

**CHAPTER 3**  
**Interfaces**

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## 1. INTRODUCTION

### 1.1 OBJECTIVE

The design and construction of the Jaipur Metro Railway, is a complex multidisciplinary project, **requiring close interaction and co-ordination between the various designers and builders**. The objective of the "Interfacing document" is to define as clearly as possible the Scope of Work of different Agencies, so that the problems which could arise during the Execution Stage are greatly minimized, if not eliminated. Notwithstanding the above, it is imperative that the JP/EW/1B/E2 Contractor shall maintain a close Interface with the other concerned Contractors and Design Consultants, so that the problems faced at site, if any, are **communicated through 'Interface requests' and discussed in periodical 'Interface meetings'**, to arrive at logical and expeditious solutions, to ensure smooth progress of physical works and realization of the scheduled dates of completion of works.

### 1.2 INTERFACING REQUIREMENTS

The following is an indicative list of the Contractors/Consultants/Agencies with whom the concern Contractor shall essentially interface. The List is not, however, exclusive and the JP/EW/1B/E2 Contractor shall ensure that any site problem, as and when it arises, is clearly and conclusively discussed with the appropriate Agency and solutions arrived at.

- Design and Build Contractors of Tunnel / Box-Section / Ra
- Station Building Contractors for Underground Stations (SBC),
- E & M Contractors for Underground Stations (E&M),
- Detailed Design Consultants (DDC)
- Track Contractor, Signalling Contractor and Telecom Contractor

## 2. INTERFACE WITH DESIGN & BUILD CONTRACTORS OF TUNNEL / BOX SECTION / RAMP (TBR), MIDSHAFT

### 2.1 GENERAL

The term TBR collectively refers to the Design & Build Contractors of Bored Tunnel Sections, Cut-and-cover sections and the Ramp Sections connecting the Underground Sections with the Elevated Sections.

The Line 1 which extends from Chand pole to Badi Chaupar has the following features on the alignment.

**The following sections are Underground (in Tunnels/Box Section)**

- **From Chand pole to Badi Chaupar about 2.525 km.**

### 2.2 ITEMS OF INTERFACE

The JE 01 Contractor is required to interface with the TBR Contractors, essentially for the following works:

- Auxiliary Substations in Mid-Shaft & U/G stations.

- Providing earthing connection
- Provision of opening in slabs etc for cable/equipment entry and cable/equipment exit
- Cable support/path for Power and Control cables in tunnels/Box Section/Ramp.

### **2.3 INTERFACE REQUIREMENTS**

The Interface requirements are described in Table 2.3.

**Table 2.3****Interfacing Requirements with Design & Build Contractors of Tunnel/Box Section/Ramp (TBR)**

| <b>Item No.</b> | <b>Item Description</b>                 | <b>JP/EW/1B/E2</b>   | <b>TBR</b>  | <b>Remarks</b> |
|-----------------|---|--|---|----------------|
| 1.              | Auxiliary Substations                   | <p>DDC will provide ASS layout drawings showing equipment layout etc.</p> <p>Civil JP/EW/1B/E2 will provide necessary foundations for transformers, panels other equipment etc. Alternatively, the Traction can provide suitably designed anchor-fasteners to fix transformers, 33kV panels, Battery chargers etc to the basic floor/pedestal.</p> | SBC/TBR will provide ASS room complete in all respects, including flooring, lighting, ventilation, power sockets, access doors, rolling shutters, windows, ventilators and interior finish, but excluding foundations for transformer and panels. SBC will provide the necessary cut-outs for cables entry and exit |                |
| 2.              | Providing earthing connections          | JP/EW/1B/E2 will provide necessary interconnections between earth terminals/riser terminals and earth conductors as shown in the Earthing connection drawings.   | Will provide necessary earth terminals, earth mesh etc. and risers and respect the schematic earthing drawing, will ensure provision of minimum of 50mm dia pipe-5 Nos. on each platform under the floor for continuity of earthing of platform shelter/ canopy.  |                |
| 3.              | Provision of openings in slabs etc. for | DDC will provide drawings showing the locations and sizes of openings to be provided in slabs etc. to allow passage of cables.   | Will provide openings as per drawing.   |                |

| Item No. | Item Description   | JP/EW/1B/E2  | TBR   | Remarks |
|----------|--|--|---|---------|
|          | cable/equipment entry and cable/equipment exit.                            | JP/EW/1B/E2 will supply and install cable supports inside the ASS Room.                            |   |         |
|          |  | JP/EW/1B/E2 will interface to ensure correct and adequate cable routings, openings etc.            |   |         |
| 4        | Cable support/path for power and control cables in tunnel/Box Section/Ramp | JP/EW/1B/E2 will interface with the TBR to ensure correct and adequate cable routing, openings etc | TBR will provide cable paths/supports along the cable route, outside the ASS room, in accordance with cable route drawing. The construction should take into consideration cable bending radius (specified in the drawing), cable fastening arrangements and suitable provision to cover the cables in public places. |         |

### 3. INTERFACE WITH STATION BUILDING CONTRACTORS FOR UNDERGROUND STATIONS (SBC)

The following list indicates the various Underground Stations in Line Chand Pole to Badi Chaupar

| Sr. No. | Name of Station | Approx Centre Line of Station (Km) |
|---------|-----------------|------------------------------------|
| 1       | Choti Chaupar   | 9.418                              |
| 2       | Badi Chaupar    | 10.271                             |

#### 3.1 ITEMS OF INTERFACE

Different Consultants / Contractors are assigned for design and construction of the various stations, collectively referred to as Station Building Contractor (SBC). The JP/EW/1B/E2 Contractor shall interface with the various Consultants / Contractors, mainly for the following works:

- Providing earthing connections
- Auxiliary Substations
- Provision of openings in slabs etc. for cable entry and cable exit.
- Provision of cable paths/supports for power and control cables in stations.

#### 3.2 INTERFACE REQUIREMENTS

The Interface requirements are described in Table 4.3.

**Table 4.3**

Interfacing Requirement with Station Building Contractor (SBC)

| Item No. | Item Description                                    | DDC/JP/EW/1B/E2 Contractor  | Station Building contractor (SBC)   | Remarks |
|----------|---|---|---|---------|
| 1.       | Providing earthing connections                      | <p>JP/EW/1B/E2 will provide Earthing connection drawings for Auxiliary Substation, showing locations of earth terminals, etc required at the ASS.</p> <p>JP/EW/1B/E2 will provide necessary interconnections between earth terminals/riser terminals and earth conductors as shown in the Earthing connection drawings.</p>               |   |         |
| 2.       | Auxiliary Substations                               | <p>DDC will provide ASS layout drawings showing equipment layout etc.</p> <p>JP/EW/1B/E2 will provide necessary foundations for transformers, panels other equipment etc. Alternatively, the JE 01 can provide suitably designed anchor-fasteners to fix transformers, 33kV panels, Battery chargers etc to the basic floor/pedestal.</p> | SBC will provide ASS room complete in all respects, including flooring, lighting, ventilation, power sockets, access doors, rolling shutters, windows, ventilators and interior finish, but excluding foundations for transformer and panels. SBC will provide the necessary cut-outs for cables entry and exit |         |
| 3.       | Provision of openings in slabs etc. for cable entry | DDC will provide drawings showing the locations and sizes of openings to be provided in slabs etc. to allow passage of 33 kV power cables and control cables.   | <p>Will prepare cable route drawing.</p> <p>Will provide openings as per</p>  |         |

| Item No. | Item Description  | DDC/JP/EW/1B/E2 Contractor   | Station Building contractor (SBC)   | Remarks |
|----------|---|--|---|---------|
|          | and cable exit.   | JP/EW/1B/E2 will supply and install cable supports inside the ASS Room.  | drawing.  |         |
| 4        | Cable supports/paths for power and control cables in Underground stations | JP/EW/1B/E2 will interface with Station Building Contractor to ensure correct and adequate cable routings, openings etc. | SBC will provide the necessary cable supports along the cable route, outside the ASS room, in accordance with cable route drawing. The construction should take into consideration cable bending radius (specified in the drawing), cable fastening arrangements and suitable provision to cover the cables in public places. |         |

### **3.3 ITEMS OF INTERFACE**

The JP/EW/1B/E2 Contractor shall interface with the various Consultants / Contractors at these stations, mainly for the following works:

- Terminating the 33 kV Auxiliary Network Power cables in the ASS at Stations

### **3.4 INTERFACE REQUIREMENTS**

The Interface requirements are described in Table 5.3.

**Table 5.3**

## Interfacing Requirement with Station Building Contractor (SBC)

| Item No. | Item Description   | DDC  | Station Building contractor (SBC)  | Remarks |
|----------|--|--|--|---------|
| 1.       | Provision of openings in slabs etc. for cable entry and cable exit, for the ASS. | DDC will provide drawings showing the locations and sizes of openings to be provided in slabs etc. to allow passage of 33 kV power cables and control cables.                  | Will prepare cable route drawing.<br>Will provide openings as per drawing. |         |
| 2        | Terminating the 33 kV Auxiliary Network Power Cables in the ASS                  | DDC will provide ASS Layout drawing showing Equipment Layout etc.<br><br>JP/EW/1B/E2 will do the necessary jointing/termination of 33 kV cables on the appropriate Switchgear. | Will supply and install the 33 kV Switchgear in the ASS's.                 |         |

**4. INTERFACING WITH E&M CONTRACTORS IN UNDERGROUND STATIONS (E&M) & ECS****4.1 GENERAL**

Different Consultants / Contractors are assigned for the design and construction of various E&M facilities, including lighting, pumps, escalators, elevators, D.G. sets etc in the stations. These Consultants / Contractors are collectively referred to as E&M/ECS. The JP/EW/1B/E2 Contractor is responsible for supply and erection of various equipments in the Auxiliary Substations at the stations to step down the 33 kV Auxiliary power to 415 V AC and supply to the Station Auxiliaries. JP/EW/1B/E2 shall interface with E&M for various items of work.

**4.2 ITEMS OF INTERFACE**

The mains items of Interface are

- Supply and erection of Low Voltage Switch Board (LVSB)
- Connection between Secondary of Auxiliary Transformer and the LVSB
- Low Voltage Protection
- Auxiliary Transformer Differential Protection

- Transformer door interlock
- Lighting and Ventilation in ASS
- Earthing in ASS
- Ventilation/cooling requirements if any.

#### **4.3 INTERFACE REQUIREMENTS**

The Interface requirements are described in Table 6.3.

**Table 6.3**

## Interfacing with E &amp; M Contractors in Stations (E&amp;M)

| <b>Item No.</b> | <b>Item Description</b>  | <b>JP/EW/1B/E2 Contractor</b>  | <b>E &amp; M / ECS Contractors (E&amp;M)/ECS</b>   | <b>Remarks</b> |
|-----------------|--|--|--|----------------|
| 1               | Supply and erection of Low Voltage Switch Board (LVSB)             |  | LVSB will be supplied and erected by E&M   |                |
| 2               | Connection between Secondary of Auxiliary Transformer and the LVSB | JP/EW/1B/E2 shall ensure that facilities are available on the Transformer Secondary to receive cable or bus duct (Bus ducts will be used for transformers 1000 kVA and above)  | Supply, erection and Connection by Bus duct or by cables will be done by E&M.<br>Any interlinks, extension parts bus bars etc has to be provided by E&M on the secondary of transformer. |                |
| 3               | Low Voltage Protection   | JP/EW/1B/E2 shall ensure that the 415 V Breakers on the LVSB are provided with necessary protection relays to isolate faults on the LV side.<br>JP/EW/1B/E2 shall also ensure that the tripping of 415 V Breakers shall also cause tripping of the corresponding HV breaker of the transformer, by inter-tripping.           | E&M shall provide the necessary protection relays on the 415 V Breakers and provide inter-tripping facilities (The HV Breaker will be provided by the JP/EW/1B/E2 )                      |                |
| 4               | Auxiliary Transformer Differential Protection                      | JP/EW/1B/E2 will provide the necessary Differential protection relays, along with matching CT's for both HV. JP/EW/1B/E2 contractor will interface with the LT contractor and provide the requirements & specifications of the LT CT.<br>JP/EW/1B/E2 will do the necessary control cable connections between HV and LV side. | E&M will supply & mount the relays and CT appropriately on the LV side. The connections of this LT CT are to be brought out at TB to be further taken for protection purposes.           |                |

| Item No. | Item Description   | JP/EW/1B/E2 Contractor  | E & M / ECS Contractors (E&M)/ECS   | Remarks |
|----------|--|---|---|---------|
| 5        | Transformer door interlock   | Wiring and interlock for transformer enclosure door will be provided by JP/EW/1B/E2   |   |         |
| 6        | Lighting and Ventilation in ASS  | JP/EW/1B/E2 will advise to the E&M any special requirements or preferred location of lights, fans and exhaust fans.   | E&M/ECS will provide Lighting and Ventilation arrangements.   |         |
| 7        | Earthing in ASS  | <p>JP/EW/1B/E2 will run an Earth Bus inside the ASS with suitable GI/copper flats.</p> <p>Various non-current-carrying metallic objects will be connected to the Earth Bus, by the JP/EW/1B/E2.</p> <p>Connection between Earth Bus and MET's will be done by JP/EW/1B/E2</p> | <p>E&amp;M will provide an Earth Mesh for the Station and provide risers to the ASS. E&amp;M will provide at least 4 Main Earth Terminals (MET's) in the ASS, in addition to a separate independent Met for SCADA equipment in the ASS.</p> <p>Interconnection between ASS Earth and the Station Earth will be provided by the E&amp;M.</p> |         |
| 8        | Ventilation in ASS   | JP/EW/1B/E2 will advise to ECS any special requirements or preferred, fans and exhaust fans, Cooling.   | ECS will provide Ventilation arrangements.  |         |
| 9        | Cable support/path for power and control cables in tunnel/Box Section/Ramp | JP/EW/1B/E2 will interface with the TBR to ensure correct and adequate cable routing, openings etc  | E&M will provide cable paths/supports along the cable route, outside the ASS room, in accordance with cable route drawing.  |         |