12	Repairs to Electrification, Fire fighting, and safety equipment	3 Hours	6 Hours	
13	Repairs to / Replacement of Pressure gauge	1 Hour	4 Hours	
14	Repairs to all type of starters	2 Hours	4 Hours	
15	Repairs to OCB	2 Hours	8 Hours	
16	Repairs to Vacuum Pump Set.	2 Hours	12 Hours	

Note: - The time limits mentioned above are indicative, however observing the urgency and site situation Executive Engineer may instruct the time limit for completion of various repairs and it will be binding on Contractor.

ANNEXURE I-D
TIME SCHEDULE FOR MAJOR & MINOR REPAIRS TO BE ATTENDED FOR
MECHANICAL AND ELECTRICAL EQUIPMENTS AT VARIOUS WTP.

Sr. No.	Particular of repairs to be attended	Time limit for minor repairs	Time limit for major repairs	Remarks and time limit for repairing of certain items
1	Repairs to Raw water and pure water flow Meter	2 Hours	6 Hours	
2	Repairs to flash mixer gear box with motor repairs	2 Hours	12 Hours	For motor rewinding 24 Hours
3	Repairs to L.T. panel boards, Main and Sub panels	6 Hours	12 Hours	
4	Repairs to HT and LT capacitors	2 Hours	6 Hours	Replace the failed capacitor immediately
5	Repairs to alum / TCL gear box with motor, stirrer's	2 Hours	12 Hours	For motor rewinding 24 Hours
6	Repairs to Flocculator/ end carriage Mechanism with motor	2 Hours	12 Hours	For motor rewinding 24 Hours
7	Repairs to Power transformers 33/3.3 Kv, 11/0.4 Kv and 3.3/0.4 Kv	12 Hours	15 Days	
8	Repairs to Clarifier bridge structure, rails, Central bearing etc.	2 Hours	12 Hours	
9	Repairs / Replacement of chlorine pumpsets, piping, valves	2 Hours	12 Hours	Replacement of booster pumpset if needed – 15 days
10	Repairs to Lifting equipments for chlorine tonner etc.	2 Hours	12 Hours	
11	Repairs / Replacement of Lab. – sampling motors , Lab. testing equipments	2 Hours	12 Hours	Replacement of sampling motors – 10 days
12	Repairs/ Replacement of Electrification / fire fighting and safety equipment	2 Hours	12 Hours	

Note :- The time limits mentioned above are tentative however observing the urgency and site situation Executive Engineer may instruct time limits for completion of various repairs and it shall be binding on contractor.

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**ANNEXURE I-E
LUBRICATION CHART**

Recommended name of oil and grease lubricants.

Sr. No.	Name of manufacture of lubricants	Oil for lubrication of bush and ball bearing	Grease for lubrication of Ball and roller bearings
1.	Indian oil corporation	Servo System 46	Servogem – 2/3
2.	Hindustan Petroleum	Enclo –46	Lithom 2/3
3.	Bharat Petroleum	Hidral – 46	Multipurpose grease - 3

Notes :

- 1) Oil lubricants: While using oil lubricants please check following.
 - a) Oil lubricants shall conform to ISO 46
 - b) It is not allowed to use mixture of two different categories of oil lubricant
- 2) Grease Lubricants
 - a) It is not allowed to use mixture of two different categories of grease.

ANNEXURE II-A
GUIDELINES AND INFORMATION FOR PUMP OPERATION

A) Special care to be taken by pump operator.

- 1) About 1 Kg. Stock of gland rope shall be kept at each pumping station
- 2) After pumping is stopped, pump house and machinery shall be cleaned and proper oiling shall be done before restarting the pump.
- 3) Pump log book shall be maintained regularly, reading of current and voltage shall be noted every hour. Also any unusual development or repairs carried out shall be noted.
- 4) Every day before starting pump, energy meter reading shall be noted in separate register.
- 5) Whether the delivery valve should be open or closed at the time of starting is to be decided by studying the power characteristics curves of pump.
- 6) Spare parts register shall be maintained in every pump house and shall be made available for checking so that material stock can be assessed. This will be useful during emergency break down.
- 7) Power factor shall be watched for every hour which shall be minimum 0.95

B) Special care to be taken by pump operator regarding electrical and mechanical installations:

- 1) Pump motor shall be checked for free rotation when not in operation, Rubber bushing if worn out, and replace after checking alignment.
- 2) During operation check the temp. of cable, motor, starter and bearing which should be within limits.
- 3) In addition to above, following works shall be carried out every week and noted in log book.
 - a. Contacts and nut bolts of main switch, VCB, OCB, starter, motor terminals shall be tightened and blackened contacts and lugs shall be cleaned and refitted in original position.
 - b. Upper layer of oil in OCB and starter shall be checked and if black oil layer is observed same shall be removed and oil shall be refilled as per oil level marking
 - c. All the joint shall be checked and tightened monthly in substation
 - d. Sufficient stock of HRC fuses, transformers oil, Insulation tapes etc. shall be kept in ready stock to attend the O&M round the clock.
- 4) All earthing shall be checked tightened and watered with 2 buckets of water every week after rainy season.

C) Guidelines regarding V.T. pump are as follows

- 1) Flow of lubricating oil (in case of oil lubricated pump) from magnetic carbon lubricator shall be maintained 10 to 12 drops per minute. Pump shall not be operated without lubricant. Ensure that plastic tubes carrying oil are connected in nipple at both ends to avoid gland nut after lifting motor.

- 2) If water is found coming out from gland nut and top shaft then tightened the gland nut after lifting motor
- 3) If water is found coming out from plastic tube in oil tank, then the same shall be informed to the In-charge.
- 4) Lubrication oil shall be SAE 10 only.
- 5) While pump is operating, Vibration shall be noted and foundation nut and bolts shall be tightened as per requirement.
- 6) If silt or sand is coming in supply well from river then desilting of well (at least once in a year) is necessary. Deposition of silt in well increases affects the discharging capacity of the pump then timely desilting is necessary.
- 7) To increase or decrease the discharging capacity of pump, adjustable nut of Hollow shaft motor shall be adjusted skillfully.
- 8) If water supply is hampered because of burning of cable or conductor then material of cable jointing shall be kept in stock by the electrician and pump operator and they should be aware of repairing and making cable joints.
- 9) Earthing is required for motor, pump starter and panel board. After some period G.I. wire used for earthing may be disconnected and earthing goes out of order. Hence the same be checked out as per IE rules and repaired.

D) Points to be checked before starting of pump

- 1) Main switch should be in ON position, check voltage. If voltage is not adequate, do not start the pump.
- 2) Check for three phase availability on phase indicator. All the three lamps should give same amount of light. Do not start pump on single phasing
- 3) Check for proper earthing.
- 4) Check proper rotation of pump.
- 5) Note pressure gauge reading.

E) Points to be checked after starting the pump.

- 1) Ensure that the motor is not taking current more than its capacity
- 2) Ensure that the pressure is correct.

F) Pump overhauling

- 1) Pump set shall be overhauled generally after 20,000 hours of operation Overhauling shall be done by expert only.
- 2) All parts shall be removed and cleaned and worn out parts shall be replaced.
- 3) While ordering parts of pump, nameplate details of pump shall be given. Pump type, machine, number, name of part, quality and quantity shall be mentioned in details. Sufficient stock of spare parts shall be maintained for day to day and major repairs. The major spare parts like shaft / sleeve, bearing, impeller shall be ordered only after opening / dismantling of pump sets with perfect information about pump model, type etc.

G) Register to be maintained for pumping machinery

- 1) Log book.

- 2) History sheet.

H) In addition to above following information shall be noted in register.

- 1) Material of construction
- 2) Number of stages
- 3) Impeller size
- 4) Bearing numbers of pump and motor
In case of VT pump oil lubricated or water lubricated,
Total column length, column, oil tube, shaft size etc. to be noted.
- 5) Date of purchase of pump motor
- 6) Value of pump motor
- 7) Total hours of running of pump at the end of months
- 8) Date of starting of pump
- 9) Annual running hours of pump
- 10) Up to date total hours of running of pump

I) Records to be kept for daily running pumps in log book.

Sr. No.	Pump number	Time of starting of pump	Time of stopping of pump	Total hours of running	Ammeter reading
1	2	3	4	5	6

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Voltmeter reading	Pressure gauge reading	Kwh meter reading on starting	Kwh meter reading on stopping	Total units	Remarks	Signature of operator
7	8	9	10	11	12	13

J) History sheet

- 1) History card
- 2) Pump maintenance
- 3) Replacement of spare parts
- 1) Information in History card.
 - a. Pump installed for raw / pure water / WTP machinery
 - b. Purpose of installing pump / machinery.
- 2) Pump maintenance
 - a) Leveling, replacement, checking to be mentioned
 - b) Overhauling to pump and motor to be mentioned.
 - c) Information regarding motor starter etc.
- 4) Spare parts – information regarding pump.
 - a) Panel : spare parts of Ht / LT panels
 - b) Motor- Bearing, winding, varnishing.
 - c) Impeller pump shaft, shaft sleeve, casing ring, bearing, mech seal.
 - d) Starter- overload relay, oil, contacts , HRC fuses.

K) Pump information chart

Sr. No.	Name of part	Date of replacement	Reasons for replacement	Remarks
1	2	3	4	5
1	Impeller			
2	Pump shaft			
3	Shaft sleeve			
4	Casing ring			
5	Bearings			
6	Stuffing box bush/mech seal			
7	Other			

Points to be noted after annual testing

- 1) Total duty head
- 2) Shut off head
- 3) Discharge at designed head.
- 4) Full load current of motor

**ANNEXURE II-B
PARAMETERS FOR PREVENTIVE MAINTENANCE**

Sr.No.	Parameter to be checked	Frequency of checking
1	Water level of Head works	Daily
2	Oil temperature, oil level, winding, temperature over all condition of pump set in operation transformers switch gear, control gear equipments etc.	Hourly
3	Noise of pump, motor and pump vibration	Hourly
4	Electric load in AMPS at various panel switch gear equipments and machine frequency of electric supply etc.	Hourly
5.	Quantity of raw water and filtered water, Turbidity of raw water, clarified water and pure water.	Daily
6.	Alum dose, alum solution tank level, chlorine dose, Residual chlorine.	Hourly
7.	Electricity consumption/ power factor.	Daily
8.	Buckolz relay, silica gel	Quarterly
9.	All other parameters as per log book	Hourly

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ANNEXURE –III**PERIODICAL MAINTENANCE OF CLARIFLOCCULATOR :**

No.	Name of section or part to be maintained	Maintenance to be carried out	Frequency time interval at which inspection and maintenance to be done	Remarks
1	Trolley wheels	Lubricating (greasing)	1 month	
2	Reduction gear box	Checking and topping the oil level	3 months	
3	Turntable mechanism	Checking and topping the oil level	3 months	
4	Rail/ track	Adjustment of gap between two rails and its aligning etc.	4 months	
		Checking earthing of rails	3 months	
5	Reduction gear box	Checking of helical or spur gear condition	6 months	
6	Iron wheels	Checking of wear and tear, alignment and its positioning	6 months	Frequently in old installations
7	Rubber/ MS Scrappers	Tightening of nut bolts, replacement of broken parts	1 year	
8	Turntable	Checking of its sprocket, chains, steel bails, gearbox etc	1 year	

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ANNEXURE IV-A
MAINTENANCE SCHEDULE OF PUMPING MACHINERY

Sr. no.	Period	Panel, Breaker ,Starter	Motor	Pump	Transformer / Substation	Remark
1)	Hourly	1) Voltage 2) Current 3) Check Whether capacitor in circuit and working	1) Bearing temperature 2) Any undue noise in running motor 3) Temperature of cable	1) Bearing cooling Water 2) Any undue noise in running condition of pump 3) Oil level in thrust bearing 4) Pressure gauge reading		Note: 1) Check RYB indicators 2) Voltage reading should be taken before and after starting of pump. 3) Before starting of pump voltage in three phases it should be equal and in permissible limit.
2)	Daily	1) KWH reading 2) Kvar reading 3) Kvarh reading 4) Power factor reading 1) Position of relays		Bearing Oil levels	1) Oil level in transformer 2) GOD Position 3)AB switch 4)Lighting adapter position 5)UPS system/ battery ies	Check relay position before starting of pumps
3)	Monthly	1) Earthing 2) Watering to earthing 3) Check setting of over current, no load tripping	Check connections, if necessary and tighten it Winding temp.	1) Top up bearing oil if necessary 2) Limit switches of valve 3) Check gland rope of Pump	1) Oil level in OLTC 2) Silica gel in breather for its colour. 3) Brush or clean	1) UPS Should be checked before starting process @ sub station 2) Check the lifting arrangement, clean grease and oil splashes.

Sr. no.	Period	Panel, Breaker ,Starter	Motor	Pump	Transformer / Substation	Remark
		setting 4) Examine contacts, if necessary clean / replace 5) Voltage/ current meters for standard setting, if necessary set the same. 6) Cleaning the panel by using Air blower. 7) Check up of panel bus bars, lugs, cable connections etc. 8) Earth connection, if necessary to be tightened 9) Check capacitor connections, lugs kit etc. 10) Check contacts of OCB / ACB starter		4) Gland rope for sluice valves	the transformer radiator, Check HT bushing, Cable Kit and lugs in off position 4) Operation of AB Switch (ON / OFF) 5) Check OLTC operations. 6) Watering to earth pits	3) Cell Voltage of UPS 4) Limit switches of crane be checked and cleaned. 5) Fire fighting equipment should be checked for proper working 6) Corbels gantry should be cleaned Once in fortnight

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Sr. no.	Period	Panel, Breaker ,Starter	Motor	Pump	Transformer / Substation	Remark
4)	Quarterly	1) Cleaning by blower by taking out the VCB and OCB contact.	1) Cleaning inside by blower.	1) Foundation nut Bolts check up for vibration. 2) Couple bolts.	1) LT/ HT connection of transformer cable kit condition 2) Oil level of transformer 3) Bushing for cracks etc. 4) If silica gel is pink, dry up or replace	
5)	Half year	Check all meters for accuracy Relay setting check all connection by megger, check insulation standards	1) Greasing to bearing	1) Gland rope checkup and if necessary add / replace for pump and sluice valves. 2) Discharge test of pump	Transformer oil sample should be checked for its dielectric strength check insulation by megger and check continuity of earth connections	
6)	Yearly			If found the excessive vibrations open and repair the pump.		

Note :-

- 1) Record of all readings mentioned above should be maintained every day.

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- 2) Before leaving the site Chemist, pump operator and worker at each working site should inform orally and in writing on message book kept at each working site. The difficulties observed and precautions to be taken, expected actions to be taken in next shift shall be written in message book.
- 3) The Machinery / Panels etc. should be cleaned every day.
- 4) Fire fighting equipment shall be checked and maintained for ready to use position.
- 5) All the maintenance and repairs scheduled should be carried out with due use to safety equipments i.e. rubber matting DO rod, hand gloves etc.
- 6) The electrical maintenance should be done by skilled employee and should be done by taking precautions, like attending electrical repairs / maintenance by making electric supply OFF etc.
- 7) All the maintenance and repairs should be carried out as per the directives of Executive Engineer and as per the maintenance schedule enclosed in annexure.
- 8) 3/5 buckets of water should be poured in earth pits weekly/ fortnight / monthly as per requirement and depending upon wet / dry season. The earthing chamber and earthing arrangement shall be get repaired as per instructions of Executive Engineer.
- 9) The maintenance and repairs of any equipment which are not included in schedule but observed essential should be carried out as per the directives of Executive Engineer.
- 10) Maintenance of EOT / HOT crane, Valve actuator, battery, fans, compressor etc. shall be done as per schedule & maintenance manual of manufacturer.
- 11) Cell voltage of batteries and specific gravity shall be checked weekly and refilling done as required
- 12) Limit switches of actuator and crane shall be cleaned once in month or earlier if required.
- 13) Cables and glands shall be cleaned once in fortnight.
- 14) Earthing of electrically operated crane shall be checked every month.

ANNEXURE IV-B

Maintenance Schedule of Pumping Machinery

Sr. No.	Parts to be maintained	Maintenance To be carried out	Period of Maintenance	Ramarks
	(A) Centrifugal Pump			
1)	Pump Foundation and nut bolt	Checking of foundation nut bolt, if required should be tightened and locked to avoid vibrations.	Every 3 days	
2)	Pump Alignment	Alignment of motor and pump should be in proper position	Weekly	
3)	Pump / Motor Coupling	Pump motor coupling, rubber bushing and nut bolt should be tightened	Fortnightly	
4)	DE / NDE Bearings of pump	To check temperature by hand or by thermometer	Daily	
5)	DE / NDE Bearings of pump	To Check the temperature of bearings if it too hot, then the bearings should be replaced if necessary	Immediate action	
6)	DE / NDE Bearings of pump	Greasing (Bearing) should be changed and greased with standard quality	Quarterly	Greasing of bearing should be done as per requirement only. Excessive greasing causes over heating of

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Sr. No.	Parts to be maintained	Maintenance To be carried out	Period of Maintenance	Remarks
				bearing.
7)	Gland and glands packing	If there is heavy leakage through the glands, the glands should be replaced with required size and quality of glands	Leakage should checked daily and gland packing should be changed by every two months	Gland packing should be of Asbestos type and of required type and of required size / After tightening the gland drop by drop leakage is essential.
8)	Pump shaft sleeves, neck ring	Check shaft sleeve, neck ring lantern ring's for it's proper shape. If Necessary replace the same	Half Yearly	This work should be done by skilled mechanic only.
9)	Pump Impeller	Opening of pump impeller and checking, if required any repairs should be carried out and then fitting to proper position	Yearly	Repair work should be done at experienced work shop.
10)	Foot valve of pump	Foot valve of pump should be checked and if required should be repaired. (Flap Should be changed)	Every two months	If the foot valve is not working in proper position then the pump will not lift water.
11)	Pressure & vacuum gauge	Both side gauges should be checked and if required to check gauge calibration	Yearly	

Sr. No.	Parts to be maintained	Maintenance To be carried out	Period of Maintenance	Ramarks
12)	Sluice valves	Valve gland packing should be replaced	Every two months	If there is heavy I leakage the glands should be tightened by two days regularly
(B) Centrifugal pump - motor				
1)	Motor cable connection and earthing connection		Daily	Before starting the motor all equipments should be cleaned. Blow away dust and clean any splashing of oil or grease. Motor winding temp should not be more than stipulated limit. Tighten the terminals
2)	Motor starter and switches	Check for loose contact and tighten it.	Daily Before starting motor	
3)	Cleanliness of motor winding	Motor winding and fan should be cleaned by giving air pressure.	Weekly	
4)	Deleted	Deleted	Deleted	
5)	Deleted	Deleted	Deleted	
6)	Motor starter and switches	Overhauling of motor starter switches	Monthly	
7)	HT / LT motors oil circuit breaker (above 50 HP)	Check oil circuit breaker and repair if required	Monthly	
8)	Motor Bearing (Oil Chamber)	If motor bearing is of oil	Monthly	

Sr. No.	Parts to be maintained	Maintenance To be carried out	Period of Maintenance	Ramarks
		lubricated type and working in humid climatic conditions bearing oil should be replaced.		
9)	Motor Bearing (With grease)	Bearing grease quality should be checked	Monthly	
10)	Motor winding	Baking and varnishing is necessary incase of weak insulation	Half yearly	
11)	Motor bearing	Grease to be replaced	Half yearly	
12)	Oil lubricating bearing	Refilling of fresh oil after clearing the bearing with kerosene	Half yearly	
13)	Motor bearing (High speed)	To be checked and to be replaced if necessary	Yearly	
14)	Motor winding	Motor winding should be cleaned with air pressure. Varnishing of oily parts	Yearly	
15)	Overhauling of motor	If motor is working in severe condition	Immediately	
16)	Motor switch and starter	Replacement of contact of motor switch and starter. If the contact are fully damaged	Immediately	
17)	Insulation resistance	Check the insulation of motor winding phase to	Half Yearly	

Sr. No.	Parts to be maintained	Maintenance To be carried out	Period of Maintenance	Ramarks
		phase and phase to earth		
18)	Motor winding Stator and Rotor	Check the air gap between motor winding and rotor	Yearly	
	Vacuum Pumps	Check the working of Vacuum pumps for vibration in couple and bushing and motor for smooth running	Daily	
	(C) Vertical turbine Deep well pump			
1)	Pump Foundation and base plate	Foundation nut-bolts of VT pump should be tightened	Daily	
2)	Pump alignment	Pump foundation and base should be leveled	Weekly	
3)	Vibration of pump	Pump vibration should be checked, recorded and is to be maintained with basic vibration level.	Fortnightly	
4)	Thrust bearing of pump	To check the temp of thrust bearing by hand or by thermometer	Daily	
5)	Gland and gland packing of pump	If there is major leakage both gland nut and shaft should be tightened and if necessary gland packing	Weekly	

Sr. No.	Parts to be maintained	Maintenance To be carried out	Period of Maintenance	Ramarks
		should be replaced.		
6)	Non-Reverse ratchet	The ratchet should be checked for proper working of ratchet balls	Daily	The balls of no-revers ratchet shall not be contact with grease
7)	Pump oil lubricator	To check carefully the oil lubricator of oil lubricated pump	Weekly	
8)	HT panels with VCB, Metering panel, Relay panel	Check the meter / reading relay setup	Hourly	
9)	33 / 3.3 kV VCB / Isolators	Check all connections for tightness	During every shutdown or for minimum every fifteen days	
10)	HT cables, cable kits	Check the joints / cable kits	During every shutdown or for minimum every fifteen days	
11)	HT / LT/ control cables	Check the temperature of cable by hand	Daily	
12)	UPS with batteries	Check the voltage, batteries for healthy working	Daily	
13)	Earthing in substation	Water the earthing pits sufficiently	Weekly after monsoon is over	Keep the substation floor clean, no grass should be there and see that sufficient stone metal is spread
14)	Tempreture gauges for HT motors &	Check temperature is	Daily	

Sr. No.	Parts to be maintained	Maintenance To be carried out	Period of Maintenance	Ramarks
	transformers	within limit		
15)	HT / LT capacitors	Confirm that the capacitors are put in working & working satisfactorily	Hourly	Replace the failed capacitors immediately to avoid low PF penalty

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**ANNEXURE IV-C
MAINTENANCE SCHEDULE FOR POWER TRANSFORMERS**

The maintenance schedule given below is an Indication of the attention required to be given to the transformer under average conditions

Sr. No.	Inspection Frequency	Item to be inspected	Inspection Notes	Action required if inspection shows unsatisfactory conditions
1	Hourly	Ambient temp.
2	Hourly	Winding temp	Check that temp. rise is reasonable and within limits	Ensure that over load does not exist. If temperature rise is still higher than normal, then shut off the transformer and investigate and refer to MJP and manufacturer
3	Hourly	Oil temp		
4	Hourly	Load (Amperes)	Check against rated figures
5	Hourly	Incoming voltages		
6.	Daily	Oil level in transformer	Check transformer oil gauges examine transformer for oil leakages	If low top up with oil having BDV value of 60 KV
7	Daily	Explosion vent diaphragm	Damage / breakage	Replace, if cracked or broken.
8 a)	Daily	Silica gel Breather of transformer	Check colors of silica gel	If silica gel is pink. Replace with blue gels. The silica gels shall be reactivated for reuse after drying
b)	Daily	Silica gel Breather of transformer	Check oil level in cup	Fill clean dry oil if required.

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Sr. No.	Inspection Frequency	Item to be inspected	Inspection Notes	Action required if inspection shows unsatisfactory conditions
9)	Daily	RTCC (optional)	Working condition of Voltmeters TPI and Indication lamps	Attend to, as may be necessary.
10)	Daily	11/ 33 KV class bushing	Check oil level in oil level gauge	Replenish, if necessary with fresh, dry filtered oil having BDV of minimum 60 KV
11)	Daily	TPI and OLTC	Tap position in both shall be same	Attend to, as may be necessary
12)	Daily	AVR (Optional)	Check various functional operations	Attend to, as may be necessary
13) a	Monthly	Bushings	Examine for dirt deposits	Clean
b)	Monthly	Bushing	Examine for cracks /damage	Replace with new original ones.
14	Monthly	Insulation resistance	Compare with values at the time of commissioning	If values are lower than point 6 of part II of IS & improve same suitably, by filtration etc.
15	Quarterly	Oil in transformer / OLTC	Check oil for dielectric strength	If BDV is less than 50 KV improve by oil filtration
16	Yearly	Earth resistance	Check resistance value	Take suitable action, if earth resistance is high
17	Yearly	a)Transformer oil b) Transformer	Check as per IS : 1866 Check ratio at all taps	Investigate and take corrective actions as required.
18	Yearly	Gaskets Joints	Check for oil leakages	If oil leakages are observed, tighten the relevant nut bolts suitably (Avoid over tightening)

Sr. No.	Inspection Frequency	Item to be inspected	Inspection Notes	Action required if inspection shows unsatisfactory conditions
20	Yearly	WTI / OTI thermometer pocket	Check oil	Oil to be replenished if required.
21	Yearly	WTI / OTI	Check pointer for free movement Examine WTI contacts.	Take corrective measures replace OTI/ STI if required
22	Yearly	Transformer body surface painting	Check for painted surface, scratches etc	Carryout necessary painting touch up etc.
23	As recommended by OLTC manufacturer	OLTC (optional provision) Oil surge relay (option provision)	As recommended by OEM of OLTC Trip switch operation	As recommended by OLTC manufacture Replace main OSR if found defective

Note :- Check Transformer Oil samples for the dielectric strength at pre-monsoon and post-monsoon Wherever separate maintenance instructions are given by the manufacturer of the transformer accessories, they shall be strictly followed.

SCHEDULE P**SCHEDULE P – REPORTING BY THE CONTRACTOR****LIST OF REGISTERS TO BE MAINTAINED BY THE CONTRACTOR**

- 1) Log book for Raw Water & Pure Water Pumping.
 - a) Date
 - b) Pump No.
 - c) Starting Time
 - d) Stopping Time
 - e) Time Difference (Pumping Hours)
 - f) Voltage
 - g) Current
 - h) Pressure Gauge Reading
 - i) Power Factor Recorded.
 - j) Water Pumped.
 - k) Remarks
 - l) Operator Name & Signature.

 - 2) History sheet for maintenance of transformer, pump, motors and other machinery's.
 - a) Date
 - b) Agency
 - c) Type of Repair
 - d) Cost of Repair
 - e) Remarks
 - f) Operator Name & Signature

 - 3) Test results of water sampling with details as under (Physical, chemical & biological tests at each WTP)
 - a) Date
 - b) Raw Water, Settle Water, Pure Water
 - c) P H Valve
 - d) Turbidity
 - e) Chlorine in PPM
 - f) Chemical Analysis
 - g) Remarks
 - h) Operator Name & Signature
- Note - Separate registers shall be maintained for each type of test.
- 4) Power factor Register (R&P)
 - a) Date
 - b) Power factor as per calculation
 - c) Remarks
 - d) Time of Reading
 - e) Operator Name & Signature

 - 5) ESR wise list of Domestic & Commercial consumers.
 - 6) Complaint Register at main office & zonal offices.
 - 7) Attendance registers of staff.

- 8) Site instruction book at all head works, all W.T.P.'s and main & zonal offices each.
- 9) Register of dismantled material at each zonal office.
- 10) Stock & Consumption register for Alum, TCL Tonnar at each W.T.P.
- 11) Weekly report of number of new connections to Consumers
- 12) Daily meter readings of bulk meters at inlet or outlet of ESRs.
- 13) Performance measurements reports

Provision of performance measurements in a format approved by Executive Engineer for all Performance Measurement parameters in accordance with Clause 11 of the Agreement.

- 14) Annual Water utilization/ loss statement as per following format

Water Utilization/ Loss Statement

All quantities in Mm³

Reporting year	Water pumped from all sources	Water received at WTP	Water pumped from WTP	Water supply at the Inlet/ Outlet of ESR	Water billed during the year	Losses in water between head works to WTP	Losses occurred in WTP	Losses occurred between WTP to ESR	Losses occurred in distribution system	Water lost during the year	Remarks

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Complaint register format

No.	Date	Name of Complainant	Address	Nature of Complaint	Action taken by Contractor			Date of information on redressal	Name and signature			Remark of MJP	Corrections done by Contractor	Remarks
					Date of inspection	Date of correction	Nature of correction		Person attending complaint	Supervisor	MJP			

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SCHEDULE Q

SCHEDULE Q – DISCHARGE CERTIFICATE

DISCHARGE CERTIFICATE

Maharashtra Jeevan Pradhikaran (“MJP”) hereby acknowledges:

1. Compliance and fulfilment by the Contractor of the Cessation Requirements set forth in Clause 23 of the Agreement in respect of the Water Supply and Distribution Assets;

2. Receipt of actual possession of the Water Supply and Distribution Assets from the Contractor; and

3. Receipt from the Contractor of a certificate confirming that there are no liens or encumbrances whatsoever on the Contractor’s Assets; on the basis that upon the issue of this Discharge Certificate, MJP shall be deemed to have acquired, and all title and interest of the Contractor’s Assets shall be deemed to have vested, unto MJP free from all encumbrances, charges and liens whatsoever.

Notwithstanding anything to the contrary contained hereinabove it shall be a condition of this Discharge Certificate that in the event of any defect or deficiency in any of the Cessation Requirements setforth in Clause 23 of the Agreement being found or discovered at any time hereafter, nothing contained in this Discharge Certificate shall be construed or interpreted as waiving the obligation of the Contractor to rectify and remedy the same and/or relieving the Contractor in any manner of the same.

Agreed and accepted

For the Contractor

For Maharashtra Jeevan Pradhikaran

By:.....

By:.....

Name:

Name:

Designation:

Designation:

Dated:

Dated:

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SCHEDULE R

SCHEDULE R – PERFORMANCE SECURITY

BANK GUARANTEE FOR PERFORMANCE SECURITY

(to be issued by a Nationalised Bank having a branch at Latur)

[Bidders should NOT provide the Performance Security with their Proposals. Only the Successful Bidder pursuant to LOI will be required to provide the Performance Security which must be in this form or in a similar form acceptable to MJP]

[To be issued by a Nationalised Bank having a branch at Latur]

From:

[Name of the Bank, and its Branch Address]

To: _____

A. MJP vide Letter No. _____ dated _____ has issued Letter of Intent to _____ (the “Successful Bidder”) for (i) _____ (the Project).

(IN CASE THE CONTRACTOR HAS BEEN FORMED BY A ASSOCIATED OF THE SUCESSFUL BIDDER) _____ being an “Associate” of _____, has promoted and incorporated a Special Purpose Vehicle in the form of a limited liability company _____(the “Contractor”) having its registered office in the State of _____, to enter into a Agreement for undertaking, inter alia, the Project and to perform and discharge all its obligations thereunder.

(IN CASE THE CONTRACTOR HAS BEEN FORMED BY THE SUCESSFUL BIDDER)

_____ has promoted and incorporated a Special Purpose Vehicle in the form of a limited liability company _____(the “Contractor”) having its registered office in the State of _____, to enter into a Agreement for undertaking, inter alia, the Project and to perform and discharge all its obligations thereunder.

B. In order to perform and discharge all its obligations concerning the “Project”, the Contractor is required to give Maharashtra Jeevan

Pradhikaran (MJP) a guarantee by a recognized bank based in India in the sum of Rs _____ only (Indian Rupees- _____) as security for compliance by the Contractor with its obligations under the Agreement during the term of the Agreement.

- C. At the request of the Successful Bidder and / or the Contractor, the Guarantor has agreed to give MJP the said guarantee on the terms set out herein.

GUARANTEE

1. We, (Name of Bank](the” Guarantor”) with its registered office at (Address of Head Office), unconditionally guarantee to pay MJP upon first written demand and without any deduction any sum claimed by MJP upto a maximum of Rupees (Indian Rupeesonly) (the “Guaranteed Sum”) subject to the conditions set out below.
2. The Guarantor unconditionally and irrevocably promises to pay on demand the Guaranteed Sum, without protest or demur whatsoever upon being served a written demand from MJP, which shall be final and conclusive as against the Guarantor requiring the Guarantor to make the payment to MJP.
3. The Guarantor waives any requirement that MJP demand any debt or payment from the Contractor before presenting it with a demand under this Guarantee.
4. MJP shall notify the Guarantor of its demand for payment of the Guaranteed Sum without any deduction of whatsoever nature and without reference to any claim or counter claim or set off, in accordance with the Concession Agreement. Such notification served by MJP, shall be conclusive and binding on the Guarantor.
5. Upon encashment and appropriation of the whole or any portion of the Guaranteed Sum by MJP in accordance with the Agreement, the Guarantor shall be obliged to replenish the existing Guarantee or provide fresh guarantee of the Guaranteed Sum and the Contractor is deemed to have made the request for such fresh guarantee upon the execution and furnishing of this Guarantee in the first instance.

6. No underlying dispute as between MJP and the Contractor nor any pending application for interim relief or arbitration proceedings or other legal proceedings shall constitute any ground for prevention, delay or obstruction for making payment to MJP by the Guarantor and the existence of any disputes or differences or claims in arbitration or otherwise shall not constitute any ground for non-payment on this Guarantee.
7. This Guarantee is valid and effective from its date. This Guarantee and the Guarantor's obligations under it will terminate on upon issuance of the Discharge Certificate by the MJP Representative for the Project as advised to the Guarantor in writing by MJP.
8. The Guarantor agrees that its obligation to pay any demand made by MJP before the termination of this Guarantee will continue until the amount demanded has been paid in full.
9. This Guarantee shall be valid and effective upto (Date of validity of the Bank Guarantee for Performance Security) for enabling MJP to lodge a claim for payment under the Guarantee till the date of expiry of the term of the Guarantee. The Guarantor shall be obligated to make payment upon the Guarantee forthwith on demand, if the claim is lodged within the claim validity period and the obligation to pay is subject to normal limitation for payment of claims upon a Guarantee. Time is of essence for payment and in the event of failure to make payment, Guarantor shall be obligated to pay compound interest at 2% above the prime lending rate of the Guarantor institution, compounding quarterly in the event of the Guarantor's failure to make payment upon the Guarantee for any reason whatsoever. Payment of interest as provided is no excuse for delayed payment or non-payment of the Guaranteed Sum.
10. No change in the constitution of the Contractor or of the Guarantor shall be a ground for release of the Guarantee and no variation in the concession agreement made post selection of the bidder, or post making of the bid, shall constitute a variation, which would, subject to the terms and conditions of this agreement, discharge the Guarantor. The Guarantor shall notwithstanding such change, be bound to make payment upon the Guarantee on demand.

- 11. The Guarantor agrees that no change, addition to or other modifications to the terms of the Agreement or to any documents which have or may be made between MJP and the Contractor will in any way release it from any liability under this Guarantee and that it waives any requirement for notice of any such change, addition or modification.

- 12. The Guarantor agrees that it will not assign its obligations under this Guarantee without the prior written consent of MJP.. MJP will not unreasonably withhold its consent if the proposed assignee is of at least equal financial standing to the Guarantor and the assignee assumes in writing the obligations of the Guarantor under this Guarantee at the same time or before the assignment.

- 13. This Guarantee binds the Guarantor, its successors and permitted assigns.

Notwithstanding anything contained herein.

- a) Our liability under the Bank Guarantee shall not exceed lakhs (in word) subject to Clause 13 of this guarantee.
- b) The Bank Guarantee shall be valid upto [date], 200_.
- c) Unless acclaimed or a demand in writing is made upon us on or before _____, all our liability under this guarantee shall cease.

SEAL OF [THE BANK]

NAME OF [THE BANK]

SIGNATURE

NAME

TITLE

DATE

SCHEDULE S**SCHEDULE S – MINIMUM REQUIREMENTS OF CONTRACTOR'S EMPLOYEES**

The Contractor shall employ a minimum number of 30 staff members for the Project. The minimum staff to be employed and their cadre are indicated in column (6) below.

Sr.No.	Name of post	Total required staff (Expected for two shifts)	No. of MJP/ LMC staff on service to the Contractor	Balance required staff. (3-4)	Min. staff compulsory to be employed by contractor out of col. No. 5
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
1	Project manager	1	--	1	1
2	Sectional Engineer	3	--	3	1
3	Electrical supervisor / Engineer	1	--	1	1
4	Tech. Asst. / Maistry	8	2	6	2
5	Water tax superintendent	4	--	4	2
6	Clerk / Carcoon	4	2	2	2
7	Pump operator	10	10	--	--
8	Electrician	3	3	--	--
9	Fitter	15	7	8	2
10	WTP operator/ Filter Attendant	8	3	5	1
11	WTP supervisor	1	--	1	1
12	Meter reader / carcoon	40	15	25	--
13	Tax collector	4	--	4	4
14	Ledger clerk / carcoon	4	--	4	1
15	Driver	1	--	1	1
16	Mali	1	--	1	1
17	Chowkidar / Mazdoor / Valveman	85	28	57	10
	Total	193	70	123	30

The estimated requirement of staff for smooth running of the project is 193 persons. MJP will provide the services of 70 staff members to the Contractor and

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the Contractor is expected to appoint atleast 30 staff members. The Contractor may appoint the balance staff members on contract or outsource the same. However, the sole responsibility of the performance of the staff whether provided by MJP or employed by Contractor or through contract or through a subcontractor or outsourced shall remain with the Contractor. The Contractor shall take all necessary steps to ensure the smooth operations and maintenance of the Water Supply and Distribution Assets.

The staff employed by the Contractor shall be skilled and competent to discharge the duties assigned to them. They should possess appropriate technical qualification as per requirement of MJP rules or the requirement of law. Following are the minimum qualification for key staff members of the Contractor.

1. Project Manager:
ME/ M Tech in Environmental Engineering with specialization in water treatment having more than 5 years experience in the field of O&M of water works of more than 20 MLD and conventional water treatment plants.
2. Sectional Engineer/ Electrical Supervisor/ Engineer
ME/ M Tech in Electrical Engineering/ Mechanical Engineering with specialization in HT water pumping machinery and HT installations with 5 years experience in the O&M of water works
Or ME/ M Tech in instrumentation with specialization in HT water pumping machinery and HT installations with 5 years experience in the O&M of water works
3. Chemist
BSc in Chemistry with specialization in water treatment and two years of relevant experience.
4. Pump operator
He should posses a certificate of electrical / wireman from PWD electrical wing or ITI
5. Filter operator
SSC Passed with suitable training / experience in operation of WTP

It shall be the responsibility of the contractor to ensure that only competent persons under the Indian Electricity Act and Regulations are employed to work on the electrical installations of the Water Supply and Distribution Assets.

The Contractor shall provide the details of the minimum staff employed by him to the Executive Engineer. The details shall cover their qualifications, past experience and references from their previous employer. The Executive Engineer reserves the right to ask for replacement of the key staff members of the

Contractor in event of them being observed not to be competent in discharging their technical duties under Clause 22 of the Agreement.

Contractor shall maintain the record of the attendance of MJP staff and employees engaged by him.

Contractor shall be responsible for making regular salaries towards his staff members. Appointment / dismissal and conditions of their services and other liabilities regarding, workers engaged under the contract shall also be the sole responsibility of the contractor.

SCHEDULE T

SCHEDULE T – DRAWINGS

Enclosed

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