

**CONTRACT NO.**

**GUJARAT WATER SUPPLY & SEWERAGE BOARD  
GANDHINAGAR**

**(A WHOLLY OWNED GOVERNMENT OF GUJARAT UNDERTAKING)**



NAME OF WORK:- Providing and Installation of machinery and other repairing work of Pratappura & Soja WTP Under M & R to M1 P2 RWSS Ta:- Kalol District:- Gandhinagar.

**Estimated Cost: - Rs. 6920696.58**

**VOLUME- III**

**Itemwise TECHNICAL SPECIFICATION**

**CIVIL WORKS**

**Chief Engineer  
Gujarat Water Supply & Sewerage Board  
Zone –II, Ahmedabad**

## **ITEM WISE DETAILED SPECIFICATIONS**

Schedule - B

Specification

**Item No :- 1**

**Providing, installing & commissioning Air agitation system including Blowers(40 HP), piping and valve arrangement etc, as per design FOR ALL BEDS**

- Air blower shall be designed to perform satisfactorily under specified start up condition, part load/ full load operation, max. Differential pressure operation and relief valve setting pressure and up to trip speed. All the compressor casing shall be air water cooled type.
- Air blower shall consist of the following accessories
- Twin / Tri lobe compressor
- Suction Filter
- Suction/discharge silencer
- V belt
- V belt guard
- Motor pulley
- Compressor pulley
- Slide rail
- Common base frame
- Safety valve
- Anti-vibration pads
- Pressure gauges – Burden type, 150mm dia,, SS casing, glycerin filled with manifold valve, siphon and snubbed. Bidder to refer specification for instrumentation work for rest specifications and make.
- The blower noise level shall be within 85 dB (A) at a distance of 1.86m
- Acoustic hood comprising of fabricated 50 mm square welded tube, frame, acoustic insulation of glass wool of density 30 kg3/m2 and perforated sheet on inside face and MS sheet on outside face in welded construction.
- Inter connecting piping comprising of discharge butterfly valve, flap type non-return valve, and expansion below.
- Capacity : As per process requirement
- Speed of blower : 1200 RPM (max.)
- Discharge Head : As per process design, min. 3500 mm of water column.
- Motor : Squirrel cage induction motor as per electrical specifications
- Material of construction of various part of the air blower shall be as under:
- Casing CI-FG-260, IS210
- Lobes CI-FG-260, IS210
- Shaft EN 24 BS:970 Part-1
- Gears EN-353 case hardened and ground
- Common Base Frame MS Fabricated
- All the necessary accessories and protections of compressor etc. are to be provided which are helpful to smooth running of the process of the plant.
- Tests

Sr. No.	Tests	Specs
1	Hydrostatic tests	Twice the maximum working pressure
2	Performance test	As per BS : 1571
3	Strip test	Clearances with tolerance limit
4	Mechanical balancing	ISO 1940 Gr. 6.3 or better
5	Visual Inspection	Before painting

- Drawings:

- The manufacturer shall submit the following drawings.
- Preliminary outline dimensional drawings.
- Performance curves
- Data Sheet
- Typical cross sectional drawing showing constructional details with the complete bill of material and relevant standards.
- Drawing showing Network, piping lay out plan, MOC, size, capacity etc.
- **MODE OF PAYMENT**
- Payment shall be made **per each Air Blower set**, completely installed, tested and commissioned, and shall include:
  - Cost of blower, motor, accessories and control panel
  - Transportation, loading, unloading and handling
  - Erection, testing and commissioning
  - All materials, labour, tools and plants
  - All taxes, duties, royalties and incidental charges
  - **No separate payment shall be made** for accessories, base frame, foundation bolts, electrical works, testing or commissioning, as the same shall be deemed to be included in the accepted rate.
- **Unit of Measurement**
- Each (No.)

#### **Item No.2**

**Providing, installing & commissioning Alum stirrers with motor(1) HP), gear arrangement & electrical cable, connections, control panels etc. (size as per design)**

- Providing, supplying, erecting, testing and commissioning **Alum Stirrer of approved make and manufacture**, complete with electric motor, reduction gear (if required), shaft, impeller, mounting arrangement and all accessories, conforming to relevant IS standards, for efficient and continuous operation, complete in all respects, as directed by the Engineer-in-Charge.
- **Type and Duty**
- Providing **vertical type mechanical alum stirrer**, suitable for continuous operation, for proper mixing and dissolution of alum solution in alum preparation tank / solution tank.
- **Capacity & Speed**
- Stirring capacity suitable for alum tank as specified in Schedule-B
- Speed of rotation: **Slow speed stirring**, suitable for uniform mixing without vortex formation
- Operating duty: Continuous duty
- **Construction & Materials**
- **Shaft:** SS 304 / SS 316 (as specified), corrosion resistant, adequately sized
- **Impeller / Paddle:** SS 304 / SS 316, properly designed for uniform mixing
- **Tank mounting arrangement:** MS / SS fabricated structure with anti-corrosive painting
- **Bearings:** Heavy-duty antifriction bearings, suitable for continuous operation
- **Finish:** One coat of primer and two coats of epoxy / enamel paint for MS parts
- **Drive System & Motor**
- Driven by **squirrel cage induction motor**, TEFC type
- Protection: **IP-55**
- Insulation: **Class-F**
- Power supply: **415 V  $\pm$ 10%, 50 Hz AC**
- Gearbox / reduction unit: Helical / worm type, oil lubricated, suitable for required RPM (if provided)

- **Accessories (Included)**
- Coupling arrangement
- Base plate / top mounting plate
- Foundation bolts and nuts
- Motor pulley / gearbox (if applicable)
- Guard for rotating parts
- All necessary fasteners
- **Electrical & Control**
- Local ON/OFF starter or control panel complete with:
  - MCB / MCCB
  - Contactor and thermal overload relay
  - Start/Stop push buttons
  - Indicating lamps
- Internal wiring, earthing and cable termination included
- **Erection, Testing & Commissioning**
- The item shall include transportation, unloading, handling, erection, alignment, fixing, testing and commissioning of alum stirrer at site. Trial run shall be carried out to ensure smooth, vibration-free operation and uniform mixing, to the satisfaction of the Engineer-in-Charge.
- **Standards**
- All materials and workmanship shall conform to relevant **IS / IEC standards** and GWSSB specifications.
- **Guarantee**
- The alum stirrer set shall be guaranteed for **12 months from the date of commissioning** against manufacturing defects. Any defective parts shall be replaced or repaired free of cost during the guarantee period.
- **Mode of Measurement**
- Payment shall be made **per each Alum Stirrer set**, completely installed, tested and commissioned, and shall include:
  - Cost of alum stirrer, motor, gearbox (if any) and accessories
  - Control panel / starter and electrical works
  - Transportation, loading, unloading and handling
  - Erection, testing and commissioning
  - All labour, materials, tools and plants
  - All taxes, duties, royalties and incidental charges
- **No separate payment shall be made** for shaft, impeller, mounting arrangement, foundation bolts, electrical wiring, testing or commissioning, as the same shall be deemed included in the accepted rate.
- **Unit of Measurement**
- Each (No.)

### **Item No.3**

**Supply, installation, testing & commissioning single girder type fully electrically operated EOT crane with electrically operated hoist, class II duty geared travelling trolley with seven meter lift complete with long travel rail track (40 mm sq bar), moving or cross girder, all three motions electrically operated by suitable rating motor IP 54, control panel & down pendant control block, brake, safety device, cables from motor to starter panel & other required accessories & tested as per IS Specifications**

- Supply, installation, testing & commissioning single girder type fully electrically operated EOT crane with electrically operated hoist, class II duty geared travelling trolley with seven meter lift complete with long travel rail track (40 mm sq bar), moving or cross girder, all

three motions electrically operated by suitable rating motor IP 54, control panel & down pendant control block, brake, safety device, cables from motor to starter panel & other required accessories & tested as per IS Specification.

- **GENERAL REQUIREMENTS**

- Cranes shall be designed and constructed in accordance with BS 2573 and shall comply with the requirements of BS 466: Class 2 medium-duty operation.
- The term 'crane' shall be deemed to include gantry rails, platform with handrails for maintenance use, down-stop conductors, end stops, holding-down bolts and all other items required for complete installation.

- **E.O.T. CRANE:**

- The crane shall be electrically operated, box / standard 'I' beam type single / double girder, complete with all accessories including down shop conductor, crane rails and fixtures, starter panel, cable up to starter and shall conform to IS:3177, IS:807 and other relevant approved standards.
- The crane bridge shall consist of bridge girders on which a wheeled trolley is to run. The bridge trucks and trolley frames shall be fabricated from structural steel. Access walkway with safe hand railing as required along the full span length of the bridge girder shall be provided. Steel shall be tested for quality conforming to ASTM A36 except that, plates more than 20 mm thick shall conform to IS:2062, BS:4360 or relevant internationally approved standards.
- The bridge shall be designed to carry safely the loads specified in IS:807, BS:2573 or relevant internationally approved standards. All anti-friction bearings for bridge and trolley track wheels, gear boxes and bottom sheaves on hook shall be lubricated manually by hand operated grease pump through respective grease nipples.
- Wheel base and structural frame of the wheel mounting of the end carriages shall be designed so as to ensure that the crane remains square and prevent skewness. Bridge and trolley track wheels shall be of forged steel and shall be double flanged type. The wheel diameter and rail sizes shall be suitable for the wheel loads conforming to relevant standards.
- The crane rails shall be manufactured from wear resistant austenitic manganese steel. Mountings of the wheels shall be designed to facilitate easy removal for maintenance.
- Walkways shall be of at least 500 mm clear inside width with a 6 mm thick non-skid steel plate surface. Steel rail stops to prevent rails from creeping and trolley from running off the bridge shall be abutted against ends of rails and welded to the girders. Bridge and trolley stops to match the wheel radius shall be provided before the buffer stops.
- All exposed couplings, shafts, gear, wheels, pinions and chain drives etc. shall be safely
- Encased and guarded completely to prevent any hazard to persons working around. All bearings and gears shall have a design life of 10,000 hours. Electro-magnetic and hydraulic thrusters brake shall be provided for the main hoist. One electro-magnetic brake shall be provided for each of the cross travel and long travel motions.
- Hook shall be solid forged, heat treated alloy or carbon steel suitable for the duty service.
- They shall have swivels and operate on ball thrust bearings with hardened races. The lifting hooks shall comply with the requirements of IS 8610 or BS: 2903/ BS: 3017 or relevant internationally approved standards and shall have a safety latch to prevent rope coming off the hook.
- Hoist rope shall be extra flexible, improved plough galvanised steel rope with well lubricated hemp core and having six strands of 37 wires per strand with minimum ultimate tensile strength of  $1.6 \times 10^6$  kN/m<sup>2</sup> of Right Hand Ordinary (RHO) lay construction. The ropes shall have a 6:1 safety factor on the specified safe working load, and shall conform to IS: 2266.
- Rope drums shall be grooved and shall be either cast iron or cast steel of or welded steel
- Conforming to IS: 3177, BS: 466 or relevant internationally approved standards.
- Gears shall be cut from solid cast or forged steel blanks or shall be stress relieved welded steel construction. Pinions shall be of forged carbon or heat treated alloy steel. Strength,

quality of steel, heat treatment, face, pitch of teeth and design shall conform to BS: 436, IS: 4460 and BS:721 or relevant internationally approved standards.

- A SWL plate not less than 150 mm in height showing year of manufacture and rated capacity of hoist in figures shall be placed on each side of the crane girder.
- The maximum deflection under full load shall not exceed 1/900 of the span (as per IS: 3177).
- All accessory and auxiliary electrical equipment including drive motors, electrically operated brakes, controllers, resistors, conductors, insulators, current collectors, pendant push button station, protective devices, operating devices, cables, conduits, etc. necessary for the safe and satisfactory operation of the crane shall be provided.
- Power to the crane shall be provided by down shop conductors manufactured from high conductivity hard drawn copper. Conductors shall be completely shrouded such that they have no exposed current carrying surfaces. Pendant type push button station shall be sheet steel enclosed and shall comprise the following push buttons and indicating lamps:
  - 'Start' and 'Stop'.
  - Long travel - 'Right' and 'Left'.
  - Cross travel - 'To' and 'From'.
  - Hook - 'Hoist' and 'Lower'.
  - Red indicating lamp for supply 'ON' indication.
- Pendant type push button shall be supported independently of the electrical cable and shall be earthed separately, independent of the suspension. Automatic reset type of limit switches shall be provided to prevent over travel for each of the following:
  - For 'UP' and 'Down' motions of the hook.
  - Long travel motion
  - Cross travel motion
- Crane structures, motor frames and metal cases of all electrical equipment including metal conduit and cable guards shall be earthed. All motors, brakes, limit switches, panels, drum controllers, resistor unit sets shall be provided with two studs for earthing.
- Drive motors shall be as per IS:325 in general. Motor shall be designed for frequent reversal, braking, inching and acceleration. Pullout torque shall be 2.15 times the rated torque. Pendant control switch, controllers and resistors, controls, electrical protective devices, cables and conductors, earthing guards, etc. shall be as per IS : 3938. Limit switches shall be provided for over hoisting and over-lowering and of two extreme ends of trolley travel i.e. crosses as well as long travel.
- **TESTS AND TEST CERTIFICATES:**
- Overload tests at 125% of the rated load shall be carried out and test certificates shall be furnished for hook, wire rope, brake and complete crane.
- **FOLLOWING ACCESSORIES SHALL BE PROVIDED WITH E.O.T. CRANE:**
- Mechanical stoppers for long travel & cross travel shall be provided.
- Pendant push button station shall be located at maximum 1.0 Mt. from operating floor elevation.
- Earthing terminals shall be provided.
- Limit switches for over hoist, over lower, over cross travel & over long travel shall be provided.
- Flexible trailing cable system shall be provided with sufficient number of loops for specified cross travel.
- The control panel shall be provided.
- Isolation on switch to receive the power from Electrical Panel.
- M.S. ladder shall be provided by the contractor for maintenance.
- **Painting:**
- Steel materials of all structural parts shall be sand blasted or shot blasted to SA 21/2
- Finish to remove rust, mill scale and grease prior to fabrication and painted as follows:
- After sand blasting or shot blasting – One coat of epoxy paint (primer).

- After partial assembly and inspection at the supplier's works - Two coats of enamel paint.
- After erection at site – One coat of enamel paint.
- The final coat shall be golden yellow colour with black zebra marking wherever applicable. All machined parts shall be coated with grease, varnish or other approved protective coats before dispatching from the supplier's works. Interiors of the gear casings shall be painted with one coat of oil resisting paint.
- **Mode of payment:**
- Payment shall be made per each EOT crane completely installed, tested and commissioned, and the accepted rate shall include cost of crane, hoist, motors, rail track, control panel, pendant control, electrical works, accessories, transportation, erection, testing, commissioning, all labour, materials, tools and plants, and all taxes, duties, royalties and incidental charges. No separate payment shall be made for any item or part thereof, as the same shall be deemed to be included in the accepted rate.

#### **Item No.4**

#### **Providing , installing & comissioning Flash mixer impeller with motor, gear arrangement & electrical cable , connections control panels etc. (size as per design) 5hp.**

- The mechanical mixing device shall comprise rapidly rotating blades mounted on a vertical shaft coupled to the gear box shaft through rigid coupling and driven through a suitably rated four pole, continuous duty, TEFC motor with IP 55 protection (motor shall be as per electrical specifications) operating through a reduction gear box to ensure uniform dispersal of the chemical solution / keep the sludge in suspension.
- **General Specification**
- Agitator component shall be designed to fit through agitator opening on tank manhole.
- Pressure containing part shall have minimum corrosion allowance of 3 mm.
- Gear unit
- A worm reduction gear shall be provided with a minimum service factor of 1.5 on the driver rated HP.
- V belt operation is not acceptable.
- Flexible coupling shall be selected with a minimum service factor of 2 and shall be capable of continuous operation at the max. Anticipated misalignment.
- Rigid coupling shall have tapered bores with key in nut arrangement. All rigid coupling shall be made from cast steel as per IS 1030 grade 2 or forged steel as per IS 2004 Cl. 3 or Cl 4 as per IS 1030 Gr 30 in tank rigid coupling in forged steel may be welded to the shaft.
- Shaft sleeve with harden surface shall be provided at standby barring and in packing areas.
- The shaft shall be suitable for transmitting full torque available at the driver name plate rating (starting torque).
- Shaft shall be suitable for jamming conditions considering that impeller is jammed at 0.75 R from centre (R = Radius of impeller).
- Shaft assembly designed with critical speed at least 30% removed from any operating speed.
- Impeller blade shall be of one piece construction.
- Bearing housing shall be designed with a span suitable for the minimum radial cum thrust loading used for the design of the shaft.
- It is preferred that the design of the agitator does not incorporate the use of a steady bearing at the shaft end. However if the use of such bearing is imperative the design shall be such that the bearing is of set aligning type and his product lubricated.
- The delivery pipe of the dosing pump shall be of SS 304 material.



- **Mechanical Data:**
- Agitation provided Agitator : Top entry vertical shaft.
- Level gauge : Required (For Chemical dosing tanks only)
- Type of level gauge : Float & board type
- Agitator type : Axial pitched turbine/low speed
- No. of Agitators : One for each tank
- No. of Blades : As per manufacturers design
- Impeller dia, mm : As per manufacturers design
- Gear box : Worm/worm wheel oil bath type vertical single reduction
- Agitator RPM : 60-100
- Material of construction
- Reaction Tank : RCC M250 epoxy lined / coated
- Agitator : SS 304
- Impeller : SS 304
- Shaft : SS 304
  
- **TESTS AND INSPECTION:**
- Equipment shall be offered for visual inspection and dimensional checks.
- Equipment shall be tested as per relevant standards with latest revisions.
- **DRAWINGS:**
- The manufacturer shall submit the following drawings.
- Preliminary outline dimensional drawings.
- Typical cross sectional drawing showing constructional details with the complete bill of material, MOC and relevant standards, foundation details at site.
- **Mode of payment:**
- Payment shall be made per each flash mixer set completely installed, tested and commissioned, and the accepted rate shall include cost of impeller, shaft, motor (5 HP), gear arrangement, control panel, electrical cables and connections, transportation, erection, testing, commissioning, all labour, materials, tools and plants, and all taxes, duties, royalties and incidental charges. No separate payment shall be made for any component or work, as the same shall be deemed to be included in the accepted rate.

#### **Item No. 5**

**Providing fabricating, fixing/installing & commissioning clarifier M.s. BRIDGE WITH RAILS and wheels rotating arrangement incl. peripheral trolley, central bearing etc.complete size as per design Should be of branded.**

- Providing, fabricating, supplying, fixing/installing, testing and commissioning **M.S. clarifier bridge** of approved and reputed make/manufacturer, complete in all respects, of size and configuration as per approved design and drawings, conforming to relevant IS standards and as directed by the Engineer-in-Charge.
- The clarifier bridge shall be fabricated from structural mild steel sections, properly designed for load conditions, welded/bolted as required, straightened, aligned and balanced to ensure smooth and stable rotation.
- All M.S. structural members shall be cleaned, surface-prepared and provided with one coat of primer and two coats of epoxy / approved anti-corrosive paint suitable for water treatment plant environment.
- The bridge shall be provided with **peripheral rail and wheel arrangement**, including peripheral trolley with wheels, shafts, bearings and supports, designed for smooth peripheral travel of the bridge.

- **Central bearing arrangement** with center column support, thrust bearing and all allied components shall be provided to permit free and uniform rotation of the bridge without vibration or undue wear.
- Wheels shall be of cast steel / CI with suitable bearings, properly machined and aligned on rails to ensure smooth operation and correct load distribution.
- The item shall include supply and fixing of all rails, brackets, clamps, fasteners, anchor bolts and accessories required for complete installation of the clarifier bridge system.
- The work shall include transportation, loading, unloading, handling, fabrication at workshop, erection, alignment, fixing, testing and commissioning of the clarifier M.S. bridge with rails and rotating arrangement at site, including trial run, to the satisfaction of the Engineer-in-Charge.
- All materials and workmanship shall conform to relevant IS codes and GWSSB specifications, and the complete system shall be of **branded and approved make**.
- The clarifier bridge assembly shall be guaranteed for **12 months from the date of commissioning** against manufacturing and workmanship defects.
- **Mode of payment:** Payment shall be made per each clarifier M.S. bridge completely fabricated, installed, tested and commissioned, and the accepted rate shall include cost of all materials, rails, wheels, peripheral trolley, central bearing arrangement, accessories, fabrication, transportation, erection, alignment, testing, commissioning, all labour, tools and plants, and all taxes, duties, royalties and incidental charges. No separate payment shall be made for any item or part thereof, as the same shall be deemed to be included in the accepted rate.
- The contractor shall dismantle and remove the existing MS Clariflocculator Bridge. All dismantled materials shall be handed over to the department. No separate payment shall be made for this work.

**Item No. 6 Extra for 3 motors of required RPM and 3 gear box assemblies with one slipping unit including wiring and installing switch and control panel as per requirement.****SUPPLY OF MATERIAL**

Extra for 3 motors of required RPM and 3 gear box assemblies with one slippery unit including wiring and installing switch and control panel as per requirement.

- Motors selected for the fan shall be of adequate rating with a safety factor of 1.5 or greater. If the fans are belt-driven the motor shall be mounted on slide rails for belt tension and adjustment. The complete assembly shall be mounted on Neoprene Vibration Isolators. The motor shall conform to the relevant latest Indian Standards of British Standards. It shall have permanently lubricated ball bearings. The motor shall be suitable for 415B, 3 Phase, 50 Hz supply.
- The bearing life shall not be less than 20,000 hours at design conditions and motor shall be of class 'F' insulation to allow for operation up to 95 rise over the ambient temperature of 45 C. External copper grease leads for lubrication of motor bearings shall be provided by the manufacturer.
- Fan motor shall be standard totally enclosed fan cooled (TEFC) foot mounted squirrel cage induction motor with single speed, single winding, continuous duty variable torque's.
- A conduit box shall be mounted on the exterior of fan casing and lead wires from the motor conduit box shall be protected from the air stream by being encased in a tight metal conduit pipe.
- The belt drives shall have stainless steel wire cage guards.
- Supply of air fans in dry well shall have air flow switches and pressure switches fitted in the ducting. The selection of these switches is left to the contractor to suit the fan units being supplied.
- Gearboxes

- The Gearboxes shall be totally enclosed dust, water and hose proof. Suitable lifting lugs shall be provided. They shall be robustly constructed and arduous duty.
  - The gear case shall be manufactured from grey cast iron to IS: 210 and of a grade to ensure high strength and wear resistance. Inspection covers shall be provided together with protected oil level indication, breather, with oil mist prevented, and drain plugs.
  - The gearboxes shall be designed for operation at the ambient temperatures specified without the assistance of a cooling fan.
  - The mechanical service factor shall be not less than 1.5 when applied to the rated motor power or higher as recommended by equipment manufacturer.
  - The gears shall be manufactured from steel to BS: 970 of grade selected by the Contractor and entered in the Schedule of Particulars. The teeth shall be profile ground and lapped to a high standard of accuracy and finish.
  - Rolling bearings shall be adequately rated to ensure a running life of not less than 50,000 hrs.L10 life.
  - The input and output shafts shall have oil seals fitted to prevent the ingress of lubricant when the gearbox is mounted in the required orientation. For example, inclined when applied to screw pump installations.
  - The seals shall also prevent the ingress of dust, sand and moisture.
  - Lubrication of the gears shall be by a splash or forced system.
  - An anti-run back device shall be supplied and fitted to all gearboxes involved in screw pump installation.
  - Each gear unit shall be subjected to a full load test at the inclinations specified for duration of 3.00 hrs during which time temperature, vibration and noise levels together with oil tightness shall be recorded in the presence of the Engineers Representative.
  - After satisfactory completion of the tests, each unit shall be drained of lubricant. All internal surfaces shall then be coated with suitable preservative.
  - A metal label shall be securely wired to the gear case to clearly state that the gear case requires to be coated with a suitable preservative.
  - The gear box shall be securely wired to the gear case to clearly state that the gear case requires to be filled with lubricant, the type and grade of which shall be clearly identifiable.
  - A metal label shall be securely wired to the gear case to clearly state that the gear case requires to be filled with lubricant, the type and grade of which shall be clearly identifiable.
- **Mode of payment:** Payment shall be made as a lump sum item for the extra provision of three motors, three gear box assemblies and one slippering unit, completely installed, tested and commissioned, and the accepted rate shall include cost of motors, gear boxes, slippering unit, control panel, switches, wiring, accessories, transportation, erection, testing, commissioning, all labour, materials, tools and plants, and all taxes, duties, royalties and incidental charges. No separate payment shall be made for any component or work, as the same shall be deemed to be included in the accepted rate.

#### **Item No.7**

**Providing and fixing rolling shutters of approved make made of 80 mm wide M.S. laths inter-locked together through their entire length and jointed together at the ends by end locks mounted on specially designed pipe shaft with bracket plates, guide channels and arrangements for inside and outside locking with push-pull operation including the cost of hood cover and spring etc. complete (A) Shutters having width below 3.5 m.**

- Providing, supplying and fixing **rolling shutters of approved and reputed make**, fabricated from **80 mm wide mild steel laths**, inter-locked together throughout their entire length and jointed at the ends with approved end locks, conforming to relevant IS standards and as directed by the Engineer-in-Charge.
- The rolling shutter shall be mounted on a specially designed **mild steel pipe shaft** with heavy-duty bracket plates, complete with spring mechanism for smooth push-pull manual operation.
- Providing and fixing **mild steel guide channels**, properly aligned and securely fixed to masonry / RCC / structural members, ensuring smooth vertical movement of the shutter.
- The shutter shall be provided with arrangements for **inside and outside locking**, including hasps, staples and locking devices of approved quality.
- The item shall include **hood cover**, springs, anchor bolts, fasteners and all accessories required for proper functioning of the rolling shutter.
- All mild steel components shall be cleaned, surface prepared and provided with one coat of primer and two coats of approved enamel / anti-corrosive paint, as directed by the Engineer-in-Charge.
- The work shall include transportation, loading, unloading, handling, fabrication (if required), fixing/installation, alignment and testing of the rolling shutter at site, complete in all respects.
- **Width of shutter:** Below **3.50 metres**, as specified in Schedule-B and approved drawings.
- All materials and workmanship shall conform to relevant IS codes and GWSSB specifications.
- **Mode of payment:** Payment shall be made per square metre (or per each, as specified in Schedule-B) of rolling shutter having width below 3.50 m, completely supplied and fixed in position, and the accepted rate shall include cost of all materials, pipe shaft, bracket plates, guide channels, hood cover, springs, locking arrangements, painting, transportation, labour, tools and plants, and all taxes, duties, royalties and incidental charges. No separate payment shall be made for any component or operation, as the same shall be deemed to be included in the accepted rate.

#### **Item No. 8**

#### **Dismantling steel work including distempering and stacking the materials with all lead and lift. Kg**

- Dismantling existing **steel work** of any description and in any position, including cutting, unbolting or removing welded connections, as required, and as directed by the Engineer-in-Charge.
- The item shall include **distempering/removal of paint, rust, grease and dirt**, wherever required, to make the dismantled materials fit for stacking and reuse or disposal.
- The dismantled steel members shall be **carefully lowered**, without causing damage to adjoining structures, services or finished surfaces.
- All dismantled materials shall be **stacked properly at site** at the location specified by the Engineer-in-Charge, including sorting of serviceable and unserviceable materials.
- The work shall include **all leads and lifts**, loading, unloading, handling, cutting tools, labour, scaffolding and safety measures required to complete the dismantling operation.
- The item shall be executed strictly as per instructions of the Engineer-in-Charge and in accordance with GWSSB specifications and standard practices.
- **Mode of payment:** Payment shall be made **per kilogram (Kg)** of steel work dismantled, properly distempered and stacked, and the accepted rate shall include cost of all labour, tools, plants, scaffolding, leads, lifts and incidental charges. No separate payment shall be made for any operation or item, as the same shall be deemed to be included in the accepted rate.

#### **Item No.9**

**Providing and fixing 25 mm x 5.2 mm MS railing with three horizontal rows and posts of angles iron of size 65 mm x 65 mm x 8 mm RCC 150 mm and 1.15 meter height and placed at 1.85 mt c/c including painting two coats and anchorage in cc etc complete**

- Hand railing shall be of MS; ERW Medium Class mild steel of circular hollow section and shall comply with the relevant requirements of BS : 1387 BS : 6323 Part I or BS : 4360. Mild Steel toe boards shall be provided, 100 mm high by 3 mm thick positioned above the platform level and fixed securely to the standards. All items shall be painted with epoxy paint & epoxy primer.
  - Standards shall not be less than 38 mm external diameter and rails shall not be less than 32 mm external diameter.
  - Horizontal handrails shall be 1000 mm high with an intermediate rail at mid height. Handrail height shall be measured vertically from finished floor level to the hand rail centre line.
  - Handling and fixings shall be designed to withstand a horizontal force of 740 N/m run without permanent distortion or failure of components. When a horizontal force of 360 N/m is applied at handrail level the deflection at any point on the handrail shall not exceed 1/125 of the distance between the centre lines of adjacent standards or 10 mm. whichever is the least.
  - All mounting flanges shall be of substantial construction, with horizontal flanges drilled for not less than three bolts with two bolts on a line parallel to and on the walkway side of the line of the hand railing and vertical flanges drilled for less than two bolts and line through the bolts being vertical. Fittings shall be screwed or secured with grub screws. The standards shall be set at not more than 1.5 m. Centres. When provided in sections, hand railing shall be joined together with purpose made fittings secured by screws or grub screws.
  - All ladders, stairway or other openings shall be guarded on three sides by hand railing conforming to the requirements stated above.
  - The Contractor shall ensure that unless specified hereinafter to the contrary, all hand railing shall be of uniform appearance and manufacture.
- **Mode of payment:** Payment shall be made **per running metre (Rmt)** of M.S. railing completely fabricated, fixed and painted in position, and the accepted rate shall include cost of all materials, cement concrete for anchorage, painting, labour, tools and plants, and all taxes, duties and incidental charges. No separate payment shall be made for any component or operation, as the same shall be deemed to be included in the accepted rate.

#### **Item No.10**

**Supply of V-wire under drain system for RSF beds made from made from stainless steel screen with base pipe of HDPE pipes with other accessories for one bed having two compartment & size of each bed is 6 m x 4 m . The system shall consist of required length of laterals , each having MOC SS 304 with 300 micron slot screen based on 3" HDPE pipe . The air distribution shall be done uniformly and shall cover all laterals individually.**

- Providing and supplying **V-wire under drain system** for **Rapid Sand Filter (RSF) bed** of approved and reputed make, complete in all respects, conforming to relevant IS / IEC standards and as directed by the Engineer-in-Charge.
- The under drain system shall be provided for **one RSF bed having two compartments**, with **size of each compartment 6.0 m × 4.0 m**, designed to ensure uniform collection of filtered water and uniform air distribution during backwashing.
- The system shall consist of **required number and length of laterals**, properly designed and laid as per approved drawings to achieve uniform hydraulic and air distribution over the entire filter bed area.
- Each lateral shall be manufactured from **stainless steel V-wire / screen of MOC SS 304**, having **300 micron slot size**, mounted on **3" (75 mm) HDPE base pipe**, suitable for long-term corrosion-free service.

- The HDPE base pipes shall be of approved quality and pressure rating, complete with all required fittings, connectors and end caps, ensuring leak-proof performance.
- The under drain system shall be designed such that **air distribution is uniform** and **each lateral is individually and effectively covered**, ensuring efficient backwashing without dead zones.
- The item shall include supply of all accessories such as headers, connectors, couplers, clamps, fasteners and sealing arrangements required for complete installation of the V-wire under drain system.
- All materials shall be of approved and branded make, suitable for use in potable water treatment works, and workmanship shall conform to GWSSB specifications.
- **Mode of payment:** Payment shall be made **per set for one RSF bed (two compartments)**, completely supplied and installed in position, and the accepted rate shall include cost of stainless steel V-wire screens, HDPE base pipes, laterals, accessories, fittings, transportation, loading, unloading, handling, labour, tools and plants, and all taxes, duties, royalties and incidental charges. No separate payment shall be made for any component or operation, as the same shall be deemed to be included in the accepted rate.

#### **Item No.11**

##### **Pre-cast Cement concrete tiles**

- Providing and supplying **pre-cast cement concrete tiles** of approved make and manufacture, of size, thickness and pattern as specified in Schedule-B and drawings, conforming to relevant IS standards and as directed by the Engineer-in-Charge.
- The tiles shall be machine-pressed / vibrated, manufactured from cement, coarse sand and graded aggregates of approved quality, ensuring uniform shape, smooth finish, adequate strength and durability.
- The cement concrete tiles shall be of **minimum M-20 grade** (or as specified), properly cured and free from cracks, chips and surface defects.
- The tiles shall have true edges and uniform thickness, and shall be suitable for use in floors, walkways or open areas, as specified.
- The item shall include loading, unloading, stacking and protection of tiles at site, complete in all respects.
- All materials and workmanship shall comply with relevant IS codes and GWSSB specifications.
- **Mode of payment:** Payment shall be made **per square metre (Sq.m.)** of pre-cast cement concrete tiles supplied at site (or supplied and laid, if so specified in Schedule-B), and the accepted rate shall include cost of tiles, materials, transportation, loading, unloading, stacking and all taxes, duties, royalties and incidental charges. No separate payment shall be made for any item or operation, as the same shall be deemed to be included in the accepted rate.

Signature of Contractor

Deputy Executive Engineer  
P.H.Sani.Sub Dn  
Kalol