

NORTH EASTERN RAILWAY

SPECIAL CONDITIONS

Name of Work:“Design, Supply, Installation, Testing, Commissioning and 05 Years Operation & Maintenance of Automatic Water Management System integrated with Microprocessor-based PLC Technology of 1.50 MLD Capacity including supply of chemicals for treatment of drinking water conforming to BIS standards or any other relevant specifications/code/manual/guidelines on turnkey basis at Kathgodam under IZN Division of N.E. Railway”.

SCHEDULE OF WORKS AND QUANTITY

Sl.	DESCRIPTION OF WORK	UNIT	QTY
	SCHEDULE- (N.S. ITEMS)		
01.	<p>Design, Supply, Installation, Testing, Commissioning and 05 Years Operation & Maintenance of Automatic Water Management System integrated with Microprocessor-based PLC Technology of 1.50 MLD Capacity including supply of chemicals for treatment of drinking water conforming to BIS standards or any other relevant specifications/code/manual/guidelines on turnkey basis at Kathgodam under IZN Division of N.E. Railway.</p> <p>The Scope of work includes provision & installation of SS Bar-Screens, Automatic Pre-chlorination Plant enabled with PLC technology (touch screen monitor facility with water flow sensor- one unit), Automatic online coagulation plant enabled with PLC technology (touch screen monitor facility with water flow sensor- one unit), Automatic Aeration treatment system with microcontroller timer (one unit), Grid of Air diffusers (one set), Tube deck settling system (one set), Pre-pressure filtration plant charged with multi-grade filter media, crushed marble crystals & silica sand (made of MS material-one unit), Post-pressure filtration plant charged with multi-grade media & activated carbons (made of MS material-one unit), Automatic Online Post-bacteriological treatment plant enabled with PLC technology (touch screen monitor facility with water flow sensor- one unit), charging MBBR media in process tank (one set), Microcontroller device based on intelligent magnetic probe technology with annunciation & remote display unit for water level management of multi-process treatment tanks & water storage tank (three units) and other associated internal/external civil works, electrical & mechanical work with regard to successful installation & commissioning of plants, machines & equipment are inclusive in cost. The scope of work also includes demolition, of redundant structures, removal of debris and clearing of site to facilitate erection of Automatic Water Treatment Plant (capacity 1.5MLD). Wastewater disposal system should be properly designed for a capacity of 1.5 times of designed wastewater having matching rainwater harvesting system adequately designed as per recharge capacity. Cost of same is inclusive and nothing extra is payable. All Design / drawings (WMS system including associated infrastructure) should be got approved from any NIT/IIT of repute as per approval of Engineer/Railway.</p> <p>Cost of manpower/machines/materials or any other resources required for 05 Years Operation & Maintenance is inclusive and nothing is payable separately/extra.</p> <p>The treated water parameters will be in conformity with B.I.S. standards vide code “Drinking Water-Specifications” (IS:10500-2012).</p>	Each	1

2	<p>Supplying, erection, commissioning and testing of Digital Online Chlorine Analyzer incorporated with microcontroller technology for online chlorine monitoring at outlet of treated water supply, having range of 0 to 10 mg/ltr. (ppm) with guarantee/ warranty for 05 Years.</p> <p>Associated internal/external civil works, electrical & mechanical work with regard to successful installation & commissioning are inclusive in cost.</p> <p>Cost of manpower/machines/materials or any other resources required for 05 Years Operation & Maintenance is inclusive and nothing is payable separately/extra.</p>	Each	1
3	<p>Supplying, erection, commissioning and testing of Digital Online Colloidal Particle Analyzer incorporated with microcontroller technology for online turbidity monitoring at outlet of treated water supply, having range of 0 to 100 NTU with guarantee/ warranty for 05 Years.</p> <p>Associated internal/external civil works, electrical & mechanical work with regard to successful installation & commissioning are inclusive in cost.</p> <p>Cost of manpower/machines/materials or any other resources required for 05 Years Operation & Maintenance is inclusive and nothing is payable separately/extra.</p>	Each	1
4	<p>Supplying, erection, commissioning and testing of Digital Online Water Meter-cum-Totalizer with microcontroller technology for online measurement & totalization of treated water with guarantee/ warranty for 05 Years.</p> <p>Associated internal/external civil works, electrical & mechanical work with regard to successful installation & commissioning are inclusive in cost.</p> <p>Cost of manpower/machines/materials or any other resources required for 05 Years Operation & Maintenance is inclusive and nothing is payable separately/extra.</p>	Each	1
5	<p>Supplying, erection, commissioning and testing of Digital Online Water Profile Analyzer incorporated with microcontroller technology for online monitoring of pH and TDS at outlet of treated water supply, having range of 0 to 14 for pH and 0 to 9999 for TDS with guarantee/ warranty for 05 Years.</p> <p>Associated internal/external civil works, electrical & mechanical work with regard to successful installation & commissioning are inclusive in cost.</p> <p>Cost of manpower/machines/materials or any other resources required for 05 Years Operation & Maintenance is inclusive and nothing is payable separately/extra.</p>	Each	1
6	<p>Operation and supervision of above Automatic Water Treatment Plant (capacity 1.50 MLD), comprising of Pre-Post Auto Chlorination Plant, Auto Coagulation Plant, Auto Aeration System, Pre & Post Filtration Plants, associated Pumps & Machines with Provision of required chemicals of Calfix (Grade-A) or similar disinfectant (conforming to the parameters of IS:11673-1992) and Polychem or similar coagulant (conforming to the parameters of IS: 15573-2018) with</p>	Month	60

	<p>deployment of technically skilled operators for round the clock operation of WTP for the period of 05 years.</p> <p>Associated internal/external civil works, electrical & mechanical work with regard to successful installation & commissioning are inclusive in cost.</p> <p>Cost of manpower/machines/materials or any other resources required for 05 Years Operation & Maintenance is inclusive and nothing is payable separately/extra.</p>		
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SPECIAL TECHNICAL CRITERIA COMPLIANCE:

Sl.	Description	Confirmation Required	Remarks Allowed	Documents Uploading
1	Supply, installation, commissioning and testing of automatic bacteriological treatment plant incorporated with microprocessor based programmable logic controller, water flow sensor and proportional dosing controller for drinking water treatment. The rate also includes supply of essential spares and accessories for successful and effective use of those plants for 05 years. <u>Non-submission of supporting document in this regard will result in summary rejection.</u>	No	No	Allowed (Mandatory)

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SCOPE OF WORK:

The scope of work for package of Water Management System (WMS) includes design, supply, installation & commissioning of all plants, machines, equipment & analyzers of 1.5MLD capacity Water Management System (WMS), construction of required rooms, boundary wall, gate, repairing and modification of existing water treatment tanks/ structures, demolition of existing redundant structures & removal of debris, provision & laying of pipeline, valves etc. including operational supervision, guarantee/ warranty with provision & supply of consumable water treatment chemicals to ensure regular operation of WMS with deployment of experienced and skilled manpower for successful treatment of drinking water as per required standards for the period of 05 years on turnkey basis, as described in various schedule items at Kathgodam. The contractor shall also arrange onsite testing of treated water in terms of residual chlorine on daily basis and other parameters like colour, odour, turbidity and pH etc. shall be tested from NABL certified lab on Monthly basis or even earlier as directed by Railway. Required electricity shall be provided by department on its own cost for operation of plants during the contract period of 05 years. During construction, water/electricity shall be arranged by contractor at own cost.

DRAWING/DESIGN OF WATER MANAGEMENT (WMS):

All Design / drawings (WMS system including associated infrastructure) should be got approved from any NIT/IIT of repute as per approval of Engineer/Railway.

OPERATION & MAINTENANCE OF WATER MANAGEMENT (WMS):

The contractor will deploy skilled staff for supervision of operation & maintenance of WMS during the contract period of 05 years. The newly installed plants, equipment, analyzers of WMS carries guarantee/ warranty for 05 years. The scope of work as per “**Schedule of Works and Quantity**” item No.NS-6 includes operation of WMS (capacity-1.50MLD) at site for treatment of drinking water with provision & use of all consumable chemicals for the period of 05 years. The treated water quality will be maintained as per given BIS or any other relevant standards.

TREATMENT STANDARDS OF TREATED WATER:

The output quality of treated water should conform to the Standards of Bureau of Indian Standards, Govt. of India in terms of physical & bacteriological characteristics which include, colour-clear, odour-unobjectionable, turbidity less than 5 NTU, pH between 6.5 to 8.5 and residual chlorine between 0.2 to 0.5ppm at output point.

TREATMENT SCHEME OF WATER MANAGEMENT (WMS):

Water Management System (WMS) consists of following treatment processes and units in general to accomplish the process of treatment of drinking water at KGM.

1) SCREEN CHAMBER-CUM-GRIT CHAMBER:

The screen chambers are constructed at the inlet of raw water to screen out the floating impurities, polythene and other solids. Screen is fabricated out of stainless steel (SS) bars and flats. The screens and chambers are cleaned manually on periodic basis.

2) RAW WATER SUMPS AND PUMPING ARRANGEMENT:

The raw water is collected from the canal by gravity flow in the existing U/G Water Collection Sumps. The existing Raw water pumps & starters shall be utilized for pumping of raw water into multi-process treatment tanks. The pump starters shall be installed in electrical control/ machine room for centralized operation.

3) AUTOMATIC ONLINE PRE-CHLORINATION PLANT INTEGRATED WITH PLC-TECHNOLOGY:

Installed in pre-treatment room for automatic online flow proportional dosing of disinfectant chemical solution of Calfix (Grade A-Technical) or similar in the raw effluent. The said chemical reacts with pathogenic microorganisms and neutralizes them at pre-treatment stage. The Specifications of this plant are enclosed separately. Automatic Online Pre-Chlorination Plant is covered under NS-1.

4) AUTOMATIC ONLINE COAGULATION PLANT INTEGRATED WITH PLC-TECHNOLOGY:

Installed in pre-treatment room for automatic online flow proportional dosing of high density polyelectrolyte type Polychem (Grade-Ex) or similar liquid coagulant in the raw waterline to accomplish coagulation process in the existing coagulation tank of multi-process treatment tanks. Specifications are enclosed separately. Automatic Online Coagulation Plant is covered under NS-1.

5) AERATION TREATMENT SYSTEM:

The Aeration Treatment System comprises of Air Blower, Microcontroller based timer and a Grid of Air Diffusers. The Air Blower with starter is installed in pre-treatment room and the grid of air diffusers are installed in one part of existing multi-process treatment tanks to accomplish automated aeration treatment process for oxidation of colour, odour & organic matter. The aeration tank is added with MBBR media for optimum efficiency. The outlet of aeration tank passes to Primary Settling Tank. The Aeration equipment and grid of Air diffusers is covered under NS-1.

6) PRIMARY SETTLING TANK:

The Primary Settling Tank is part of multi-process treatment tanks. It is provided with suitable size of tube-deck settling system for speedy settlement of loaded impurities. The settled sludge is drained out through drain valve for dewatering & solar drying on drying beds for disposal. The clearer water to overflow from Primary settling tank to Secondary settling tank, while sludge settled at the bottom by sedimentation. The provision of Tube-deck settling system is covered under NS-1.

7) SECONDARY SETTLING TANK:

The Secondary Settling Tank is part of existing multi-process treatment tanks. It is provided for final settlement of left over colloidal impurities. The tank is provided with drain for sludge clearance. The settled sludge is passed for dewatering, solar drying and disposal.

8) PRESSURE FILTRATION PLANTS:

Two Units of M.S. High Pressure Filtration Plants are provided after secondary settling tank. The Pre-Filtration Plant is charged with multi-grade filter media & filter sand with back-wash arrangement for filtration and removal of fine colloidal particles, fine suspended impurities to produce crystal clear water. The Post-Filtration Plant is charged with filter media and activated carbon with back-wash arrangement for removal of colour and odour from water to produce crystal clear water quality. Specifications of Pressure Filtration Plants are enclosed separately. The pressure filtration plants and their interconnection piping are covered under NS-1.

9) AUTOMATIC ONLINE POST-BACTERIOLOGICAL TREATMENT PLANT INTEGRATED WITH PLC-TECHNOLOGY:

Installed in post-treatment room for automatic online flow proportional dosing of Calfix (Grade A-Technical) or similar liquid chlorine solution in the filtered water in route to treated water storage tank. The said chemical reacts with pathogenic microorganisms in water in the treated water storage tank and a residual chlorine content is maintained in treated water in the range of 0.2ppm to 0.5ppm. Specifications are enclosed separately. Automatic Online Post-Bacteriological Treatment (Chlorination) Plant is covered under NS-1.

10) TREATED WATER STORAGE TANK:

Provided with suitable capacity for storage of treated water. The tank is provided with drain and overflow arrangement. The water from secondary settling tank is fed by filter pump through pre & post filtration plants and treated online by automatic post chlorination plant.

11) SLUDGE DRYING BEDS:

Three Units of sludge drying beds to be provided for dewatering and solar drying of sludge. These are charged with filter media and filter sand and provided with strainer pipes. The sludge gets dried up by solar radiation and disposed/ used as composed fertilizer as per instructions.

12) ROOMS, BOUNDARY WALL, GATE PATHWAY ETC.:

The construction of rooms for housing plants, machines, chemical storage, operator rest room, boundary wall, pathway (within boundary wall), gate, door, windows etc. shall be carried as per approved drawings and cost is inclusive.

13) INTERNAL AND EXTERNAL PIPING WORK:

The interconnection piping work between different plants machines will be covered under NS-1 Items. Agency should leave the external piping network duly providing suitable NRV valve outside the boundary but within 50 mtr from plant location and cost of such is inclusive. Further connection from this location to desired location shall be covered under DSR Items.

14) ELECTRICAL INTER-CONNECTIONS:

The electrical inter-connection of all plants, machines, pumps, starter panels, sensors, fans, exhaust etc. with consumable material, wire, cable etc. is covered under NS-1. Railway will provide single point connection within the boundary / building of treatment plant. Further networking to be done by agency.

15) PROVISION OF ELECTRIC POWER CONNECTION FOR OPERATION OF WMS:

The provision of Electric Power Connection of 3 phase 440 Volt for operation of full load of WTP/WSM is existing at site with control and distributor panel/MCB etc. The cost of electric power consumption for operation and maintenance of WTP/WSM will be borne by the department.

16) TERMS OF PAYMENT:

Total estimated cost of the work is Rs 44055862.23/-

Sl.	Stage	Estimate Cost (%)	Remarks
1.	On completion of Civil and electrical works	10% of Contract value (i.e Rs 4405586.22/-)	-
2.	On receipt of Machinery at Site	20% of Contract value (i.e Rs 8811172.44/-)	Payment will be made against suitable indemnity bond.
3.	On installation and successful commissioning of Plant	50% of Contract value (i.e Rs 22027931.11/-)	For this stage, after successful commissioning of plant, necessary water test report will be mandatory to prove upon that treated water is meeting desired specification.
4.	Monthly O&M charges (for 05 years)	20% of Contract value (i.e Rs 8811172.44/-)	Payment will be made on 06 months / 12 months basis as mutually agreed, in proportionate to O&M period rendered/passed successfully.

Contractor is supposed to quote % rate against each items / schedule. Payment will be made as per quoted rate under relevant items / schedule, as per actual execution of work.

17)MANPOWER DEPLOYMENT DURING 05 YEAR OPERATION/MAINTENANCE PERIOD:

Agency need to be deploy competent manpower 01 nos. skilled and 01 nos. semiskilled during entire operation/maintenance period who will be stationed at Kathgodam. In case agency does not provide competent manpower then deduction at two times will be done as per prevailing relevant minimum wages rate of central Govt.

18)OPERATION/MAINTENANCE OF WMS AND PENALTY PROVISIONS:

If WMS plant goes out of order for more than 12 hrs then suitable penalty @10000.00 (ten thousand) per day or part thereof will be made for period over and above to 12 hrs but upto 48 hrs. If plant is not made functional in next 48 hrs then penalty @30000.00 (Thirty thousand) per day or part thereof will be made for period over and above to 48 hrs. If plant is not made functional with relevant output / parameter within 10 (ten)days, then contract will be terminated and PG/SD will be forfeited.

Planned / Scheduled maintenance, or any other shutdown as agreed/approved by Railway is not covered under above penalty provisions.

19)TIME TO TIME TESTING OF WATER QUALITY:

The contractor shall arrange onsite testing of treated water in terms of residual chlorine on daily basis. Register / records to be maintained. and other parameters like colour, odour, turbidity and pH etc. shall be tested from NABL certified lab on Monthly basis or even earlier as directed by Railway. Testing charges are inclusive and nothing payable extra.

20) RELEASE OF SECURITY DEPOSIT:

Security Deposit (SD) will be released after operation / maintenance period of 05 years.