Name of Work : Comprehensive Operation & Maintenance of Civil & Electromechanical assets such as elevated service reservoirs (E.S.R), HGLR, sump, pump house, all distribution pipelines, valves, pumping machinery & electrical equipment etc. for the Raval regional water supply schemes, including supply of 5.37 MLD potable water to all the 09 villages and 1 city for 60 months period. Taluka:-Kalyanpur District:- Devbhumi Dwarka based on Narmada Pipe line NC-21. Including supply of PAC/Alum, Bleaching Powder/Chlorine Gas etc. complete..

Detailed Specification for Part-B Maintenance

Sch-B1(i)

Item No:-2

Inside-Outside Painting to all Functional civil structures.

Applying any approved quality of cement paint in three coats including cleaning, washing etc. comp.

Finishing wall with water proof cement paint on an undecorated wall surface (3 coats) to give an approved brand and manufacture and of required shape, even shade after thoroughly brushing the surface to remove all dirt and remains loose powered materials.

The water shall confirm to M-1 and cement water proofing shall confirm to I.S. 5410-1969. Scaffolding: The relevant specification of item No. 88 of standard specification booklet.

Preparation on surface. The relavent specification of 1. No. 88 of standard specification booklet shall be followed except that the word white wash, colour wash shall be substituted with water proofing cement paint. The surface shall be thoroughly wetted with clean water surface before cement water proofing paint is applied.

Preparation of paint: Portland cement shall be prepared by adding paint power to water and stirring to obtain a thick paste, which shall then be diluted to a brushable consistency. Generally, equal volumes of paint powder and water make a satisfactory paint. In all cases, the manufactures instruction shall be followed. The paint shall be mixed in such quantities as can use up within an hours of mixing as otherwise the mixture will set and thickness affecting flowing and finish. The libs of cement paints drums shall be kept tightly when not in use.

No painting shall be done when the paint is likely to be exposed to a temperature of below TC within 48 Hrs. after application.

When weather conditions are such as to cause damage the work shall be carried out “IN THE SHADOW” as far as possible.

The helps the proper hardening of the paint film by keeping the surface moist for a longer period. To maintain the uniform mixture and to prevent the paint shall be stirred frequently in the bucket.

The finished surface shall be even and uniform in shade, without patches brush marks, paints drops etc.

Distempering of wall surfaces

Distempering with dry distemper of approved brand and manufacture (two coats) and of required shade on wall surfaces of given an even shade, over and including a priming coat of whiting after thoroughly brooming the surface free from mortar dropping and other foreign matter as per instruction of Engineer in charge. The payment shall be made as per **Schedule -B**

Sch-B1(ii)

Item No:-3

Oil paint colour: All type of doors, windows, ventilation, shutter, pump, motor, all valves & equipment inside pump house, transformer yard, D.P. structure, transformer etc

Painting Two coats (excluding priming coat) on steel and other metal surface

The item includes all metal surfaces shall be painted with enamel paint and brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter as per instruction of Engineer in charge.

Painting letters with enemalled paint for capacity of tank. The size of letter will be 45 cms height & 50mm width. The work shall be carried out as directed. The paint to be used shall be used shall be of approved quality and tint.

The payment shall be made as per **Schedule -B**

Sch-B1(iii)

Item No:-4 Food Grade epoxy coat: Inside of storage reservoir/ tanks.(only RWSS – Twice in the contract period)

Applying anti Corrosive chemical treatement food grade epoxy for water retaining structure including cleaning the surface with required treatment and cleaning the surface thoroughly and making surface dry, even & smooth for applying treatment and coats. DCL1400 with 3 years guarantee for removal of chlorine effect on RCC structure.

The payment shall be made as per **Schedule -B**.

Sch-B2

Item No:-5

Cleaning of Storage reservoir: UG sumps, ESR, HGLR/ GLCC and all village level sumps every six month

PROCEDURE:-

STEP 1:- **Mechanized Dewatering**

In the **First stage** of Mechanized Dewatering of the process the Manhole and surroundings are cleaned off dirt, mud and algae after which the water below the foot-valve level is pumped out using special de-watering equipments. All tools and machinery required shall be provided by the contractor.

STEP 2:- **Sludge Removal**

In the **Second Stage** of Sludge Removal the sludge which has settled on the floor of the tank shall be sucked out using special sludge pumping equipments. All tools and machinery required shall be provided by the contractor.

STEP 3:- **High Pressure Cleaning**

In the **Third Stage** of High Pressure Cleaning the Walls & ceilings of the tanks shall be thoroughly cleaned using special high pressure jet cleaners which rid of the walls off calcinations, algae and all contaminants which cling on the internal surface of the tank helping the microbiological contamination to grow. All tools and machinery required shall be provided by the contractor.

STEP 4:- **Vacuum Cleaning**

In the **Fourth stage** of the sludge removal process an Industrial Vacuum Cleaner shall be used to remove the resultant contaminants, making the tank absolutely speck-free. All tools and machinery required shall be provided by the contractor.

STEP 5:- **Anti-bacterial Spray**

In the **Fifth very important Stage** of Anti-bacterial treatment the walls & ceilings shall be made totally sterile from bacterial attack using specially developed Antibacterial agents. All chemicals ,chlorine powder etc. shall be provided by contractor.

STEP 6:- **UV Radiation**

And finally in the **Sixth Stage** of the process final sterilisation and disinfection shall be done using UV Radiation by a specially developed UV Radiator which shall used to kill any suspended or floating bacteria remaining in the tank.

This full procedure makes the tank 100% Bacteria free and makes it perfectly fit for storing clean drinking water. The above process shall be common for both the Underground and Overhead drinking water storage tanks and can be used for all types of tanks like Concrete Tanks, Fabricated Steel tanks, Plastic (Syntax Type) Tanks etc.

The payment shall be made as per **Schedule –B.**

Part C : Repairing work of Pump House

Item No.2

Providing form work of ordinary timber planking so as to give a rough finish including centering strutting and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ reinforced concrete and plain concrete work in foundation, footings, bases of columns, and mass concrete.

1.0. Materials

1.1. The shuttering to be provided shall be of ordinary timber plank and shall conform to M-26.

1.2. The dimensions of scantlings and battens shall conform to the design. The strength of the wood shall not be less than that assumed in the design.

2.0. Workmanship

2.1. The form work shall conform to the shape lines and dimensions as shown on the plans and beconstructed as to remain sufficiently rigid during the placing and compacting of the concrete. Adequate arrangements shall be made by the contractor toe safe-guard against any settlement of the form-work during the course of concreting and after concreting. The form work of shuttering, centering, scaffolding, bracing etc. shall be as per design.

2.2. Clearing and Treatment of forms:

2.2.1. All rubbish, particularly chipping shaving and saw dust shall be removed from the interior of the form before the concrete work is placed and the-form in contact with concrete shall be cleaned and thoroughly wetted or treated. The surface shall be then coated with soap solution applied before concreting is done. Soap solution for the purpose shaft prepared by dissolving yellow soap in water to get consistency of paint. Alternatively a coat of raw linseed oil shall be applied after thoroughly cleaning the surface. Care shall be taken that the coating does not get on construction joint surface and reinforced bars.

2.3. Stripping time:

2.3.1. In normal circumstances and where ordinary cement is used forms may be struck after expire of following periods.

(a) Sides of walls columns and vertical faces of beams……24 to 48 hours.

(b) Beam soffits, (props, left under)……..7 days.

(c) Removal of props slabs:

(i) Slabs spanning up to 4.5. m……7 days.

(ii) Spanning over 4.5 mm……...14 days.

(d) Removal of props t beams and Arches:

(i) Spanning up to 6 mm……..14 days.

(ii) Spanning over 6 m……21 days.

2.4. Procedure when removing the form work:

2.4.1. All form work shall be removed without such shock or vibrations as would damage the reinforced concrete surface. Before the soffits form work and struts are removed, the soffits and the concrete surface shall be exposed where necessary in order to ascertain that the concrete has sufficiently hardened

2.5. Centering:

2.5.1. The centering to be provided shall be got approved. It shall be sufficiently strong to ensure absolute safety of the form work and concrete work before, during and after pouring concrete. Watch should be kept to see that behavior or centering and form work is satisfactory during concreting. Erection should also he such that it would allow removal of forms in proper sequence without damaging either the concrete or the forms to be removed.

2.5.2. The props of centering shall be provided on firm foundation or base of sufficient strength to carry the loads without any settlement.

2.5.3. The centering and form work shall, be inspected and approved by the Engineer-in-charge before concreting. But this will not relieve the contractor of his responsibility for strength,-adequacy and safety of form work and centering. If there is a failure of form work or centering, contractor shall be responsible for the damages to property.

2.6. Scaffolding:

2.6.1. All scaffolding, hoisting arrangements and ladders etc., required for the facilitating of conceding shall be provided and removed on completion of work by contractor at his own expense. The

scaffolding, hoisting arrangements and ladders etc. shall be strong enough to with sand all live, dead and impact loads expected to act and shall be subject to the approval of the Engineer-in-charge. However contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangement, ladders, work and workman etc.

2.6.2. The scaffolding, hoisting arrangements and ladder shall allow easy approach to the work spot and afford easy inspection.

2.6.3. The rate is applicable to all condition of working and height up to 4 mts. The rate shall include the cost of materials and labour for various operations involved such as:

(a) Splayed edges, notching, allowance for overlaps and passing at angles, battens centering, shuttering propping, bolting, wedging easing, striking and removal.

(b) Filleting to form stop chamfered edges or splayed external angles not exceeding 20 mm: width to beams, columns and the like.

(c) Temporary openings in the forms for pouring concrete, if required removing rubbish etc. (d) Dressing with oil to prevent adhesion of concrete with shuttering and.

(e) Raking or circular cutting.

2.7. Re-Use:

2.7.1. Before re-use, all from shall be inspected by Engineer-in-charge and their suitability ascertained. The forms shall be scarred, cleaned and joints are gone over, repaired where required. Inside surface shall be retreated to prevent adhesion of concrete.

3.0. Mode of Measurements & Payment

3.1. From work shall be measured as the area in square meters to shuttering in contract with concrete except in the case of inclined member and portion of curved profile and upper side in which case on area of underside shall be measured for payment.

3.4. From work to secondary beams shall be measured up to the sides of main beams but no deduction shall be made form the form work of the main beam at the inter section point. No deduction shall be made form the form work of a column at inter section of beams.

3.5. The rate is for the completed item

3.6. The rate shall be for a unit of one sq. meter.

Item No.3

Providing & Laying controlled cement concrete M 250 and curing complete excluding cost of formwork and reinforcement for RCC work, Slabs upto floor two level

(A) For Slab. (B) For Lintels. (C) For Beam (D) For Chhaja (E) For Columns.

Cement concrete shall consist one part of cement two parts of sand and four parts of black trap metal chips 12 mm to 20 mm size as measured by volume.

1. CEMENT:

Cement to be used shall be Indian Portland cement complying with material specification M-3.

2) SAND:

Sand to be used shall be as per material specification M-6.

3) COARSE AGGREGATES :

Aggregates to be used shall be as per material specification M-12.

4) WATER :

Water to be used shall be as per material specification M-1.

5) FORM WORK:

The form work must be of planks and struts at required level and well supported by runners and beams. They shall not be so dry to sock water from the concrete not they shall be so grass shrink after erection. The forms shall be laid truly vertical horizontal and exactly true to shape required. All projection shall be removed and joints closed to prevent any mixture from following our the inside of the form should strictly confirm to the requirement dimensions on drawing. The methods and the details of form work shall be approved by the Engineer-in-Charge or his representative. All centering must be sufficiently strong and supported on props as wedges to prevent any lightest deflection due to the load of the concrete.

6) MIXING :

The ingredients shall be mixed in a proper mixture or by hand as ordered by the Engineer-in-Charge. The aggregates shall be measure by means, of measuring boxes corresponding to one bag of cement, which shall be taken as 117 Cft.

Mixing of concrete shall be carried out constantly in section of one bag of cement at a time shall immediately use after used after mixing. In order to test the consistency of the mixed concrete and to keep the quality of mixed water under control.

A slump test shall be carried out from time to time by the contractor by means of sand slumps cones. The amount of slumps shall be decided by the Engineer-in-Charge, and the contractor shall have to regulate the mixing accordingly.

The greatest care shall be exercised in lying of concrete to see that no displacement of steel from its true position takes place. In order to give required clear cover of concrete for steel, Precast cement block or stone chips shall be placed below the reinforcement at interats before laying to concrete is done. Niddle vibrator shall be used at the time of laying cement concrete. The mixed concrete shall be carried out in one operation quietly as possible and one days work shall be at place as directed by the Engineer-in-Charge or his representative.

Concrete shall be kept thoroughly wet and shall be protected from the direct heat of the sun by covering it with gunny bags wet soaking of any men conducting materials shall be kept wet for at least 21 days.

The period of removal of form shall be as under :

(1) Bottom of slab ..... 14 days.

(2) Bottom of beam and braces ..... 21 days.

(3) Side of beams and lintels ..... 3 days.

(4) Sides of slab and lofts ..... 3 days.

(5) Sides of column ..... 3 days.

No form shall be removed without getting the permission of Engineer-in-Charge or his representative while removing forms extreme care and caution is to be observed and main forms shall be removed quietly as without disturbing the cone.

The contractor shall be held responsible for any injury to the work arising form the removal of forms.

Item No.:- 4

High yield deform bars steel reinforcement for R.C.C. work including bending, binding and placing in position complete up to floor two level.

1.0. Materials

1.1. Cold twisted steel bars (high yield strength deformed bars) shall conform to M.19 Mild steel binding wires shall conform to M-21.

2.0. Workmanship

2.1. The specifications of item No. 5.4.10 shall he followed except that the cold twisted steel bars shrill be used with or without hooks at the ends. Deformed .bars without hooks shall, however, comply with relevant anchorage requirements

3. Reinforcing steel shall conform accurate to the dimensions given in the bar bending schedules shown on relevant drawings. Bars shall be bent cold to specified shape and dimensions or as directed, using a

proper bar bender, operated by hand of power to attain proper radius of bends. Bass shall not be bent or straightened in a manner that will injure the material. Bars bent during transport-or handling shall be straightened before being used on the work. They shall not be heated to facilitate bending Unless otherwise specified a "U" type hook at the end of each bar shall invariably be provided to main

reinforcement. The radius of the bend shall not be less then twice the diameter of the round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times the diameter of the round bar. In case of bars which are not round and in case of deformed bars, the diameter shall be taken as the diameter of circle having an equivalent effective area. The hooks shall be suitably encased to

prevent any splitting of the concrete.

2.4. All the reinforcement bars shall lie accurately placed m exact position shown on the drawings, and shall be securely held in position miring placing of concrete by annealed binding wire not less than 1 mm in size, and by using stay blocks or metal chair spacers, metal hangers supporting wires or other approved devices at sufficiently close intervals, Bars shall not be allowed to sag between supports nor displaced during concreting or any other operations of the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports shall not extend to the surface of concrete, except where shown on drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed Pieces of broken stone of brick and wooden blocks shall not be used Layers of bars snail be separated by spacer bars, precast mortar blocks or other approved devices Reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement form corrosion, concrete cover shall be provided as indicated on drawings. All the bars protruding from concrete and to which other bars are to be sliced and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout. Bars crossing each other where required shall be secured by binding wire (annealed) of size not less than 1 mm. in such a manner that they do not slip over each other at the time of fixing and concreting.

2.6. As far possible, bars of full length shall be used. In case this is not possible. Over lapping of bars shall be done as directed When practicable, overlapping bars shall not touch each other, but be kept apart by 25 them. Where not feasible, overlapping bars shall be bound with annealed wires not less than 1 mm.thick twisted tight. The overlaps shall be staggered for different bars and located at points, along the span where neither shear non bending moment is maximum.

2.7. Whenever indicated on the drawings or desired by the Engineer-in-charge, bars shall be jointed by couplings which shall have a cross-section sufficient to transmit the full stresses of bars. The ends of thebars that are joined by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross-section of the bar. Threads shall be standard threads Steel for coupling shall conform to I.S. 226.

2.8. When permitted or specified on the drawings, joints of reinforcement bars shall bull- welded so as to transmit their full stresses. Welded joints shall preferably be located at points when steel will not be subject to more than 75 percent of the maximum permissible stresses and welds so staggered that at any one section not more than 20 percent of the rods are welded. Only electric are welding using a pieces which excludes air from the molten metal and conforms to any or all other special provisions for the work shall be accepted. Suitable means shall be provided for holding bars securely in position during welding. It shall be ensured that no voids are left in welding and when welding is done in tow or three stages, previous surface shall be cleaned properly. Ends of the bars shall be cleaned of ell loose scale, rust, stages, paint and other foreign matter before welding. Only competent welders shall be employed on the work. The M.S. electrodes used for welding shall conform to I.S. 814. Welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number and frequency of test shall be as directed.

3.0. Mode of Measurements & Payment

3.1. For the purpose of calculating consumption, wastage shall not be permitted beyond 5 percent Excess consumption over 5% will be charged at penal rate.

3.2. Reinforcement shall be measured in length including overlaps, separately for different diameters as actually used in the work. Where welding or coupling is resorted to in place lap joints, such joints shall be measured for payment as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in tones on the same basis of as per M-18 even though steel is supplied to the contractor by the department on actual weight. Length shall include hooks at the ends Wastage and annealed steel wire for binding shall not be measured and the cost of these items shall be deemed to be included in the rate for reinforcement.

3.3. The rate for reinforcement includes cost of steel binding wires. its carting from Department store to work site, cutting, bending, placing, binding and fixing in position as shown on the drawings and as directed It shall also include all devices for keeping reinforcement in approved position, cost of joining as per approved method and all wastage and spacer bars.

3.4. The rate shall be for a unit of One Kg

Item No.:- 5

Providing 10mm thick cement plaster in single coat on brick/concrete walls for interior plastering upto floor two level & finished even & smooth in cement mortar (1 cement : 6 sand).

1.0. Materials

1.1. Water shall conform to M-1. Cement mortar shall conform to M-11.

2.0. Workmanship

2.1. The work shall be carried out in the coats. The backing coat (base coat) shall be 12 mm. thick in C.M. 1:3. The relevant specifications of item No. 17.58(I) shall be followed except that the thickness of back coat shall be 12 mm. average. Before the first coat hardens its surface shall be beaten up by edges of wooden tapers and close dents shall be made on the surface. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days, depending upon the weather conditions. The surface shall not be allowed to dry during this period.

2.2. The second coat shall be completed to 8 mm. thickness in C.M. 1:1 as described above,

including raising sand facing by bushing. The sample of sand face shall be got approved before the work is started. The whole work shall be carried out uniformly as per sample approved.

2.3. Curing :

The curing shall be started overnight after finishing of plaster. The plaster shall be kept wet for a period of 7 days. During this period, it shall be protected from all damages.

3.0. Mode of measurement & payment

3.1. The relevant specifications of item No. 17.58 shall be followed except that the sand face plaster on outside up to 10 m. above ground level shall be measured under this item.

3.2. The rate shall be for a unit of One sq. meter.