TECHNICAL SPECIFICATIONS
(Civil Works)
SPECIFICATION FOR WORK, QUALITY AND WORKMANSHIP

Name of the work: Rectification of deteriorated structures both RCC & structural members due to corrosion/ erosion at 765/400 kV POWERGRID Bhuj PS.

The specifications are intended for general descriptions of the work, quality, and workmanship. The specifications are not, however, intended to cover the minute details and the works shall be executed according to the best practices of Central Public Works Department or as per the recommendations of relevant Indian Standard Codes and according to the instructions of the Engineer-in-Charge.

All the materials required for successful completion of the project shall be brought from the approved sources/brands.

The procurement of various materials shall be done either directly from the main manufacturer or their authorized dealers whose traceability can be established to ensure that no duplicate/spurious makes are used in the works. The Contractors are required to submit manufacturer's test certificates for the lots supplied at site with due endorsements by the actual dealers/vendors/sellers. Notwithstanding all the above, the contractor shall be held responsible for the execution of works and use of proper materials as per the tender specifications. All materials shall be approved by the Engineer-in-charge before putting them to use.

The Contractor shall arrange all labour, equipment and materials required for complete performance of the work in accordance with the BOQ, specification and directions of the Engineer In-Charge.
The work to be performed under these specifications consists of providing all labor, supervision, materials, planking and strutting, power, fuel, construction equipment's, tools and plants, supplies, transportation, blasting materials if required, storage, insurance, royalty and all incidental items not shown or specified by reasonably implied or necessary for successful completion of work including contractor's supervision and in strict accordance with drawing and specifications.

Specifications:

1. Surface of member should be checked for sounding using hammer. The damaged/delaminated portion will sound hollow. The same should be marked to regular geometrical shapes. The edges should be grooved using slim and powerful 850W (230V) corded angle grinder about 25 mm deep. Grinder to have no load speed of 11500 rpm with on *I* off side switch and for use of cutting disc up to 100 mm. Concrete within the grooved area should be removed using High performance chipper hammer featuring low weight & low vibration having single impact energy of 7.5 J, full hammering frequency of 3180 impacts/minute, maximum chiseling performance of 900 cm3/min, weighted emission sound pressure level of 94 dB (A)

according to EN 60745, Triaxle vibration for chiseling in concrete 12.1 m/s2 according to 60745-2-6 and having weight according to EPTA procedure 01/2003 of 5.6 Kgs. (Mode of Measurement: Sq Mt of Area Chipped).

2. Providing and applying alkaline based rust remover having pH value in the range of 9.5-10 with Specific Gravity of 1.20-1.22@ 25 Deg C. Material should be compatible for use up to 70-degree surface *I* ambient temperature. (The surface area of member shall be measured) (MAXCURE® RR HR - Thermax Ltd).

   Providing & applying a single component cementitious corrosion inhibiting primer which is in powder form needing only water addition at site at a w/p ratio of 0.3 (30%). It shall have a mix density in the range of 2.0-2.5 and a pot life exceeding 25 minutes. It shall have a touch dry time of 10-15 minutes and minimum adhesion Bond strength of 1MPa when tested on Standard Electrometer as per ASTM D 4541-85. It shall provide a coverage of 10-12 RM per kg for a 12 mm bar when applied at 1 mm thickness. Material should be compatible fo1;- e up to 70-degree surface/ ambient temperature. The Surface area shall be measured.

   The cleaned and prepared concrete surface shall be applied with a Single coat of Migrating Multifunctional Corrosion Inhibitor. It shall be applied by a suitable brush/roller and shall provide a coverage of 3.5 sqm per litre per coat depending on the surface conditions. Material should be compatible for use up to 70-degree surface / ambient temperature. The surface area shall be measured. (MuCis® mia 200 HR - Thermax Ltd)

3. Marking, Drilling and installing the 12 mm dia holes about 100 mm to 150 mm deep on the member wall. Cleaning the holes with compressed air and spiral brush to make it free from drill dust. Fixing twin lock nozzles of 11 mm dia OD (to sustain pressure up to 1O Kg/cm2) in 12 mm dia holes, with epoxy putty as directed. (Salseal PT HR - Industrial Corporation of India). (Mode of Measurement: Number of Nozzles fixed).

4. Providing and Grouting MMA grout: Providing and Grouting with MMA grout having viscosity 20-25 sec by B/4 cup. Curing time of MMA grout should be 30-90 min depending on climatic conditions. Mode of measurement shall be for Grout consumed. (Salopol LV HR - Industrial Corporation of India).

   Providing and Grouting Epoxy grout: Providing and Grouting with the Epoxy grout shall have a minimum pot life of 40 minutes at 35 Deg C and a density in the range of 1ODO - 1100 kg/M3. It shall achieve a minimum compressive strength of 80 MPa@ 7days when tested as per ASTM D 695 or BS 6319 Part 2 and a flexural Strength of 40 MPa@ 7 Days when tested as per ASTM C-550 or BS 6319 Part 3. It shall achieve a tensile strength of 25 MPa@ 7 days when tested as per BS 6319 Part 7 or ASTM D 638. The mixed viscosity of the resin shall not exceed 200 - 225 cps when tested on Brookfield Viscometer as per ASTM D 638. Mode of measurement shall be for Grout consumed. (MAXGROUT E10 HR - Thermax Ltd)

5. Drilling holes of 12 mm dia. about 75 mm deep as per 450 mm c/c or as per drawing. Cleaning the holes with compressed air and hole cleaning brush. Filling polyester resin in the holes as per manufturer spacing. Fixing the connector bar of 8mm dia in the hole 175mm long. (PV 50 PRO- DEWALT)

6. Providing, Fabricating and Erecting ply post box shuttering formwork of all shapes including curved, etc. at specified levels and places wherever directed, specified and required including placing around the existing concrete leaving required space for pouring Micro concrete. Sealing the borders ot formwork to make it watertight

   Providing and pouring /pumping free flow, shrinkage compensated, sulphate-resistant Micro concrete up to any thickness in the formwork. The micro concrete shall achieve a minimum compressive strength of 60 MPa@ 28 days when tested as per ASTM C-

109 and a flexural strength of 1O MPa when tested as per ASTM C 348. The modulus of Elasticity shall be a minimum of 25 kN/mm2 when tested as per BS 1881. It shall provide an unrestrained positive expansion of up to 4 % when tested as per ASTM C 827 -87. It shall have a mixed density of around 2250 -2300 kg/M3. Mode of measurement shall be Micro concrete consumed. (BS 66 MuCis SR - Thermax Ltd)

7. Grinding the concrete surface to make it free from any concavities and remove all protrusions. Providing heat-resistant high-performance epoxy sealer paint having spreading rate of 6-8 sqm/litre. It should have touch drying time of 30-60 minutes. It should have pot life of 6-8 hours. Over coating interval should be minimum 2 hours. It should have temperature resistance for continuous exposure under 93°C.
8. Providing acrylic polyurethane paint having spreading rate of 11.2-15.0 sqm/litre. It should have touch drying time of maximum 30 minutes. DFT and WFT should be in the range of 30"40 microns per coat and 67-90 microns per coat respectively. It should have temperature resistance for continuous exposure under 93°C. (Epilux 84 Clear, Bergerthane PU Glossy Finish - Berger Protecton Protective coatings)
9. Cutting the anchor/bolt and sealing the resulting ho, ensuring a complete and secure finish, as per the directions of the Engineer-in Incharge.

Methodology:

Repair of RCC Members:-

- G.I. Pipe scaffolding to be erected as per site condition and as per repair requirements for RC Members.
- The damaged/delaminated portion will sound hollow. The loose area should be marked in the geometrical shapes.
- Remove the damaged area with the help of hand-held tools **or** with the help of chipper to expose the loose, damaged & honeycombing area etc.
- Clean the entire loose area with the help of air/water jetting. Manual cleaning should not be relied upon. Cleaning the area with compressed air and spiral brush to make it free from drill dust.
- The exposed reinforcement should be cleaned using Rust converter. Clean the reinforcement scales again 24 hours after application of Rust Converter. Apply Alkaline Rust converter to the exposed reinforcement of RC member.
- The exposed steel reinforcement should be coated with Single component, cementitious corrosion inhibiting primer, preferably two coats.
- One coat of Migrating multifunctional corrosion inhibitor should be applied on the exposed concrete surface@ 0.25 kg/smt/coat.
- Drilling 12 mm Dia x 150 mm deep and fixing 11 mm dia. Twin lock nozzle into the concrete.
- Grout the same with MMA grout followed by epoxy grout.
- Drilling 12 mm dia x 75 mm deep hole and fixing 10 mm dia hole with polyster Resin Grout
  Fix watertight shuttering and pour Sulphate resistant micro concrete inside the shuttering The repaired surface to be cured for minimum 3 days.
- Grinding the concrete surface to make it free from any concavities and remove all protrusions.
- Applying heat-resistant high-performance epoxy sealer paint having spreading rate of 6-8 sqm/litre.

General Note:-

1. No materials will be supplied by POWERGRID. Item rates are inclusive of material cost.
2. The contractor shall arrange all labour, tools, equipment, materials, temporary works, constructional plant & machinery, fuel supply, transportation and all other incidental items not shown or specified but as may be required for complete performance of the works in accordance with drawings, specifications and direction of Employer. Item rates are inclusive of the cost of labour, equipment, material, tools & plants etc. No materials will be supplied by POWERGRID.
3. All bought out items shall be approved by Engineer in charge prior to its procurement. All material should be of best quality confirming to relevant Indian Standards and codes.
4. The bidder shall fully apprise himself of the prevailing conditions at the proposed site, climatic conditions and site-specific parameters, soil parameters, availability of construction material and shall include for all such conditions and contingent measures in the bid, including those which may not have been specifically brought out in the specifications.