

PART 2: EMPLOYER'S REQUIREMENTS

CHAPTER 8: CIVIL WORKS

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1. INTRODUCTION

1.1 GENERAL

The PST Contractor will be required to execute certain civil work along the line and at various Power Supply installations, for erection and commissioning of the various electrical equipment and systems. While executing such civil works, the PST Contractor will have to maintain close interface with the various other contractors responsible for execution of civil works at Viaducts, Metro Stations, Depot etc., wherever and whenever required.

1.2 LOCATIONS

Broadly, the PST Contractor will be required to execute civil works at the following locations:

- OHE Foundations, Grouting, Muffing
- Installation of OHE Masts / Portals etc.
- Traction Switching Stations on the Viaduct/Depot/ATGRADE
- Along Viaduct
- At Auxiliary Substations (ASS)

The above list is indicative only and the PST Contractor will be required to execute all necessary civil works to enable the Power Supply equipment's/systems to be installed and commissioned. The boundary against viaduct/station/depot civil contracts are already indicated in Chapter 3 Interface management. Payment provision for supply and erection of related PST civil works exists in the BoQ.

1.3 NATURE OF WORKS

The specific nature of civil works, required to be done at different locations, will be different and will depend upon the locations. Broadly, the services to be provided at Metro Stations, Viaduct, ATGRADE etc. may be limited to those services which are required for supplementing the designs etc., already provided by the Detailed Design Consultant/Contractor, responsible for Design/Construction of such installations (Metro Stations, Viaduct etc.). The services to be provided by the PST Contractor are broadly described in the subsequent paragraphs.

2. FOUNDATIONS, GROUTING & MUFFING

The Civil works pertaining to OHE foundations are to be performed at all locations other than viaduct by the PST Contractor. GPR survey for foundations at ATGRADE locations is to be done by the PST Contractor to check for any crossings of other services & infringements. Soil Testing is also to be done by the PST Contractor as per RDSO guidelines. The design for the foundations is to be verified & submitted by PST Contractor as per site conditions.

For grouting & muffing, RDSO standards are to be followed by the PST Contractor. For Technical aspects regarding foundations, please refer to Technical Specifications.

3. INSTALLATION OF OHE MASTS / PORTALS etc.

OHE Masts and Portals, with Base Plates, are erected on the top of parapet of the Viaduct, with the help of Holding down bolts provided by the Viaduct Contractors. The PST Contractor shall ensure that the Base Plate rests properly on the top surface of the parapet, for this purpose, if required at site, the PST Contractor shall provide necessary Grouting Mix (GP-2 or equivalent) for ensuring that there are no gaps between the base plate and the top of parapet.

4. TRACTION SWITCHING STATIONS

4.1 GENERAL

The design of Traction Overhead Equipment provides for Switching Stations along the Line, by means of

pole-mounted switchgear. The Civil Works required to be done along the Line, at Switching station locations are described below.

4.2 C&M PANELS

At every Switching Station a Control & Monitoring Panel, approximately 3.0m x 0.6m may have to be installed on the parapet. For this purpose, specially strengthened segments and parapets will be provided by the Viaduct Contractor along with buried fastening bolts. The PST Contractor will be required to install the C&M panel on the parapet and secure it properly with suitable nuts, locknuts and washers. The PST Contractor shall also be required to provide Grouting Mix (GP-2) for ensuring that there are no gaps between the bottom of panel and top of parapet.

In addition, suitable pipes must be provided to link the C&M panel outlet to the cable trough running along the track. Similarly, a link, by means of pipes will have to be provided between the cable trough and the Control Mechanism box of the pole-mounted switchgear, like interrupters, isolators circuit breakers etc.

4.3 PIPE CONDUITS BETWEEN UP AND DN TRACKS

At Switching Station locations (ATGRADE & VIADUCT), it may be necessary to run the cables (power and/or control) from UP track to DN track and vice versa. The PST Contractor will have to provide the necessary pipe conduits to carry such cables. The number, size and arrangement of such pipe conduits will be decided depending upon the actual site conditions obtaining.

4.4 FENCING

Fencing arrangement to the masts at Switching stations is to be done as per the tender drawing: KRDD01-TDR-GEN-GEN-OCS-DWG-00022 if required.

The equipment mast is to be covered with fencing so that theft of cables or equipment damage can be restricted. For fencing details refer the RDSO drawing CORE/ALD/PSI/01.

5. ALONG VIADUCT

5.1 GENERAL

The PST Contractor may be required to carry out certain works, which are more in the nature of civil works, along the Viaduct. For this purpose, he will maintain suitable interface with the Viaduct Contractor. The indicatives list of such works is as follows:

Buried Earth Conductor (BEC) shall be connected to the girders by means of flexible ACSR, the connection being established to the terminals provided on the girder. At Integral Transverse Link (ITL), it will be necessary to lay adequate number of suitable size HDPE pipes to carry the cables required for establishing the connection. Power sockets will require to be provided along the Viaduct, on one side only, at an approximate spacing of 50m.

5.2 BURIED EARTH CONDUCTOR CONNECTION

The PST Contractor will have to ensure that the connections between the BEC and other constituents of the Earthing system such as girder, handrail, C&M boxes etc. are properly realized in accordance with the Approved Drawings.

5.3 INTEGRAL TRANSVERSE LINK (ITL) LOCATIONS

At ITL locations PST Contractor will be required to lay HDPE pipes to carry cables for ITL. The PST Contractor will have to interface with the Signaling Contractor and the Viaduct Contractor, for actual execution of this work

5.4 POWER SOCKETS ALONG THE VIADUCT

Power sockets shall be installed all along the viaduct.
From each station, 2 cables must be laid, one on each direction.

Sockets shall be placed every 50 meters. They shall be 16 A rated current with 5 pins/ 3 phases plus neutral plus earth. They shall ensure a protection of IP 65. Not more than 2 sockets will be operated in one circuit at any time. That is to say, the cable should be designed for carrying a continuous rated current of 32A, after considering the derating factors as applicable.

The cable along the viaduct should be of the same cross section (min. 25 sq. mm.) throughout.

The 5 wires cables shall be laid along the line on the parapet, under the sockets with space enough between them to install the connection box.

The cables will be laid in PVC conduits fixed on the parapet. They shall be fixed, at least, every two meters.

The tube shall enter the connecting box to ensure proper sealing of the system.

One PVC conduit shall ensure the cabling between the connecting box and the socket

The connecting box shall ensure the connection of the socket by means of 5 wires cable. Due to the difference in size between the main cables and the socket cable, connecting plates will ensure this reduction.

The connecting box, PVC made, shall include five connecting plates, mounted on insulators. Each connecting plate, copper made, shall ensure the connection of three cables, one for the socket, the two others for the incoming and the outgoing cable

The fixing of the cables will be done by bolt and nuts, or bolt directly screwed in the connecting plate. The cable termination shall not be open but shall only permit the screwing in order the cable do not fall and touch any other parts in case of bad tightening of the bolt.

The connecting box shall be fixed on the parapet, under the socket

The connecting box shall be waterproof and dust-proof, with PVC tubes placed in position with a protection level of IP 65.

All cables should meet the design criteria specified for 415 V cables.

5.5 VIADUCT LIGHTING

Viaduct Lights shall be installed all along the viaduct.
From each station, 2 cables must be laid, one on each direction.

Viaduct Lights shall be placed at every approx. 14 meters. They shall ensure a protection of IP 65. The cable along the viaduct should be of the same cross section throughout.

The cables shall be laid on cable brackets along the line on the parapet. To connect the viaduct lights, cable connection boxes shall be installed on the parapet.

One conduit shall ensure the cabling between the connecting box and the viaduct light. The tube shall enter the connecting box to ensure proper sealing of the system.

The connecting box shall ensure the connection of the Light by means of cable. Due to the difference in size between the main cables and the light cable, connecting plates will ensure this reduction.

The cable termination shall not be open but shall only permit the screwing in order the cable do not fall and touch any other parts in case of bad tightening of the bolt.

The connecting box shall be fixed on the parapet, under the viaduct light

The connecting box shall be waterproof and dust-proof, with tubes placed in position with a protection level of IP-65.

All cables should meet the design criteria specified for 415 V cables.

6. AT AUXILIARY SUBSTATIONS (ASS)

6.1 GENERAL

The ASS rooms at stations are constructed by the Station Building Contractor (SBC). The SBC shall complete the ASS room including the final finished floor. The PST Contractor will have to do the following Civil works

Construction of necessary foundations or Anchor fasteners for Auxiliary transformer, Switchgear panel and other equipment.

Provision of earthing for Auxiliary Transformer neutral earthing and other equipment earthing.

Connection of ASS earthing system to the Station Building earthing system provided by the SBC

6.2 TRANSFORMERs EQUIPMENT FOUNDATIONS

The PST Contractor will have to interface with the SBC to ensure that

The HT, LT and Control cables can be managed properly in the ASS Room.

The 33kV draw-out type switchgear has adequate space in front, at the same level, to facilitate drawing out.

The ASS floor strength and level is such that it is possible to move transformers and heavy panels, on rollers, from the Loading/unloading platform to the final location where the equipments are required to be erected.

6.3 EARTHING ARRANGEMENTS

The Auxiliary transformer neutral is required to be connected to the ASS earth by means of 2 independent connections. In addition, the PST Contractor will have to run an earth bus inside the ASS room, and all non-current-carrying metallic parts of the various equipment's will require to be connected to this earth bus. The earth bus will ultimately have to be connected to the ASS earth, which may be an earth-mesh or a series of interconnected earth electrodes.

7. AUXILIARY MAIN SUBSTATION ROOMS IN RSS

7.1 CABLE PATHS

The AMS Rooms in RSS's is built by the PST Contractor along with the 33kV cables from the 33kV outgoing switchgear to the designated ASS along the alignment including the cable paths required to be provided, in the Switchyard as well as inside the AMS Rooms, are as per the requirements, from points of view of size, layout etc.,