

## Section-II

### Technical Specifications for PCC and associate repair work at OLA-4 repeater station.

#### 1.0 Introduction

This section describes the functional requirement, major technical parameters and all the testing requirements for telecom shelter system including its sub-systems.

#### 2.0 Requirements

##### 2.1 Earthing

For satisfactory operation of the equipment inside the shelter, good and proper earthing is required at each site. The earthing resistance generally varies depending on soil resistivity. The earthing system at each site shall be provided by the Contractor with earthing resistance not exceeding the two (2) ohms.

Required nos. of earthing pits shall be erected at site which shall includes excavation of earth, PCC chipping if required, removal of surplus soil, suitable disposal of excavated earth, filling with earth enhancement compound, installation and commissioning of earth pit and all associated activities for commissioning of the earth pits in totality.

Three days after completion of the earthing pit, the earth resistance shall be measured in the presence of Employer's representative and test results for each location shall be submitted for Employer's approval. Measurement of earth resistance shall be carried out as per IS 3043:1987 code of practice. All the equipment shall be connected properly to this earthing system for their safe operation.

Following earthing pit shall be erected as per requirements at site.

##### 2.1.1 Pipe Type Earthing

The Contractor shall provide the pipe type earthing along with the necessary hardware and accessories required. Minimum two earth pits shall be made at each location. However, if required resistivity is not met, then, sufficient nos. of pipe type earthing shall be provided by the Contractor. Two nos. of earth pits per location have been considered in BoQ, however, payment shall done for earth pits actually erected as per the requirements. The Contractor shall submit the earthing pit diagram for Employer's approval.

##### 2.2 Foundation System for Shelter

The Contractor shall design and construct complete foundation system for the shelter location depending on the type of soil, including supply and furnishing all the material & labour, tools & tackles, plant and machineries etc.

As required for successful completion of the job. The foundation system shall also include the following:

- Site preparation
- Soil characteristics assessment as required for foundation design for each site including detail soil investigation, if required.
- Water level assessment
- Raising of site level above maximum flood limit level to avoid any water logging in the shelter area.
- PCC and finish of surface below and around shelter location with suitable slope.

##### 2.2.1 Site Preparation at Shelter locations

For each of the shelter to be installed on the ground, the Contractor shall execute the work for site preparation, such as clearing of the site, levelling of the site, the supply and compaction of fill material (if required), excavation and compaction of backfill for foundation, trenches etc with available excavated earth. At certain locations, the finished ground level (FGL) site shall be fixed above High flood level (HFL) to avoid water logging in the shelter area. The site shall be prepared to meet the specified requirement for each site and up to satisfaction of the Employer. If fill material is required for site preparation, the fill material shall be provided with suitable protection so as to prevent the erosion by wind and water from its final compacted position or the in-situ position of undisturbed soil. Quantities of Earth filling with suitable protection have been identified in BoQ for above purpose.

Backfill material around foundation and shelter shall be suitable for the purpose for which it is used and compacted to the satisfaction of the Employer. Excavated material not suitable for use or not required for backfill shall be disposed off in area as directed by the Employer, including all leads and lifts.

Whenever water table is met during the excavation, it shall be dewatered and water table shall be maintained below the bottom of the excavation level during excavation, concreting and backfilling.

For roof top shelters, the Contractor shall also prepare the site suitably for shelter installation on the pedestals. In all cases, each site shall be fully prepared before start of foundation activities up to satisfaction of the Employer.

### 2.2.2 Concreting

After completion of foundation work at each shelter location, PCC (1:2:4) of depth minimum 100 mm shall be provided below the shelter position and outer sides for shelter as decided during detail engineering / execution. There shall be adequate slope in the Shelter area PCC to avoid water logging.

The Contractor shall also provide the PCC platform of about 600 mm height for installation of DG set. The exact area and the height of PCC required for DG set and shelter area shall be finalised during detailed engineering. At few locations, RCC platform for DG set may be provided. Quantities of RCC have been identified in BoQ for above. At few locations, PCC platform for other auxiliary items may also required, which may be executed from the PCC quantities identified above.

### 2.2.3 Properties of Concrete

The cement concrete used for foundation shall be of grade M-20 corresponding to 1:1.5:3 nominal mix ratio with 20 mm coarse aggregate. All the properties of concrete regarding its strength under compression, tension, shear, punching and bend etc. as well as workmanship will conform to latest IS standards.

The Portland cement used in concrete shall conform to 33 grade (IS:269) or 43 grade (IS:8112) or 53 grade (IS:12269).

The Puzzolena cement used in concrete shall conform to IS : 1489. The curing time of Puzzolena cement shall be decided at the time of execution of the work under the contract based on the certificate from a reputed laboratory which will be obtained and submitted by the Contractor. Cement of only POWERGRID approved make shall be supplied.

Concrete aggregate shall conform to IS: 383.

The water used for mixing concrete shall be fresh, clean and free from oil, acids and alkalis, organic materials or other deleterious substances. Portable water is generally preferred.

### 2.2.4 Mixing, Placing and Compacting of Concrete

Mixing shall be continuous until there is uniform distribution of material and the mix is uniform in colour and consistency. Normal mixing shall be done close to the foundation, but exceptionally the concrete may be mixed at the nearest convenient place. The concrete shall be transported from the place of mixing to the place of final deposit as rapidly as practicable by methods which shall prevent the segregation or loss of any ingredient. The concrete shall be placed and compacted before setting commences.

Form boxes shall be used for casting all types of foundations and pedestals.

The concrete shall be laid down in 150 mm layers and consolidated well, so that the cement cream works, up to the top and no honey-combing occurs in the concrete. Preferably, a mechanical vibrator shall be employed for compacting of concrete. However, in case of difficult terrain, manual compaction may be permitted at the discretion of the Employer. Monolithic casting of foundations must be carried out. After concreting the pedestal portion to the required height, the top surface should be finished smooth.

Wet locations shall be kept completely dewatered, both during and 24 hours after placing the concrete, without disturbance of the concrete.

If the concrete surface is found to be defective after the form work has been removed, the damage shall be repaired with rich cement sand mortar to the satisfaction of the Employer before the foundation is back filled.

### 2.2.5 Curing

The concrete shall be cured by maintaining the concrete wet for a period of at least 10 days after placing. Once the concrete has set for 24 hours, the pit may be backfilled with selected moistened soil and well consolidated in layers not exceeding 200 mm thickness and thereafter both the backfill earth and exposed pedestal shall be kept wet for the remainder of the prescribed 10 days. The exposed concrete chimney shall also be kept wet by wrapping empty cement bags around it and wetting the bags continuously during the critical 10 days period.

### 2.2.6 Other associated civil works

The Contractor shall also carry out other minor civil works in the shelter area for the equipment/system being supplied under the Contract at no additional cost to the Employer.