

# ANNEXURE- 11

# ***Maha Metro***



## **Tender Documents**

**UGC-02: DESIGN AND CONSTRUCTION OF UNDERGROUND STATIONS AT  
BUDHWARPETH, MANDAI AND SWARGATE AND ASSOCIATED TUNNELS  
ON THE NORTH-SOUTH CORRIDOR OF PUNE METRO RAIL PROJECT**

### **PART II – EMPLOYER’S REQUIREMENTS**

#### **Section VI – Employer’s Requirements**

#### **Appendix 19 – Design and Construction Interface Management**

May 2018

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## DESIGN AND CONSTRUCTION INTERFACE MANAGEMENT

### 1. DEFINITIONS AND ABBREVIATIONS

- 1.1 Chief Interface Coordinator means a suitably qualified person, assigned by the Contractor, who is the Team Leader responsible for administrating, monitoring, managing, supervising, coordinating and resolving all interface issues between Interfacing Contractors for the Pune Metro Project.
- 1.2 Combined Services Drawings (CSD) means those drawings produced by the Contractor, showing the locations, layouts, sizes and details of all services, including those of Interfacing Contractors (All Project Contractors), such as equipment, cables, other services, cable containment, pipes, etc. complete, co-ordinated so as to eliminate all clashes. These drawings are to be used to enable all equipment, pipes, cables, etc. to be installed without conflict and to enable future changes or modifications to be performed without impacting the existing installation.
- 1.3 Interface means the region of interaction across the common boundary between two adjacent but separately managed and controlled parts (or Contracts) of the Project. The coordination and management of the interaction regions is necessary to ensure that the overall scope and definition of the Project works is complete and seamless across all such boundaries.
- 1.4 Interfacing Contractors means any of the following whose activities or the works they are engaged to carry out in any way or at any time affect or are affected by the Works:
  - (a) Project Contractors and design or specialist consultants engaged on the Project from time to time by the Employer, the Government of Republic of India, the Government of Maharashtra or the utility providers;
  - (b) utility providers;
  - (c) developers or franchisees appointed on the Project from time to time by the Employer;
  - (d) subcontractors of any tier of the contractors within category (a) above, and contractors and subcontractors of any tier of utility providers, developers and franchisees within categories (b) and (c) above;

Provided that the definition shall exclude the Contractor and his subcontractors of any tier in relation to the Works and in any other capacity which would otherwise fall within categories (a) to (d) above in relation to other works.
- 1.5 Interface Coordination Sheet (ICS) means a document produced by the Contractor which defines the integration and interfaces between his Contract and the Interfacing Contractors employed on the Project.
- 1.6 Interface Management Programme (IMPG) means the programme produced by the Contractor, developed and updated on a quarterly basis, which describes the sequence and timing of each of the Interfacing Contractors' scope of work, and clearly describes dependencies between his Works and the work of the Interfacing Contractors.
- 1.7 Interface Management Plan (IMP) means the Report prepared by the Contractor,

developed and updated on a quarterly basis that provides a clear description of his interfaces both sequentially and technically as specified in the Contract or as additionally identified by the Contractor/Interfacing Contractors. The report will be reviewed in accordance with this procedure and is a pre-requisite to the Engineer's Notice of No Objection.

- 1.8 Interface Specification (IS) means the specification document developed by the Lead Contractor for the interfacing part of his Project/Contract on the basis of, and by integrating into his design, the information provided by the Interfacing Contractor(s), in accordance with the interface agreements as contained in the ICS. The Interface specification needs to be agreed upon by both the Lead Contractor and the Interfacing Contractor(s), before it is submitted to the Engineer for Notice of No Objection (NONO).
- 1.9 Master Interface Matrix (MIM) means the document developed by the Engineer, which may be updated, and/or expanded to include additional Interfacing Contractors, by the Engineer as the Project progresses. The purpose of the Master Interface Matrix is to allocate which Interfacing Contractors are the lead party(s) for each contract.
- 1.10 Structural, Electrical and Mechanical Drawings (SEM) means those drawings produced by the Contractor, showing the locations, sizes and details for all structural openings, plinths, embedments, sumps, floor chases, etc. required for the installation of all equipment, cable trays, pipes, etc...
- 1.11 Zone of Interface means where two or more components of the railway (Metro System) provided by two or more Interfacing Contractors combine to provide a single element.

## **2. INTRODUCTION**

- 2.1 Interface and co-ordination of the Works will include the co-ordination of all design, technical and programming matters with the various Interfacing Contractors to achieve fully co-ordinated construction and installation of the facilities.
- 2.2 This Appendix 19 describes the Contractor's responsibilities with regard to interface management and coordination with those Interfacing Contractors who are responsible for undertaking work, which interfaces with the Contract. The Contractor's responsibility for interface coordination shall include currently defined Interfacing Contractors and those who may be identified in the future. This responsibility is not limited to a particular number of Interfacing Contractors.
- 2.3 The Contractor's responsibility for interface co-ordination shall include identification of Interfacing Contractors and those who may be subsequently identified during the course of the Contract with whom the Contractor will need to interface and coordinate the Works. This in no way detracts from the fact that the Contractor remains solely responsible for identifying, liaising, and co-ordinating with all Interfacing Contractors in relation to the Works.
- 2.4 The Engineer will monitor and oversee the interface Management activities by the Contractor and will specifically provide direction or information in the following

circumstances.

- (a) When the interfacing contract has not yet been awarded
- (b) When common agreement cannot be reached between the interfacing parties
- (c) When it is in the interest of the project programme, quality or safety to issue direction.

Direction or information provided by the Engineer wherever necessary, shall not in any way relieve the Contractor of his full responsibility to ensure the correctness, accuracy and suitability of the interface implementation and the required specification.

- 2.5 The Contractor shall at all times, use his best endeavours to resolve all interfaces applicable to the Contract and shall be proactive in seeking out interface issues and their solutions.
- 2.6 The Contractor shall ensure that all of the above Interface requirements are included in his Interface Management Plan, refer to Clause 6 of this Appendix 19. Flow charts illustrating the process of entering into an Interface agreement and Monitoring its progress with the help of the Interface Coordination Sheet are provided as Attachments A & B of this Appendix. Figure 1 gives a schematic presentation of the Interface Communication and Coordination processes between the various role-players in the Project.
- 2.7 The Contractor's internal sub-contractors' and suppliers' interfaces are the sole responsibility of the Contractor and are not covered in this Appendix. However, the Contractor shall co-ordinate and manage these interfaces in such a way as to identify and cater for the requirements of the Interfacing Contractors and domestic interfaces, including but not limited to, the avoidance of clashes and sequencing of Works. The Contractor shall compile an internal IMP for his own use, a copy of which shall be furnished to the Engineer on request at any time.

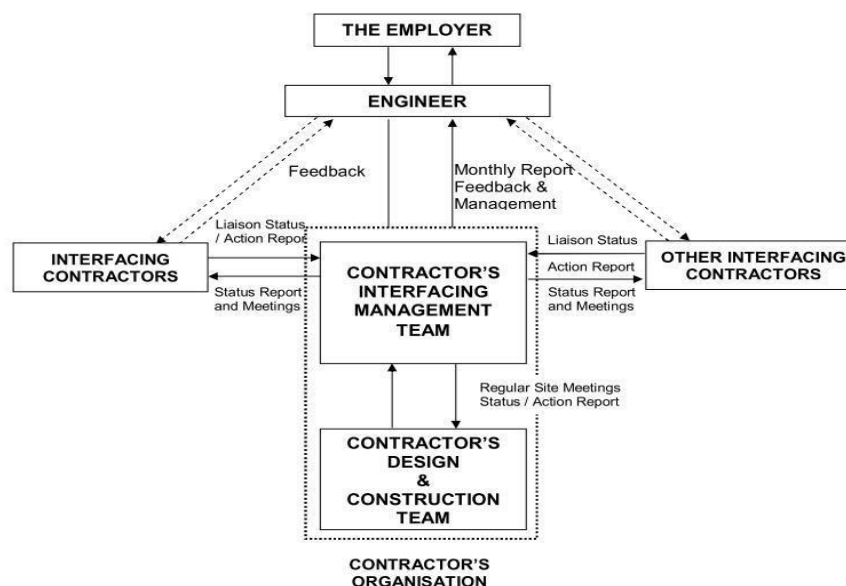


Figure 1 - Interface Communication and Coordination Model.

### 3. CO-ORDINATION

#### 3.1 Contractor’s Co-Ordination Responsibilities

The Contractor shall co-ordinate with the Engineer and may be required to attend meetings on issues appertaining to Government authorities and utility agencies regarding the services/facilities to be provided by them for the project.

The Contractor shall ensure that the work of all Interfacing Contractors can be carried out in accordance with the Interface Management Plan prepared by the Contractor.

#### 3.2 Site Co-Ordination & Attendance

3.2.1 The Contractor shall, at his own cost, provide all attendance on and co-ordination with Interfacing Contractors. The following items are not a comprehensive or exhaustive list of the co-ordination or interface attendance items to be provided for the Interfacing Contractors’ use, but are intended to provide an outline of the content of amenities, services and facilities for which the Contractor is responsible:

a) Single point of contact for meetings, actions, planning, scheduling and co-ordinating.

b) Site access

The Contractor shall co-ordinate with the Interfacing Contractors and provide access and use of temporary access roads to and from and within the Site. The Contractor shall co-ordinate all vehicle movements, deliveries and other activities with the Interfacing Contractors so as to ensure that conflicts of use are controlled on and around the Site.

c) Storage and Accommodation area

The Interfacing Contractors will require limited temporary site accommodation and storage areas. The Contractor shall agree with the Interfacing Contractors access and areas for storage and temporary site accommodation prior to their commencing work on Site.

d) Work space requirement and sequence of Works

e) Shared use of Contractor’s scaffold

The Contractor shall co-ordinate with the Interfacing Contractors and provide free use and shared access of his erected scaffolding, ladders and hoists should they be available at the time the Interfacing Contractor requires to use them. Notwithstanding this requirement, the Contractor shall at all times remain responsible for the management of safety and the maintenance of such scaffolding, ladders and landings. The Contractor will not be required to adapt or erect access scaffolds specifically for the use of Interfacing Contractors.

If the Interfacing Contractor erects and uses his own scaffold he will be required to adhere to the Contractor’s safety rules and access routing for equipment and materials. The Contractor shall ensure that all scaffolds of Interfacing Contractors are erected in a safe manner and are subject to permits for use issued by the Contractor.

f) Setting out control points

g) Access Openings

The Contractor will form all penetrations and delivery openings and subsequently close them (either temporary or permanent) for access to rooms or areas for the delivery of equipment and materials.

- h) Temporary lighting requirement will be 100 lux minimum.
- i) Temporary power and water supplies shall have to be provided at agreed locations around the Site for the Interfacing Contractors' use.
- j) Water tightness. All rooms and areas handed over to Interfacing Contractors shall be in a watertight condition and maintained as such.
- k) Ensure all electrical supplies both temporary and permanent have the correct testing and commissioning certification.
- l) Waste management and disposal
- m) Appropriate protection to finishes, walls, floors, ceilings and equipment using polythene, hardboard, steel plates etc.
- n) Programme agreement for mobilizing and demobilizing
- o) Firefighting and supply and maintenance of fire extinguishing equipment and devices pursuant to the Contractor's obligations.
- p) Construction interface co-ordination management of penetrations in structures, embedded and cast-in items, etc.
- q) Temporary Drainage  
The Contractor shall provide, operate and maintain all necessary temporary drainage, sumps, silt traps and sump pumps to collect and dispose of wastewater from Interfacing Contractors construction processes including installation, testing and commissioning activities.
- r) Sanitation facilities  
The Contractor shall provide all sanitation facilities and the disposal of waste. No unauthorised sanitation facility will be allowed on the Site.
- s) Making good and fire stopping, of penetrations
- t) Lifting apparatus and hoists  
The Contractor will be required to install all temporary and permanent lifting hooks and beams shown on the drawings and the Specification, required for installation and/or maintenance purposes. The Contractor will be responsible for the testing and labeling of all apparatus. The Contractor will be required to make available any lifting or hoist apparatus on Site as required by the Interfacing Contractor at agreed times and duration for their use. The Contractor shall be responsible for the maintenance testing and operational management of hoists. The Contractor shall make available his cranes for lifting equipment or materials for Interfacing Contractors.
- u) Health and Welfare Facilities  
The Contractor shall allow Interfacing Contractors use of his health, welfare and mess facilities, and temporary background lighting. He shall liaise with the Interfacing Contractors to determine their planned and actual manning levels and ensure that sufficient facilities are provided prior to them commencing work on Site. The facilities shall be maintained on Site until the Interfacing Contractors have completed their Works and demobilised or such earlier time as the Engineer may direct.

3.2.2 The Contractor is deemed to have ascertained for himself the full scope of his responsibilities and obligations under the Contract in terms of attendance on and co-ordination with Interfacing Contractors and shall not be entitled to any additional payment, Cost or extension of time for completion should he have failed to do so.

- 3.2.3 The Contractor shall make due allowance for providing Attendance, including power and other utilities’ supplies, throughout all phases of the Interfacing Contractors work including testing and commissioning and where supplies to various Interfacing Contractors need special consideration during testing and performance trials under peak load conditions.

## **4. INTERFACE**

### **4.1 Co-Ordination of Contractor’s Scope of Work**

In accordance with the requirements of the Conditions of Contract and other specified requirements, the Contractor shall co-ordinate his own work with that of all Interfacing Contractors and ensure that the design, construction, installation and testing requirements of the Interfacing Contractors are incorporated into the Contractor’s co-ordinated plans, programmes and Works. The Contractor shall proactively seek out interface issues and solutions.

In addition to the Contractor’s obligations to the Interfacing Contractors contained elsewhere in the Contract, the Contractor shall provide / handover occupation or access as required, to the Interfacing Contractors to those parts of the Works which are subject to Key Dates by the required Key Dates.

The Contractor shall complete those parts of the Works, which are subject to Key Dates, by the required Key Dates that may be specified in the Appendix to Tender and/or Appendix 2 of Section-VI – Employer’s Requirements of this Contract. Those parts of the Works subject to Key Dates shall be completed to a state whereby any Interfacing Contractor can immediately commence his works without the need to make any change, addition or modification to the Contractor’s Works.

### **4.2 Interfacing Contractors**

- 4.2.1 The Interfacing Contractors will require interface and co-ordination for information, programming, drawings acceptance, handover, etc. as shown on the Interface Coordination Sheet enclosed in Attachment F of this Appendix.

However, the Contractor should note that the Interface Coordination Sheet shown herein has been compiled by the Engineer, and is therefore given as example only.

The Contractor’s responsibilities in this respect are in no means restricted by the details listed in such sheets and no warranty is given by the Employer or the Engineer that all interfaces and Interfacing Contractors have been included in such sheets. The Contractor is to confirm and verify all of the details included in the Interface Coordination Sheets, and his review should ensure that all interfaces have been included.

The Contractor shall take overall responsibility for the Interface Coordination Sheets, which must be submitted to the Engineer for a notice of no objection.

- 4.2.2 The Master Interface Matrix (MIM), enclosed in Attachment E, assigns the Contractors which have been designated as the Lead party(s) for each interfacing contractor. The MIM has been developed by the Employer/Engineer, which he may update and/or expand at any time to include additional Interfacing Contractors, and the Contractor’s Contract price shall be deemed to include any such additional works related to interfacing or Interface Management. The leading Interfacing Contractor shall be responsible for administrating, monitoring, managing, supervising and

resolving all interface issues between all Interfacing Contractors.

**4.2.3** In a situation when the Lead Contract has not yet been awarded and the Interfacing contractor has commenced work, the Engineer will perform the coordination activities including preparation of tentative ICS / Interface Specification, with the express understanding that they may undergo changes as and when the Lead Contractor commences his work on being awarded the Contract.

**4.2.4** Where an interfacing contract has yet to be awarded, the Lead Contractor shall proceed with the coordination activities (including preparation of ICS and Interface specification) as instructed by the Engineer until such time when the Interfacing Contractor is available.

### **4.3 Interfacing Contractors - Communications and Information Exchange**

#### **4.3.1 GENERAL**

- a) The Contractor shall communicate, co-ordinate and exchange information directly with the Interfacing Contractors and the Contractor shall keep the Engineer advised at all times. Information necessary to fulfil the Contractor’s interface obligations shall be directly requested and obtained from the Interfacing Parties, and receipt acknowledged. Conversely, the Contractor shall provide directly to the Interfacing Contractors information within the Contractor’s scope that is required by them.
- b) All requests for information, acknowledgement of receipt of information, and any official communication between the Contractor and the Interfacing Contractors shall be made in writing, with a copy to the Engineer for his information. The Engineer shall be invited to attend all interface meetings between the Contractor and the Interfacing Contractors. Irrespective of whether these meetings were attended by the Engineer or not, the Contractor’s monthly progress report to Engineer shall invariably include the details of all interface meetings held and decisions arrived.
- c) The Contractor’s programme shall allow time for the availability of necessary interface information from the Interfacing Contractors and in this regard the Contractor shall, where required, proceed on a late start basis to allow adequate time for others to provide required information and thereby achieve design process compatibility.
- d) The Contractor shall allow for the fact that many of the design and construction activities for the different contracts will be proceeding concurrently. In the event that certain interface information is not forthcoming at the time targeted, the Contractor shall be responsible to resolve the matter with the relevant Interfacing Contractor without recourse to the Engineer, and where necessary develop alternative interim arrangements such that the interface information may be accommodated at a later date.
- e) Definitive dates for transfer of information and particular interface actions shall be confirmed between the Contractor and the Interfacing Contractors.

#### **4.3.2 INTERFACING FUNCTIONS**

The Interfacing Contractors are responsible for, but not limited to, the following;

- the management of Contract to Contract Interfaces as required;
- preparing the Interface Management Plan and subsequent procedures;
- preparing their Interface Management Programmes in accordance with this procedure and submitting these to the Interfacing Contractors for concurrence;

- preparing the Interface Management Programmes and submitting these to the Engineer for a Notice of No Objection;
- preparing their Interface Coordination Sheets and Interface Specifications and issuing same to the relevant Interface Contractors and Engineer;
- co-ordinating with the relevant Interface Contractors to establish coordinated CSD & SEM Drawings;
- maintaining their ICS updated continuously and attaching it to their Monthly Progress Report submitted to the Engineer in accordance with the requirements of the Contract and this Appendix.

#### **4.3.3 DOCUMENTATION REVIEW**

The Contractor shall, as a minimum:

- review those portions of the Specification and Drawings relevant to the interface and transmit such information to the Interfacing Contractors;
- co-ordinate and co-operate with Interfacing Contractors on all Site related matters including, but not limited to, Site access and occupation, attendance, safety, verification of work compatibility, survey control, etc...;
- review the interface information received and agree in writing with the Interfacing Contractors that the interface information is adequate for that stage of that activity.

#### **4.3.4 DESIGN STAGE**

The design interface is an iterative process, thus throughout the design process, the Contractor shall be responsible for coordinating his own design with Interfacing Contractors to develop interface designs in conjunction and co-operation with the designers of Interfacing Contractors. These interface designs will be monitored and have to be given Notice of no objection by the Engineer, but the Contractor shall work directly with the Interfacing Contractors to develop designs which are mutually acceptable to all parties.

The Contractor shall, immediately upon Contract Award, gather all necessary information and develop his design to a level where meaningful interaction can take place as soon as the Interfacing Contractors are available.

#### **4.3.5 INTERFACE DESIGN CHANGE PROCESS**

The Contractor shall establish an interface design change process to ensure that:

- All proposed changes for a specific interface are reported, recorded and resolved;
- Proposed changes are fully evaluated; and
- Internal/External communications and distribution paths are properly defined

#### **4.3.6 CONSTRUCTION PHASE**

During construction the Contractor shall, when a construction item is ready for field inspection, advise the Interfacing Contractor in advance to verify compatibility with the Interfacing Contractor's needs.

The Contractor shall:

- advise the Interfacing Contractors in writing when the as-constructed interface-related work can be inspected, and provide the necessary Site access and occupation;

- request in writing and obtain from the Interfacing Contractors, interface information required for that stage of the Contract;
- agree in writing with the Interfacing Contractors on the adoption of any applicable comments on the constructed work;
- agree that any testing and commissioning for works can be carried out in accordance with the Interface Management Plan;
- conduct on-Site inspections of the work elements, and give comments in writing to the Interfacing Contractors;
- agree in writing with the Interfacing Contractors that the as-constructed work meets the interface requirements.
- Where the execution of work by Interfacing Contractors depends upon the Contractor’s site management or upon information to be given by the Contractor, the Contractor shall provide the Interfacing Contractors with the required services or the correct and accurate information required to enable the Interfacing Contractors to meet their programme for the construction or installation of their works.

#### **4.3.7 INTERFACE COMMISSIONING**

The Contractor shall co-ordinate all of his testing and commissioning activities with the Interfacing Contractors. Interface commissioning shall demonstrate that the delivered interface, part A of the interface, is ready and meets the interface requirements of the interface part B, and vice versa.

Successful completion of all interface commissioning shall prove its readiness for commissioning of the overall Contract scope and completion of the overall Metro-rail Project, prior to handover to the Employer for their commercial operation.

#### **4.4 Resolution of Co-ordination Difficulties**

When the Contractor identifies interface co-ordination difficulties, the Contractor shall review the pertinent points of each Interfacing Contractor to determine possible compatible solutions in terms of sequence, timing and technical details. The Contractor shall then meet with the relevant Interfacing Contractor(s) to determine solutions, which are mutually acceptable to each Interfacing Contractor and advise the Engineer.

Where an acceptable solution has not been identified, the Contractor shall advise the Engineer in writing of the problems encountered. If, in the opinion of the Engineer, an interface is not proceeding satisfactorily, then the Engineer will review the matter, and establish a co-ordinated plan directing the Contractor and the Interfacing Contractor(s) on the required action. In the event that no agreement can be made between the Contractor and the Interfacing Contractor(s), the Engineer shall determine the requirements to the best of his knowledge, and his determination shall be final and binding on the Contractor and the Interfacing Contractor(s).

#### **4.5 Interface Performance**

The Contractor’s performance in relation to his compliance with the interface requirements under the Contract shall be assessed by the Engineer 3 months after the Commencement Date and thereafter at three monthly intervals. The assessment will be in the form of an audit of the Contractor’s interface management system. This audit will assess the Contractor’s compliance with the responsibilities delineated in

this Appendix and elsewhere as related to interface management and the preparation of the Interface Management Plan and Programme and other documentation and procedures associated with Interface Management and Coordination.

The Contractor will be notified of non-conformances from the audit, which will require rectification. Where, in the opinion of the Engineer, the Contractor has failed to rectify a non-conformance within a reasonable period from the date of notification, this may lead to non-payment of any lump sums, until such time as the non-conformance has been rectified to the satisfaction of the Engineer, refer sub-clause below.

The Contract allows for continuous audits of the Contractor’s compliance with his Interface Management Plan and the requirements of this Appendix 19 of Section-VI Employer’s Requirements, and any extreme or continuing failures shall result in a negative audit report, which may lead to non-payment of the relevant payment item in the Preliminaries section of the Pricing Document. The decision of the Engineer in this regard shall be final.

## **5. CONTRACTOR’S INTERFACE MANAGEMENT SYSTEM**

### **5.1 Interface Management System**

The Contractor shall establish and maintain an Interface Management System to identify, control and monitor the interfaces of the Contract, which shall include, but not be restricted to, the following:

- Establishment and maintenance of an Interface Management Team suitably qualified and experienced in co-ordination and interface management.
- Provision, as one of his Key Personnel, of a Chief Interface Co-ordinator, to head the Interface Management Team, suitably qualified and experienced as noted in Sub-division A of this Section-VI, Employer’s Requirements, with the responsibility, experience and authority to resolve interface matters in accordance with the Contract. The Chief Interface Co-ordinator will develop a monitoring and reporting procedure to be implemented by his team for the duration of the Contract.
- Implement and maintain a strict monitored control of information transfer to the Interfacing Contractors, the Employer and the Engineer utilising the official channels of communication.
- Provide a comprehensive interface schedule of Interfacing Contractors, including specialist domestic interfaces (i.e. specialist testing and commissioning engineers) identifying all interfacing activities and timetables of events.
- Arrange all internal and external interface meetings. The Engineer may arrange regular meetings to monitor the status of interfaces, and may require special meetings as may be necessary to resolve specific issues. The Contractor’s Interface Management Team will be required to attend such meetings. The Contractor may request assistance from the Engineer to arrange meetings on particular subjects.
- Providing the Engineer with all information and/or details of interfaces, including copies of all correspondence and material.
- Providing the Engineer with access to information for the purpose of

conducting audits on the interface system and for confirming that interface co-ordination is proceeding consistently with the Project requirements.

- Establish interface dates for information, documentation, access or works completion requirements.

## 5.2 Interface Management Team

The Contractor’s Interface Management Team will undertake and fulfil the following tasks:

- Provide timely interface information when requested, anticipating the information needs of the Interfacing Contractors and transmitting such information as soon as it is available.
- Pro-actively keep the Interfacing Contractors informed of any development of the Works related to the interfaces. Communicating and co-operating with the Interfacing Contractors to identify and resolve potential interface problems.
- Advise the Interfacing Contractors on potential problems related to the interfaces, together with proposed solutions likely to be acceptable to Interfacing Contractors and which meet the needs of the Project.
- Arrange and/or attend meetings with the Interfacing Contractors as necessary to resolve interface issues.
- During each stage of the Contract, the Contractor shall directly communicate and co-ordinate with Interfacing Contractors as necessary to achieve a fully co-ordinated design / construction / installation.
- Contractor shall issue true records of all interface meetings, with appropriate actions and attendance lists, to all Interfacing Contractors, whether in attendance or not, and to the Engineer, within 3 days of the meeting. Minutes of meetings shall be signed by all parties in attendance, signifying their agreement to the contents thereof, before being formally issued by the Contractor.

The authority and responsibilities of all personnel involved in the Interface Management Team must be clearly defined in the IMP.

## 6. INTERFACE MANAGEMENT PLAN & INTERFACE MANAGEMENT PROGRAMME

### 6.1 General

The Contractor shall prepare the proposed Interface Management Plan and proposed Interface Management Programme, in accordance with the Contract stipulations and based on the formats noted in Attachments H and I, to which the Engineer issues a notice of no objection. The Interface Management Plan and Interface Management Programme shall completely define the Contractor’s programme and methodology for interface co-ordination and management, whilst complying with all Key Dates stated in Appendix 2B of this Section-VI Employer’s Requirements.

Subsequently they shall be kept up to date and submitted on a quarterly basis to the Engineer for scrutiny and notice of no objection, and a summary of the principal issues shall be included in each Monthly Progress Report. The Contractor shall note that each submission of these documents is subject to regular audits and the issue of a notice of no objection by the Engineer.

## 6.2 Interface Management Programme (IMPG)

The Interface Management Programme describes the sequencing and timing of each of the Interfacing Contractors' scope of work, clearly describing the interdependencies for all stages of the work between the Contractor's works and that of the Interfacing Contractors and complementing the Interface Management Plan, whilst complying with all Key Dates stated in the Appendix 2B of this Section-VI Employer's Requirements.

The programme shall be structured to detail each of the primary zones of interface and the principal elements of the design and of the works requiring interfacing contribution from others. This Interface Management Programme shall also be related to the Contractor's Works Programme and shall show the sequences and timing agreed with the Interfacing Contractors to the necessary degree of detail to clearly illustrate each of the interfaces to be undertaken.

Targets to receive or supply information shall also be shown, with due allowance being given for the design process of others. Information relating to Contractual Key Dates and information exchange dates shall be shown for both the Contractor and the Interfacing Contractors to demonstrate a matching of design processes.

A record of these interfaces, with current status and agreed dates for information transfer, site inspections, access, occupation, handover, etc. shall be maintained and also identified on the ICS, refer Clause 7 below.

Refer to Attachment H - Guidance Notes for the Preparation of IMPG.

## 6.3 Interface Management Plan (IMP)

The Interface Management Plan is that document which describes the Contractor's interface management in terms of providing a clear description of each of the interfaces, both technically and sequentially, and represents an account of how the Contractor proposes to achieve co-ordination of the Works. The description shall completely detail the Contractor's work scope and interface with each of the Interfacing Contractors in terms of technical description, sequence and timing for each of the elements required to achieve a coordinated design. The Contractor shall demonstrate how potential interface conflicts can be eliminated by design simplification. This document is also required to demonstrate that the co-ordinated design and construction details described therein fully comply with the needs of others, and agreement in writing of these details by the Interfacing Contractors will be a pre-requisite to the Engineer issuing a notice of no objection.

Refer to Attachment I – Guidance Notes for the Preparation of IMP.

## 6.4 Requirements For The Interface Management Programme & Interface Management Plan

The Interface Management Programme (IMPG) shall be a process-driven programme in a format to be agreed with the Engineer. The IMPG shall incorporate the key activities from both the Interfacing Contractors' and Contractor's Works programmes that will enable the Contractor to demonstrate that any Interface is being correctly managed and will result in fully co-ordinated design / construction / installation of works.

The Interface Management Plan and Interface Management Programme shall:

- Follow the outline structure, numbering system, and related procedures in a format to be agreed with the Engineer.

- Be co-ordinated with the Interfacing Contractors to ensure compatibility of interface identification and definition.
- Comply with the Key Dates stated in the Appendix 2B of this Section-VI Employer’s Requirements.
- Be transmitted to the Interfacing Contractors concurrently with submittals to the Engineer.
- Support the Works Programme to which the Engineer has given a notice of no-objection.
- Address each zone of interface, i.e., ancillary buildings, train stabling, trackwork external, trackwork internal, substations, signalling and telecommunications facilities, operation and control rooms, staff accommodation, external works etc. related to each design submission and stage of design / construction / installation.
- List all relevant interfaces in detail, their status, and the corresponding source(s) of information.
- Include interface information transfer dates which have been agreed by the Interfacing Contractors.
- Accommodate comments and input required by the Engineer.
- Include an account of how the interfaces are being managed.
- Identify the latest information regarding agreements with the Interfacing Contractors and transfers of information.
- Review and address the design, supply, installation, testing & commissioning programme of the Interfacing Contractors to ensure that the Key Dates of each contract can be achieved, and highlight any programme risks requiring management attention.
- Identify any problems related to co-ordination with Interfacing Contractors.

## 6.5 Interface Specification.

6.5.1 The Interface Specification, proforma enclosed in Attachment C, and associated drawings shall specify the proposed method and schedule for verifying the interface integrity, the individual equipment / system performance and the combined system performance.

The Interface Specification shall include a programme of tests to demonstrate the performance and integrity of the integrated system. The interface sheets developed by the Employer / Engineer are enclosed in Attachment D. The attached interface sheets are not final and do not relieve the Contractor’s obligation to identify any new interface to meet contract requirements. The interface sheets, which the Contractor shall develop, shall be used as a basis to establish the Interface Specification. Any revision to the Interface Specification shall be mutually agreed between the Contractor and Interfacing Contractors, with submission to the Engineer, and shall specifically -

- Understand the design requirements of each party and associated constraints;
- Determine the detailed interface works to be performed during the various stages; and
- Agree on the interface works in reference to respective scope, with any agreements reached to be formally documented in Interface Meeting Minutes, including an actions item list.

- 6.5.2 The Interface Contractors shall mutually identify and agree the Interfaces that will exist between them using the Interface Coordination Sheets, the format of which is contained in Attachment F. These interfaces may be expanded to include all, and any other, interfaces that develop during the execution of the Project.
- 6.5.3 The Interfacing Contractors shall mutually agree upon the information to be exchanged and shall develop a unique Interface Specification for each interface identified. A sample Interface Specification proforma is provided in Attachment C.
- The ICSs will be tracked and monitored using an ICS Register to be compiled by the Contractor. This register will track the progress of the ICS from inception through to closure and final processing by the Contractor, prior to transmittal to the Engineer as a complete Integrated Design.
- Each interface shall have a unique reference number to enable the Interface to be readily identified, tracked and monitored.

## **7. INTERFACE COORDINATION SHEET (ICS)**

- 7.1 The Contractor’s Interface Coordination sheet, the format of which is shown in Attachment F – Part 1, is required to be used by each of the Interfacing Contractors to record all of the Contract Interfaces. The Contractor shall ensure that each Interfacing Contractor provides input and maintains the ICS continually updated as required in this Appendix.
- 7.2 The Contractor shall ensure that the Interfacing Contractors demonstrate their co-ordination efforts as required by the Contract. To achieve this, the Contractor and the Interfacing Contractors shall identify their interface requirements which shall be input into the interface documents, i.e., IMP, IMPG, ICS, etc., by the Contractor.
- 7.3 The Contractor shall monitor the ICS to ensure that, as the Interface progresses, the records show the appropriate Status (refer status codes indicated in Part 3 of Attachment F) as agreed with the Interfacing Contractors. The Contractor will be responsible for confirming the “Closing Out” of each ICS record, whilst ensuring that throughout the interface process all Interfacing Contractors have agreed to the following:
- a) The receiving Interfacing Contractor has received and accepted the Interface being recorded.
  - b) All Interfacing Contractors have recorded the interface record as “Proposed Close Out”.
  - c) The Confirmation of Co-ordination form in Attachment G has been updated and signed by the relevant Interfacing Contractors, refer clause 7.4 below.
- 7.4 When documents are exchanged for review/comment with Interfacing Contractors, the originator preparing these documents should ensure that they are accompanied by the Confirmation of Coordination form in Attachment G. When the Interfacing Contractor returns these documents with comments to the originator, they should be returned with the Confirmation of Coordination form duly completed, confirming coordination and agreement or comment as appropriate, as a record of them having coordinated the interface item. This Confirmation of Co-ordination is to be transmitted to the Engineer upon signing by the Interfacing Contractor(s).

## **8. COORDINATION DRAWINGS**

### **8.1 General**

For the purpose of achieving a Project which is fully co-ordinated with respect to civil, structural, architectural, building services, electrical, mechanical works and interface elements, and to ensure compatibility between different facilities and services, and adequate space requirements, all drawings are to be reviewed and co-ordinated by the Contractor.

The Contractor will provide and issue detailed Interface Working Drawings in terms of items such as; special arrangements, space allocation, cast in items, primary and secondary fixings, grouting of equipment/plinths, drill and fix brackets, embedded and cast-in items and the like.

The drawings shall be prepared by the Contractor and shall also include composite cross-sections and layouts, which show the spatial requirements of all Interfacing Contractors and identify items to be finalised, defined, or resolved.

### **8.2 Combined Services Drawing (CSDs) And Structural E&M Drawings (SEMs)**

The Contractor's CSDs and SEMs must be clear and sufficiently detailed to unambiguously show the intent of the subject services and the corresponding structure / facility allowances. While these drawings do not have to duplicate all of the details of the Drawings, they must include plans, sections and elevations as required to clearly illustrate the compatible relationship between the different disciplines. Specifically, the drawings will include wall elevation drawings at 1:50 scale (or larger where required) indicating all openings, access panels, reinforcement zones, embedded and cast-in items and the like, and shall be submitted to the Engineer for a notice of no objection.

The CSDs shall show the intended locations, routes and spatial relationships of the individual E&M services, Building Services systems, and installations, Depot Equipment (where applicable), Core Systems installations and other installations, fully co-ordinated with each other and the civil structural and architectural work. The CSDs shall also clearly indicate that effective cable co-ordination has been achieved in terms of cable location or cable trays and the trunking and cable routing.

The SEMs shall show all civil, structural, and architectural requirements for the E&M services, Building Services systems and installations, Builder's works and the Core Systems and other installations.

Where Builder's works are required by the Interfacing Contractors, the drawings, details, specification notes and catalogue information and the like shall be obtained by the Contractor from these Interfacing Contractors indicating the builder's work to be incorporated into the Works. The Contractor shall include details of such Builder's works in the SEMs and Method Statements as appropriate.

Builder's work comprises, but is not limited to, the following:

- Construction of plinths, bases, builders bund walls and the like.
- placing and fixing of holding down bolts, lifting beams and hooks and other supporting items;
- supply, fabrication installation, protection, fixing and finishing of supporting steelwork, for equipment and associated accessories;
- casting in of edgings, angles in recesses, ducts, conduit, pipes etc.;

- fixing equipment and associated, brackets, cable containment and fixtures;
- forming of penetrations, sleeves, access panels, holes, chases, recesses, openings;
- All in accordance with the Contract.

The CSD/SEMs shall also be used for the purpose of co-ordinating with the Interfacing Contractors and shall be continuously updated to reflect the latest interface co-ordination. Copies of the CSD/SEM drawings shall be included in submittals to the Engineer.

Where the CSDs or SEMs do not fully co-ordinate with the Site conditions the Contractor shall co-ordinate and propose a solution to the problem. All proposed solutions shall be issued to the Engineer.

### **8.3 Interface Drawings**

For the Interface Drawings, the Contractor shall prepare in diagrammatic format for each interface the demarcation of scope of responsibilities between the Contractor and each of the Interfacing Contractors. The Contractor shall submit all Drawings with interface requirements for a notice of no objection from the Engineer. Any proposed deviation to the Construction Specification or noticed drawings shall be identified and justified with design documentation, details and drawings. The submission shall also identify all interface requirements. The contractor shall develop interface drawings with detailed design and dimensions and submit the same to other interfacing contractors.

### **8.4 As Constructed Drawings**

Upon completion of the Works the Contractor shall submit all Combined Services Drawings, Structural E&M Drawings, and Interface Demarcation Drawings showing the final “As Constructed” status of the Works related to these drawings.

## **9. ATTACHMENTS.**

Attachment A - Flow Chart for creation / elaboration of Interface Coordination Sheet

Attachment B – Flow Chart for Progress Monitoring of Interface Agreements

Attachment C – Interface Specification Form.

Attachment D – Indicative Interface sheets

Attachment E – Master Interface Matrix

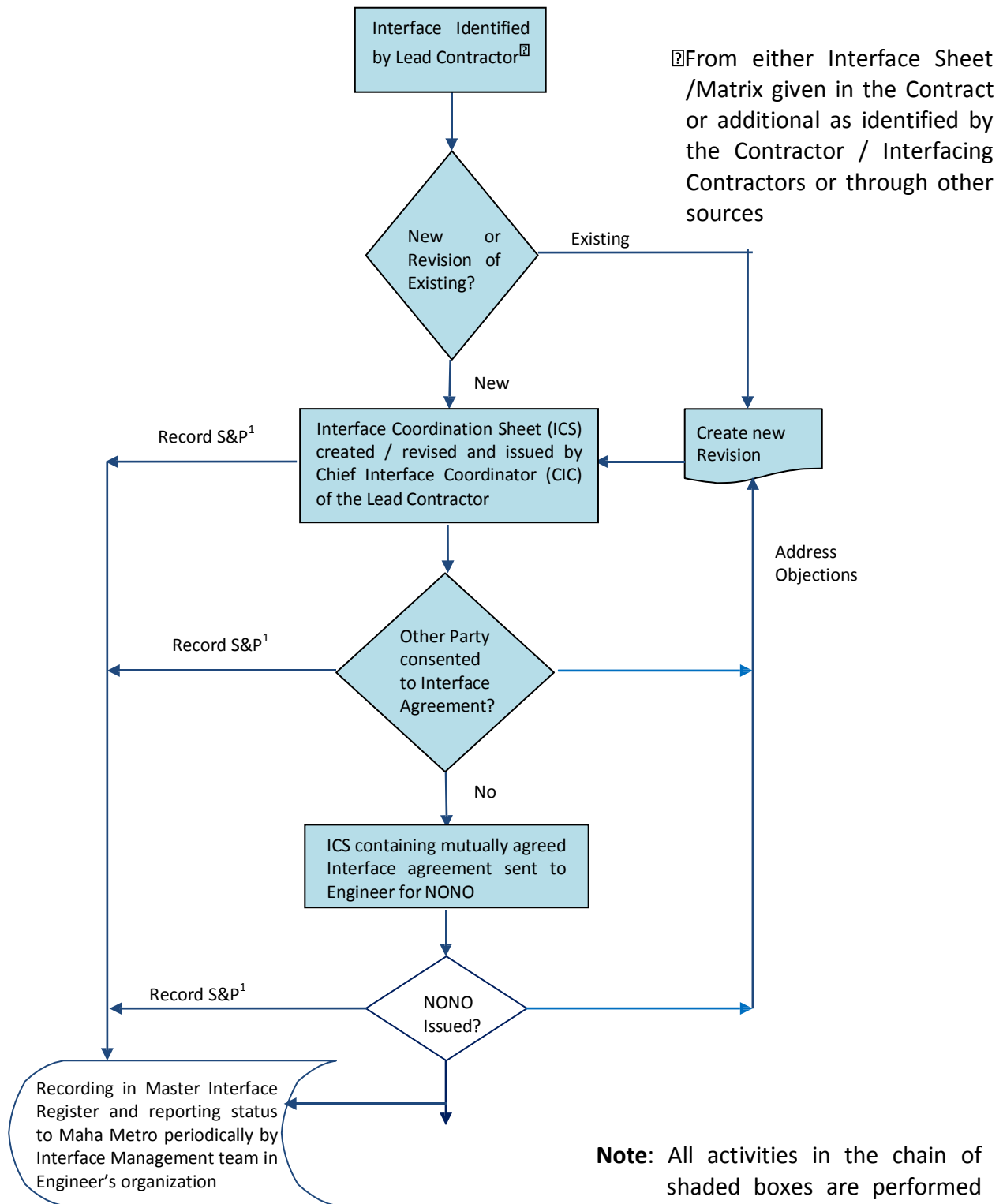
Attachment F – Interface Coordination Sheet

Attachment G – Confirmation of Co-ordination Form

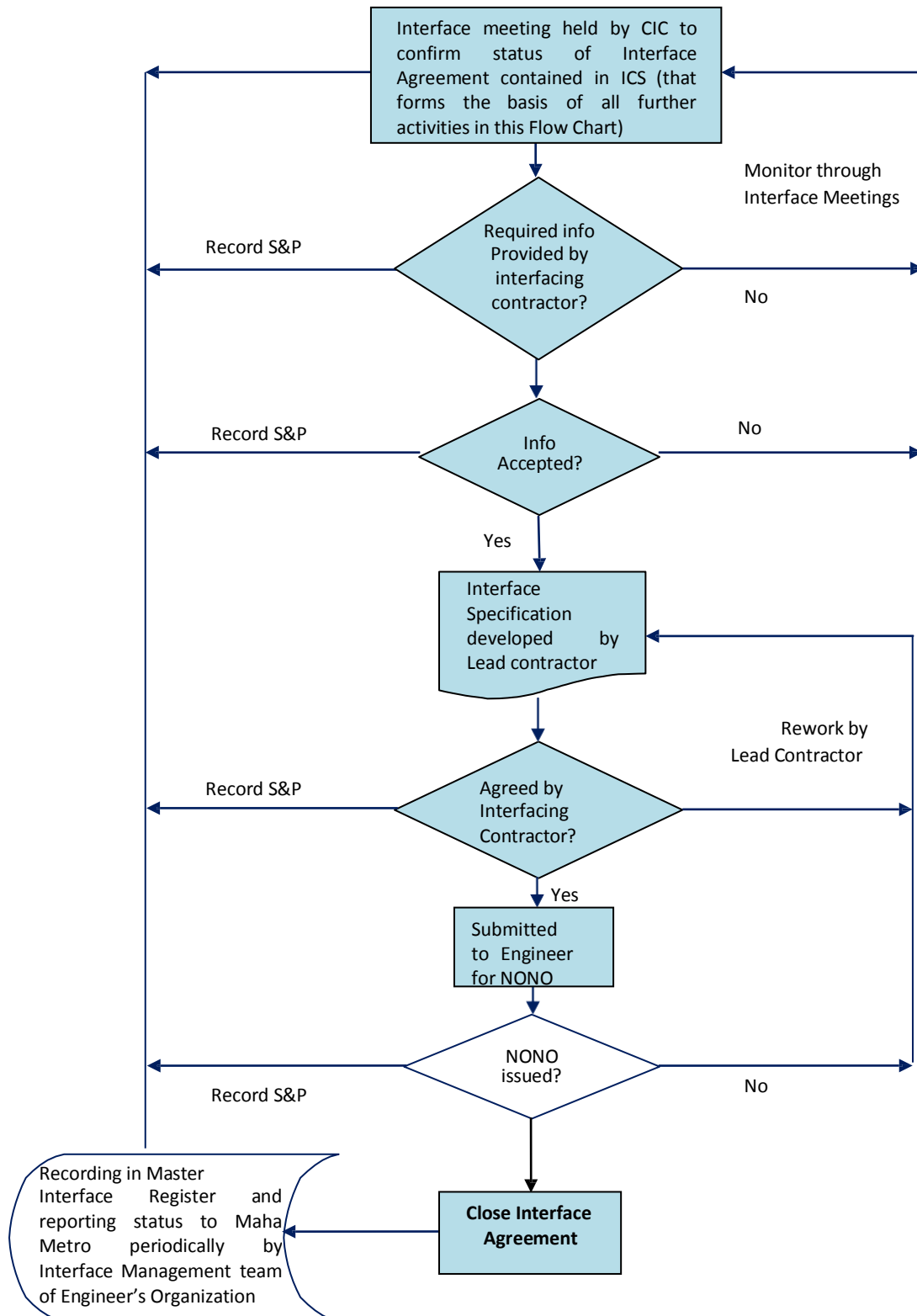
Attachment H - Guidance Notes for the Preparation of IMPG

Attachment I – Guidance Notes for the Preparation of IMP

### Attachment A - Flow Chart for creation / elaboration of Interface Coordination Sheet



## Attachment B - Flow Chart for Progress Monitoring of Interface Agreements



Note: All activities in the chain of shaded boxes are performed by Contractors, duly overseen by Engineer.

### Attachment C - Interface Specification Form

<b>INTERFACE SPECIFICATION</b>	<b>Ref:</b>
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	Contract Designation	Contractors Sequence Number	Date of Issue	
Initiating Contracto			Interface Manager	
Responding Contractor			Interface Manager	
Interface Specification Required			Response Required by;	
Reviewed by;				
Design Sections	Civil Work	Track work	Station Arch. / Building Services	Core Systems
<u>Description of the Interface</u>				
<u>Specific Details of the Interface</u>				<u>Location</u>
<u>Drawings / Specifications Attached</u>				
Title	Drawing / Specification Ref.		Drg. Issue	
Document	Name	Date	Document References (if any)	
Prepared by:				

### Attachment D – Indicative Interface Sheets

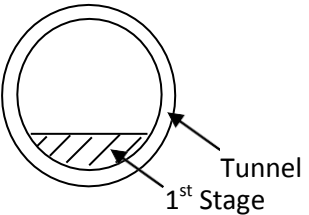
List of Interface sheet for UGC-02

SL NO	Description
1	UG Tunnel (UGC-02) and UG Station (UGC-01)
2	TVS&VAC(ECS) vs. Civil UG Stations & Tunnel (UGC-02)
3	Lifts & Escalators vs. UG Stations & Tunnels(UGC-02)
4	Rolling Stock vs. UG Stations & Tunnel (UGC-02)
5	Track vs. Civil UG Stations (UGC-02)
6	Track vs. Civil UG Tunnel (UGC-02)
7	Power Supply System vs. UG Stations & Tunnel (UGC-02)
8	OHE (PST) vs. UG Stations (UGC-02)
9	OHE (PST) vs. UG Tunnel (UGC-02)
10	Telecommunication vs. UG Stations (UGC-02)
11	Signalling and Train Control vs. UG Tunnel (UGC-02)
12	PSD vs. UG Stations (UGC-02)
13	AFC vs. UG Stations (UGC-02)

## 1. UG Tunnel (UGC-02) and UG Station (UGC-01)

Contract A : UG Tunnel (UGC-02) (Interface Lead)		Contract B : UG Station (UGC-01) (Interface follower)	Sheet # : 1/3
Contract A ( UGC-02 - Tunnel)	DESIGN STAGE	Contract-B (UGC-01–Station)	
<b>UT/US-01:</b> Contractor-B shall provide to the Contractor-A all the details and parameters necessary for the provision of soft-eye in the Diaphragm wall/secant pile wall/tunnel face of Budhwar Peth station.		<b>UT/US-01:</b> Contractor-A shall provide the required soft-eye in the Diaphragm wall/secant pile wall/tunnel face of Budhwar Peth station duly ensuring the overall compatibility with the Station design.	
<b>UT/US-02:</b> Contract-A shall Design station walls/tunnel face to be compatible with the tunneling scheme and arrangements including any ground treatment of the Contractor-B TBMs in the Budhwar Peth station .		<b>UT/US-02:</b> Contractor-B shall design any ground improvement/ treatment required outside the station wall/tunnel face depending upon his chosen tunneling scheme in consultation with Contractor-B duly interfacing and sharing the required information/details with him.	
<b>UT/US-03:</b> Contractor-A shall agree Survey and Alignment with Contractor-B		<b>UT/US-03:</b> Contractor-B shall agree Survey and Alignment with Contractor-A	

Contract A : UG Tunnel (UGC-02) (Interface Lead)		Contract B : UG Station (UGC-01) (Interface follower)	Sheet # : 2/3
<p><b>UT/US-04:</b> Contractor-A shall plan and design drainage system in consultation with contractor-B</p> <p><b>UT/US-05:</b> (a) Contractor-A shall provide cable tray for Contractor-B requirements from the common contract boundary point upto the termination points and design the electrical system for emergency light and fire detection etc., (b) Contractor-A shall design and install fire hydrant, plumbing services, etc., to suit the contractor-A design and tap it from the Contract boundary line.</p>		<p><b>UT/US-04:</b> Contractor-B shall design temporary and permanent drainage system in consultation with contractor-A</p> <p><b>UT/US-05:</b> (a) Contractor-B shall design and install electrical services like emergency light, fire detection linear cable etc., from half of tunnel and extend them up to the termination points inside the <b>Budhwar Peth</b> station, (b) Contractor-B shall design and install fire hydrant, plumbing services, etc., upto the boundary line of the two Contracts.</p>	
Contract A ( UGC-02 - Tunnel)	CONSTRUCTION / INSTALLATION STAGE	Contract-B (UGC-01 –Station)	
<p><b>UT/US-06:</b> Contractor-A shall Review &amp; follow TBM programme and shall provide space for TBM break-through and retrieval from Station central portion and drainage systems .</p> <p><b>UT/US-07:</b> Contractor-A shall Provide space and access to Contractor-B (tunnel Contractor), inside/outside the station, as required, for carrying out the ground treatment works.</p> <p><b>UT/US-08:</b> (a) Contractor-B shall install/provide cable tray meeting the requirements of Contractor-A, from Contract boundary point upto the termination points and provide proper terminal points to connect tunnel side electrical cables (b) Contract-B shall tap fire hydrant system, drainage system etc. from the Contract boundary point</p> <p><b>UT/US-09:</b> Contractor-A shall construct temporary and permanent drainage system and interlink with Contractor-B drainage system</p>		<p><b>UT/US-06:</b> Contractor-B shall Provide TBM programme/Access Schedule, land sharing schedule , construction programme and actual Physical progress</p> <p><b>UT/US-07:</b> Contractor-B shall carry out any ground improvement/ treatment work required outside the station wall/tunnel face depending upon his chosen tunneling scheme in consultation with Contractor-B duly interfacing and sharing the required information/details with him.</p> <p><b>UT/US-08:</b> (a) Contractor-A shall install tunnel electrical systems/services cables up to the Distribution boards/terminal points inside the Budhwar Peth Station (b) Contractor-A shall terminate fire hydrant system, drainage system etc. at Contract boundary point</p> <p><b>UT/US-09 :</b> Contractor-B shall construct temporary and permanent drainage system and interlink with Contractor–A drainage system</p>	

Contract A : UG Tunnel (UGC-02) (Interface Lead)		Contract B : UG Station (UGC-01) (Interface follower)	Sheet # : 3/3
<p><b>UT/US-10:</b> Contractor-A shall clear the area and provide the space for cradle</p> <p><b>UT/US-11:</b> Contractor-A shall Construct soft-eyes in Station wall/tunnel face to accept two TBMs</p> <p><b>UT/US-12:</b> Contractor-A shall Allow Contractor-B for the breakthrough &amp; removal of TBMs from station central portion</p> <p><b>UT/US-13:</b> Contractor-A shall Jointly inspect and accept the sealing</p> <p><b>UT/US-14:</b> Contractor-A shall Install water stoppage barrier to prevent water entry from UGC-01 to UGC-02 area</p>		<p><b>UT/US-10:</b> Contractor-B shall Install cradle for receiving the TBMs</p> <p><b>UT/US-11:</b> Contractor-B shall Breakthrough soft-eyes with TBMs</p> <p><b>UT/US-12:</b> Contractor-B shall Dismantle and remove TBMs from the station central portion</p> <p><b>UT/US-13:</b> Contractor-B shall provide proper sealing in the tunnel eye (if found necessary)</p> <p><b>UT/US-14:</b> Contractor-B shall Request water stoppage barrier to prevent water entry from UGC-01 to UGC-02 area</p>	
Contract A ( UGC-02 - Tunnel)	TEST & COMMISSIONING STAGE	Contract-B (UGC-01 –Station)	
<p><b>UT/US-15:</b> Alignment of the tunnels and 1<sup>st</sup> stage concrete in the tunnels to match the arrangement/level with respect to the station/tunnel base slab</p> <p><b>UT/US-16:</b> Stop water leakage between the station wall/NATM tunnel face &amp; bored tunnels</p> 		<p><b>UT/US-15:</b> Agree and accept</p> <p><b>UT/US-16:</b> Joint inspection and accept</p>	

## 2. Tunnel Ventilation & UG Station Air Conditioning System (TVS and ECS) and UG Stations & Tunnel (UGC-02)

Contract A : Tunnel Ventilation & UG Station Air Conditioning System (Interface Lead)		Contract B : UG Stations & Tunnel (UGC-02) (Interface follower)	Sheet # : 1/7
Contract A (TVS and ECS)	DESIGN STAGE	Contract B (UG-Stations & Tunnel)	
<p><u>Interface related to Architectural:</u></p> <p><b>TV/UG-01:</b> Contractor A shall collect station Architectural/Structural drawings, false ceiling details including room names, location of rooms and sectional views in the concourse level, mezzanine level (where applicable), platform level and street level including subways and shafts etc.,</p> <p><b>TV/UG-02:</b> Shall provide the room size, door size, shaft &amp; Plenum size and finish details for all VAC (ECS) and Tunnel ventilation (TVS) equipmentsystems.</p> <p><b>TV/UG-03:</b> Shall collect all corridor and door details to facilitate equipment delivery in the station ancillary areas, VAC(ECS) and Tunnel ventilation (TVS) equipment rooms etc. and request for any changes/modifications, if required,</p> <p><b>TV/UG-04:</b> Shall collect the details of walls, ceiling, floor, windows and finish details to design VAC (ECS) system.</p> <p><b>TV/UG-05:</b> Shall provide size to get space and location of VAC concrete shaft and Tunnel ventilation concrete shaft as well as adjust the location of shaft.</p> <p><b>TV/UG-05(A):</b> Shall provide the required design details (such as spacing, free area required, material, various dimensions and clearances etc.) of the External Intake and Outlet Louvers for the TVS and ECS shafts to Contractor B.</p> <p><b>TV/UG-06:</b> Shall provide size to get space and location of concrete shaft for condensed water pipes from cooling tower to chiller plant room as well as adjust the location of shaft.</p>		<p><b>TV/UG-01:</b> Contractor B shall provide the same as requested by contractor A.</p> <p><b>TV/UG-02:</b> Shall incorporate the same in the station design.</p> <p><b>TV/UG-03:</b> Shall provide all corridor and door details as requested by contractor A and incorporate the changes as per the requirements of Contractor-A.</p> <p><b>TV/UG-04:</b> Shall provide the same as requested by contractor A.</p> <p><b>TV/UG-05:</b> Shall incorporate the same in the station design and provide the suitable shaft locations.</p> <p><b>TV/UG-05(A):</b> Shall Design/provide the External Intake and Outlet Louvers for the TVS and ECS shafts and incorporate the same in the station design duly considering the site- specific architectural and finishing requirements and fulfilling the design requirements provided by Contractor A.</p> <p><b>TV/UG-06:</b> Shall incorporate the same in the station design and provide the suitable shaft location.</p>	

Contract A : Tunnel Ventilation & UG Station Air Conditioning System (Interface Lead)	Contract B : UG Stations & Tunnel (UGC-02) (Interface follower)	Sheet # : 2/7
<p><b>TV/UG-07:</b> Shall provide size to get space and location of concrete shaft for chilled water pipes from chiller plant room to Air handling units as well as adjust the location of shaft.</p> <p><b>TV/UG-08:</b> Shall collect opening size, location details, and cross sectional views of all staircases including emergency staircase to design staircase pressurisation system.</p> <p><b>TV/UG-09:</b> Shall collect details of smoke protection zone to design smoke extract fan and fire limit zone for evacuation of people.</p> <p><b>TV/UG-10:</b> Shall provide size to get space and location of concrete duct for under platform exhaust and over track way exhaust system.</p> <p><b>TV/UG-10A:</b> Shall provide details of fire rated door size and location in the tunnel ventilation concrete shaft in the TVS equipment room</p>	<p><b>TV/UG-07:</b> Shall incorporate the same in the station design and provide suitable shaft location.</p> <p><b>TV/UG-08:</b> Shall provide the same to design VAC (ECS) system.</p> <p><b>TV/UG-09:</b> Shall provide the detailed drawing to design VAC (ECS) system.</p> <p><b>TV/UG-10:</b> Shall incorporate the same in the station design.</p> <p><b>TV/UG-10A:</b> Shall incorporate contractor-A requirements in TVS equipment room</p>	
<p><u>Interface related to Civil:</u></p> <p><b>TV/UG-11:</b> Shall provide size and location details to make pedestal for VAC(ECS) equipment and Tunnel ventilation equipment (TVS); such as Air handling units, Fans and Outdoor units for Split air conditioning etc.,</p> <p><b>TV/UG-12:</b> Shall provide size and location details to make pedestal for chiller plant room equipment.</p> <p><b>TV/UG-13:</b> Shall provide size and location details to make pedestal for cooling tower plant equipment.</p> <p><b>TV/UG-14:</b> Shall provide size and location details to make pedestal for condenser water and chilled water pipes.</p> <p><b>TV/UG-15:</b> Shall provide duct size and duct routing to make opening in the wall/ceiling/slabs as well as get the space for ducting.</p>	<p><b>TV/UG-11:</b> Shall design the pedestal for VAC (ECS) equipment and Tunnel ventilation (TVS) equipment to accommodate the details by Contractor-A.</p> <p><b>TV/UG-12:</b> Shall design the pedestal for chiller plant room equipment to accommodate the details by Contractor-A.</p> <p><b>TV/UG-13:</b> Shall design pedestal or foundation for cooling tower plant equipment to accommodate the details by Contractor-A.</p> <p><b>TV/UG-14:</b> Shall design the pedestal for condensed water and chilled water pipes to accommodate the details by Contractor-A.</p> <p><b>TV/UG-15:</b> Shall provide coordinated combined builders work drawing agree jointly and provide opening in wall/ ceilings/slabs for duct route.</p>	

Contract A : Tunnel Ventilation & UG Station Air Conditioning System (Interface Lead)	Contract B : UG Stations & Tunnel (UGC-02) (Interface follower)	Sheet # : 3/7
<p><b>TV/UG-17:</b> Shall provide cabling size and cable routing to make opening in the wall/ceiling/slabs and get the space for cabling including cable tray and brackets etc.</p> <p><b>TV/UG-18:</b> Shall give opening size and location in the false ceiling to mount grille and dampers and space/size requirement for Air curtains at entrances.</p> <p><b>TV/UG-19:</b> Shall give size and location to make concrete shaft for chilled water pipe line from chiller plant room to Air handling unit.</p> <p><b>TV/UG-20:</b> Shall give size and location to make concrete shaft for condensed water pipe line from cooling tower to chiller plant rooms.</p> <p><b>TV/UG-21:</b> Shall give size and location to make concrete shaft for VAC system (ECS) and Tunnel ventilation system (TVS). Water proofing required in the concrete shaft.</p> <p><b>TV/UG-21(A):</b> Shall give the requirements and details of the External Intake and Outlet Louvers for the TVS and ECS shafts to Contractor B.</p> <p><b>TV/UG-22:</b> Shall provide size and location of pipe/cable to fix sleeves.</p> <p><b>TV/UG-23:</b> Shall provide size and location to make opening in the wall/ceiling/slabs to carry VAC system equipment and Tunnel ventilation system equipment from one level to another level.</p> <p><b>TV/UG-24:</b> Shall give size and location details to get space for mounting fan coil units and split air conditioning units in the station ancillary/plant rooms.</p> <p><b>TV/UG-25:</b> Shall provide size and location to make opening in the wall to provide air louver and ventilation fans in the station ancillary/plant rooms and electrical rooms.</p>	<p><b>TV/UG-17:</b> Shall provide coordinated combined builders work drawing agree jointly and provide opening in wall/ ceilings/slabs for cable route and provide the space for cabling including cable tray and brackets etc.</p> <p><b>TV/UG-18:</b> Shall provide openings in false ceiling to mount grilles and dampers and also provision for the space for Air-curtains at the entrances.</p> <p><b>TV/UG-19:</b> Shall accommodate the details given by contractor-A in making concrete shaft.</p> <p><b>TV/UG-20:</b> Shall accommodate the details given by contractor-A in making concrete shaft.</p> <p><b>TV/UG-21:</b> Shall accommodate the details given by contractor-A in making concrete shaft.</p> <p><b>TV/UG-21(A):</b> Shall provide/construct the External Intake and Outlet Louvers for the TVS and ECS shafts as per the requirements and details provided by Contractor A.</p> <p><b>TV/UG-22:</b> Shall provide coordinated combined builders work drawing agree jointly and accommodate the sleeves for pipe/cable</p> <p><b>TV/UG-23:</b> Shall accommodate the size and location of opening in the wall/ceiling/slabs to carry VAC system equipment and Tunnel ventilation system equipment from one level to another level.</p> <p><b>TV/UG-24:</b> Shall provide space to accommodate them in station ancillary/plant rooms.</p> <p><b>TV/UG-25:</b> Shall make opening in the wall to accommodate them in station ancillary/plant rooms and electrical rooms.</p>	

Contract A : Tunnel Ventilation & UG Station Air Conditioning System (Interface Lead)	Contract B : UG Stations & Tunnel UGC-02 (Interface followe	Sheet # : 4/7
<p><b>TV/UG-26:</b> Shall provide number of openings, opening size and location details in the concrete duct for under platform exhaust and over track way exhaust system.</p> <p><b>TV/UG-27:</b> Shall get the space to fix air curtains in the station entrances (including subways entrances) to prevent conditioned air loss from concourse public areas.</p> <p><u>Interface related to Plumbing:</u></p> <p><b>TV/UG-28:</b> Shall provide drain point information in the VAC (ECS) equipment rooms, chiller plant room, Cooling tower plant and Tunnel ventilation equipment rooms etc.,</p> <p><b>TV/UG-29:</b> Shall provide drain point information for all fan coil units and its associated pipes in the station ancillary areas and terminate condensate drain pipe to the nearest drain point.</p> <p><b>TV/UG-30:</b> Shall collect water supply pipe line connection and other accessories from plumbing centre to the makeup water tank. Shall provide water requirements for cooling tower system.</p> <p><b>TV/UG-31:</b> Shall collect water supply pipe line connection(where required), floor drain with grating for VAC equipment rooms, chiller plant room and Tunnel ventilation equipment rooms etc.,</p>	<p><b>TV/UG-26:</b> Shall accommodate them.</p> <p><b>TV/UG-27:</b> Shall provide the space to fix air curtains in the station entrances (including subways entrances) to prevent conditioned air loss from concourse public areas</p> <p><b>TV/UG-28:</b> Shall provide plant room floor drains.</p> <p><b>TV/UG-29:</b> Shall provide floor drains in the nearby wet area. (Janitors closet / Refuse room / Cleaners room / Lunch room / Toilet / Mechanical equipment room, etc.)</p> <p><b>TV/UG-30:</b> Shall provide one point of connection up to cooling tower Make up water tank.</p> <p><b>TV/UG-31:</b> Shall provide Water supply through one point of connection and floor drain through plant room floor drains.</p>	
<p><u>Interface related to Electrical (Low Voltage Distribution):</u></p> <p><b>TV/UG-32:</b> Shall collect the details of equipment heat generation load, number of persons and operating temperature details in the electrical rooms such as room, DG room and UPS room etc. to design VAC system.</p> <p><b>TV/UG-33:</b> Shall collect the details of lighting heat generation load in the station (public and non-public areas including subways etc.) to design VAC system.</p>	<p><b>TV/UG-32:</b> Shall provide the details as requested by contractor A.</p> <p><b>TV/UG-33:</b> Shall provide the details of lighting heat generation load.</p>	

Contract A : Tunnel Ventilation & UG Station Air Conditioning System (Interface Lead)	Contract B : UG Stations & Tunnel (UGC-02) (Interface follower)	Sheet # : 5/7
<p><b>TV/UG-34:</b> Shall coordinate for power requirements (Normal ,DG, &amp; UPS) for complete Station and Tunnel loads to design the main switchboards in the ASS room.. Shall provide the location and power requirements for the TVS and VAC electric panels considering all modes to enable UGC-02 contractor to plan for distribution and sizing the DG and UPS.</p> <p><b>TV/UG-35(A):</b> Shall get the cable containment for VAC and tunnel ventilation system upto inner wall of VAC and TVS panel rooms.</p> <p><b>TV/UG-35(B):</b> Shall get the earth bus in the VAC and tunnel ventilation system equipment rooms.</p> <p><u>Interface related to Fire Detection System:</u></p> <p><b>TV/UG-36:</b> Shall collect the details of fire heat generation capacity (Fire load) in the station areas <u>(and subways' etc.)</u> to design smoke exhaust fan capacity.</p> <p><b>TV/UG-37:</b> Shall provide cabling up to Interface terminal board/Interface unit to get control signal from fire alarm main panel to Smoke Control Panel/Motor control centre via SCADA for the operation of smoke extract fan, Track way exhaust system and Tunnel ventilation system during a fire in station, tunnel and cross over. Shall provide VAC system and Tunnel ventilation system functions for fire in station, tunnel and crossover in the operation mode table for comply with compatibility.</p>	<p><b>TV/UG-34:</b> Shall coordinate for power requirements (Normal, DG &amp; UPS) the three phase and single phase including fault levels etc. for the power loads in station and tunnel, to enable TVS/ECS contractor to design and supply the main switchboards in the ASS room. Shall check the location of <u>Outgoing feeders from</u> main distribution boards to design the further distribution.</p> <p><b>TV/UG-35(A):</b> Shall provide the cable containment for VAC and tunnel ventilation system upto inner wall of VAC and TVS panel rooms.</p> <p><b>TV/UG-35(B):</b> Shall provide the earth bus in the VAC and tunnel ventilation system equipment rooms.</p> <p><b>TV/UG-36:</b> Shall provide the details as requested by contractor A.</p> <p><b>TV/UG-37:</b> Shall provide the signal from Fire alarm panel and linear heat detection system through Interface terminal board/Interface unit/Control module/Monitor module etc.</p>	

Interface related to Tunnel:			
<b>TV/UG-37(A):</b> Shall provide the details of pressure effects on cross passage doors and the wayside equipment in the tunnel induced by train piston effect.		<b>TV/UG-37(A):</b> Shall get the details of pressure effects on cross passage doors and the wayside equipment in the tunnel induced by train piston effect.	
Contract A(Tunnel Ventilation & Station VAC)	<b>CONSTRUCTION / INSTALLATION STAGE</b>	Contract B(UG-Station&Tunnel)	
Interface related to Architectural:			
<b>TV/UG-38:</b> Contractor A shall check room sizes, stair case sizes, door sizes and finishes for VAC and Tunnel ventilation system as provided by contractor B.		<b>TV/UG-38:</b> Shall Co-ordinate with contractor –A	
<b>Contract A : Tunnel Ventilation &amp; UG Station Air Conditioning System (Interface Lead)</b>		<b>Contract B : UG Stations &amp; Tunnel (UGC-02) (Interface follower)</b>	<b>Sheet # : 6/7</b>
Interface related to Civil:			
<b>TV/UG-39:</b> Shall check all pedestals for VAC and Tunnel ventilation system equipment as provided by contractor B.		<b>TV/UG-39:</b> Shall Co-ordinate with contractor –A	
<b>TV/UG-40:</b> Shall check all concrete shafts <u>(including Intake and Outlet external Louvers)</u> for VAC and Tunnel ventilation system.		<b>TV/UG-40:</b> Shall Co-ordinate with contractor –A	
<b>TV/UG-41:</b> Shall check all concrete ducts for VAC and Tunnel ventilation system.		<b>TV/UG-41:</b> Shall Co-ordinate with contractor –A	
<b>TV/UG-42:</b> Shall check the space and all opening dimensions in the Wall/ceiling/slabs to run ducting, piping and cabling.		<b>TV/UG-42:</b> Shall Co-ordinate with contractor -A	
<b>TV/UG-43:</b> Shall check all opening dimensions in the false ceiling to mount grilles and dampers.		<b>TV/UG-43:</b> Shall Co-ordinate with contractor –A	
<b>TV/UG-44:</b> Shall check opening dimensions in the wall/ceiling/slabs to carry VAC and Tunnel ventilation equipment.		<b>TV/UG-44:</b> Shall Co-ordinate with contractor -A	

<p><b>TV/UG-45:</b> Shall check the space to mount fan coil units and split air conditioning units.</p> <p><b>TV/UG-46:</b> Shall check the sleeves for pipe/cables.</p> <p><b>TV/UG-47:</b> Shall check opening sizes in the wall to provide air louver and ventilation fans in the station ancillary/plant areas and electrical rooms.</p> <p><b>TV/UG-48:</b> Shall check number of openings, opening size in the concrete duct for under platform exhaust and over track way exhaust system.</p>	<p><b>TV/UG-45:</b> Shall Co-ordinate with contractor -A</p> <p><b>TV/UG-46:</b> Shall Co-ordinate with contractor -A</p> <p><b>TV/UG-47:</b> Shall Co-ordinate with contractor –A</p> <p><b>TV/UG-48:</b> Shall Co-ordinate with contractor –A</p>
<p><b>Contract A : Tunnel Ventilation &amp; UG Station Air Conditioning System (Interface Lead)</b></p>	<p><b>Contract B : UG Stations &amp; Tunnel (UGC-02) (Interface follower)</b></p> <p><b>Sheet # : 7/7</b></p>
<p><u>Interface related to plumbing:</u></p> <p><b>TV/UG-49:</b> Shall check all the drain point, grating for the floor drain and connection for water supply for VAC and Tunnel ventilation system as provided by contractor B.</p> <p><u>Interface related to Electrical (Low Voltage Distribution):</u></p> <p><b>TV/UG-50:</b> Shall check three phase and single phase incoming power supply for normal, congested and emergency operation for all VAC and Tunnel ventilation system equipment.</p> <p><b>TV/UG-50(A):</b> Shall check the cable containment works.</p> <p><u>Interface related to Fire Detection system:</u></p> <p><b>TV/UG-51:</b> Shall check cabling in the Interface terminal board/Interface unit to get control signal from fire alarm main panel to Smoke Control Panel/Motor control centre via SCADA for the operation of smoke extract fan, Track way exhaust system and Tunnel ventilation system during a fire in station, tunnel and cross over.</p>	<p><b>TV/UG-49:</b> Shall Co-ordinate with contractor –A</p> <p><b>TV/UG-50:</b> Shall Co-ordinate with contractor –A and shall check the location of all main/emergency LV switchboards in ASS room for further distribution.</p> <p><b>TV/UG-50(A):</b> Shall Co-ordinate with contractor –A</p> <p><b>TV/UG-51:</b> Shall Co-ordinate with contractor -A</p>

Contract A(TVS and ECS )	TEST & COMMISSIONING STAGE	Contract B(UGC-02—Station & Tunnel)
<u>Interface related to Electrical (Low Voltage Distribution):</u> <b>TV/UG-52:</b> Shall conduct joint testing on the electrical inputs and outputs operation required for VAC (ECS) and TV system (TVS).		<b>TV/UG-52:</b> Shall agree and do the needful.
Contract A(TVS AND ECS )	MAINTENANCE STAGE	Contract B(UGC-02—Station & Tunnel)
<b>TV/UG-53:</b> Shall jointly agree and accept as per the maintenance specification		<b>TV/UG-53:</b> Shall do the needful as per the maintenance specification of the station and tunnel.

### 3. Lifts and Escalators and UG Stations & Tunnel (UGC-02)

Contract A : Lifts and Escalators (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 1/2
Contract A (Lifts & Escalators)	DESIGN STAGE	Contract B (UG station)	
<p><b>LE/US-01:</b> Shall provide the requirements of total Electrical Power (Normal, DG), Earthing, Cable Routing &amp; location of the power point (Isolator) for Lifts and Escalators in the station.</p> <p><b>LE/ES-02:</b> (a) Shall provide the interface details of Fire alarm system inside the lift &amp; firefighting system inside the escalator to Contractor-B. (b) Shall implement functional requirements in software</p> <p><b>LE/US-03:</b> Shall provide the requirement of mounting and structural details like head room space, lift shaft spacing, lift pit (water resistant), Escalator pits (water resistant), with notches and gravitational drainage system to Contractor-B</p> <p><b>LE/US-04:</b> Shall request access (to site) and delivery space for Lifts and Escalators and equipment load details and locations of hooks required for handling lifts and escalator during installations.</p> <p><b>LE/US-05:</b> Shall request the station architectural/structural drawings</p> <p><b>LE/US-06:</b> Shall provide the architectural/structural/fixing ‘general arrangement drawing’ of Lifts and Escalators for installation with load details.</p> <p><b>LE/ES-06A:</b> Shall provide interface details of sprinkler system inside Escalator</p>		<p><b>LE/US-01:</b> Shall collect the load details and design the power supply, earthing (from earth pit to respective equipment room), Cable routing and isolators locations as per the requirements.</p> <p><b>LE/ES-02:</b> (a) Shall collect the details from Contractor-A and utilize the input for fire protection/Alarm system (b) Shall provide functional requirements under various emergency conditions</p> <p><b>LE/US-03:</b> Shall incorporate Contractor-A’s requirements in his station design.</p> <p><b>LE/US-04:</b> Shall incorporate Contractor-A’s requirement in his station design and shall provide lifting hooks/beams.</p> <p><b>LE/US-05:</b> Shall provide the station architectural/structural drawings.</p> <p><b>LE/US-06:</b> Shall incorporate Contractor-A’s requirement in his station design.</p> <p><b>LE/ES-06A:</b> Shall collect details from Contractor-A to provide water tap at suitable location and design his system accordingly</p>	
Contract A (Lifts & Escalators)	CONSTRUCTION / INSTALLATION STAGE	Contract B (UG station)	
<p><b>LE/US-07:</b> Shall jointly check the availability of requirement (shaft/site, readiness) for Lifts and Escalators installation, like Power Supply, Earthing Cable routing, power supply Isolator points, mounting facility, water resistant pits, access and delivery space as per the drawing (provided by Lift &amp; Escalator Contractor) suitable for lifts &amp; Escalators erection and confirm.</p>		<p><b>LE/US-07:</b> Shall provide ‘Contractor A’ requirements in station.</p>	

Contract A : Lifts and Escalators (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 2/2
<p><b>LE/US-08:</b> Shall request free space for temporary storage in the Station building.</p> <p><b>LE/US-09:</b> Space should be free from human interference materials.</p> <p><b>LE/US-10:</b> Shall request Contractor-B for Lift entrance cladding (Architrave).</p> <p><b>LE/US-11:</b> Shall provide the safety working atmosphere at work site.</p> <p><b>LE/US-12:</b> Shall provide the micro schedule of erection.</p> <p><b>LE/US-13:</b> Shall request water connection to Escalator sprinkler system.</p>		<p><b>LE/US-08:</b> Shall provide free space for the temporary storage for limited period.</p> <p><b>LE/US-09:</b> Will ensure the space is free from human interference materials</p> <p><b>LE/US-10:</b> Shall provide Lift entrance cladding (Architrave).</p> <p><b>LE/US-11:</b> Shall request the safety working atmosphere at work site.</p> <p><b>LE/US-12:</b> Shall request the micro schedule of erection before erection starts.</p> <p><b>LE/US-13:</b> Shall provide the water connection as per the requirements of Contractor-A.</p>	
Contract A (Lifts & Escalators)	TEST & COMMISSIONING STAGE	Contract B (UG station)	
<b>LE/US-14:</b> Contract-A Shall Conduct test run jointly with Contractor-B		<b>LE/US-14:</b> Contractor-B shall co-ordinate with Contractor - A.	
Contract A (Lifts & Escalators)	MAINTENANCE STAGE	Contract B (UG station)	
<b>LE/US-15:</b> As per the maintenance manual supplied by supplier and agreed by all the parties.		<b>LE/US-15:</b> As per the maintenance manual supplied by supplier and agreed by all the parties	

#### 4. UG Stations & Tunnel (UGC-02) and Rolling Stock

Contract A: UG Stations and Tunnel (UGC-02) (Interface Lead)		Contract B : Rolling Stock (Interface follower)	Sheet # : 1/2
Contract A(UG Station & Tunnel (UGC-02))	DESIGN STAGE	Contract B (Rolling stock)	
<b>Tunnel:</b> <b>TL/RS-01: (a)</b> Contractor-A shall give the details of Tunnel Design Drawings showing the indicative curves, dimensional clearances, gradients, chainages, levels to rolling stock contractor(Contractor-B) <b>(b)</b> Shall obtain from the Contractor-B, the values of maximum attainable speed on each curve in normal and all-out modes (based on simulation studies to be done by the Contractor-B) so as to determine the values of cant to be provided on each curve to determine the design/theoretical coordinates of tunnel center on each curve. <b>(c)</b> Shall obtain from the Contractor-B the Rolling Stock details such as length of train cars, height and location of doors, loading configuration (axle loads and configurations) etc. for tunnel and walkway design. <b>TL/RS-02:</b> Contractor-A Shall give details of the emergency escape provision in tunnels to Contractor-B <b>TL/RS-03:</b> In tunnel, maximum flood level (water height) will be 100 mm –car must still operate <b>UG-Station:</b> <b>TL/RS-04:</b> Contractor-A shall obtain the details of Rolling stock including length of train cars, height , throws on curves, platform clearances to be maintained on straight and curved tracks, loading configuration(axle loads and configurations) etc. for station design.		<b>TL/RS-01: (a)</b> Contractor-B shall obtain the details of Tunnel Design Drawings showing the indicative curves, dimensional clearances, gradients, chainages, levels to design rolling stock suitably  <b>(b)</b> Shall provide the required details to Contractor-A  <b>(c)</b> Shall provide the required details to Contractor-A  <b>TL/RS-02:</b> Contractor-B shall design the rolling stock with suitable emergency escape provision to match tunnel provision <b>TL/RS-03:</b> Contractor-B shall design under slung equipment suitably  <b>TL/RS-04:</b> Contractor-B shall give the required details to Contractor-A	

Contract A: UG Stations and Tunnel (UGC-02) (Interface Lead)		Contract B : Rolling Stock (Interface follower)	Sheet # : 2/2
<b>TL/RS-05:</b> Contractor-A shall require the details of kinematic, structural gauges and swept envelope on straight and curved tracks		<b>TL/RS-05:</b> Contractor-B shall give the details of kinematic, structural gauges and swept envelope for straight and curved tracks.	
Contract A(UG Station & Tunnel (UGC-02))	CONSTRUCTION / INSTALLATION STAGE	Contract B (Rolling stock)	
<b>TL/RS-06:</b> Shall jointly check and confirm the curves, dimensional clearances, gradients, chainages, levels and emergency escape provision		<b>TL/RS-06:</b> Shall co-ordinate and confirm with contractor-A	
<b>TL/RS-07:</b> Contractor-A shall participate/attend test run and do modifications, if required.		<b>TL/RS-07:</b> Contract-B shall be required to conduct test run with the train at low speed.	
Contract A(UG Station & Tunnel (UGC-02))	TEST & COMMISSIONING STAGE	Contract B (Rolling stock)	
<b>TL/RS-08:</b> Shall jointly check and confirm the maximum noise/echo level with Respect to various operating speeds of rolling stock.		<b>TL/RS-08:</b> Shall co-ordinate and confirm with contractor-A	
<b>TL/RS-09:</b> Contractor-A shall coordinate with contractor-B to complete testing and commissioning work		<b>TL/RS-09:</b> Contractor-B shall be required to conduct integrated tests with all systems	
Contract A(UG Station & Tunnel (UGC-02))	MAINTENANCE STAGE	Contract B (Rolling stock)	
NIL		NIL	

## 5. Track and UG Stations (UGC-02)

Contract A: Track (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 1/2
Contract A(TRACK)	DESIGN STAGE	Contract B(UG-Station)	
<p><b>TK/UG-01:</b> Shall fix chainages of the Turnouts / Cross over based on the chainage of Station Centre Line furnished by the Contractor-B.</p> <p><b>TK/UG-02:</b> Shall ensure at design stage.</p> <p><b>TK/UG-03:</b> Shall provide Track drainage consistent with the General Drainage arrangement in Station area and agree &amp; provide the Point of interface</p> <p><b>TK/UG-04:</b> <i>Shall provide required no. of HDPE cross-track ducts/sleeves of the required size at required locations.</i></p>		<p><b>TK/UG-01:</b> Shall furnish correct chainage of Station centre line to Contractor-A.</p> <p><b>TK/UG-02:</b> Shall ensure that the pillars / columns supporting the station structure and all other structures are located clear of the minimum infringement clearances from centre of track as stipulated in the approved S.O.D.</p> <p><b>TK/UG-03:</b> Shall design the General drainage system (overall drainage system) in the Station area taking into account Track Drainage and accept the Point of Interface in the Station/Platform Area.</p> <p><b>TK/UG-04:</b> <i>Shall provide details related to cross-track ducts/sleeves required for crossing of services such as cables, pipes below the track.</i></p>	

Contract A(TRACK)	CONSTRUCTION / INSTALLATION STAGE	Contract B(UG-Station)
<p><b>TK/UG-04:</b> Shall arrange for taking over after joint verification with Contractor-B</p>		<p><b>TK/UG-04:</b> Shall hand over to the Track contractor(Contractor-A) the concrete base ( duly providing 1st pour concrete, if required, and the shear connectors for track laying within the permitted tolerances) for track structure and the station platform to designated levels / clearances with in the tolerances permitted.</p>
<p><b>TK/UG-05:</b> Shall ensure before taking up track installation work.</p>		<p><b>TK/UG-05:</b> Shall hand over the track installation area in the vicinity of Pillars / Columns and such structures/obstructions clear of the infringement distances stipulated in the approved S.O.D.</p>

Contract A: Track (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 2/2
<p><b>TK/UG-06:</b> Shall jointly decide with the Contractor-B opening requirements, storage spaces and Schedule of Access Periods and ensure implementation based on track construction program.</p> <p><b>TK/UG-07:</b> Shall furnish details of requirements to Contractor-B.</p> <p><b>TK/UG-08:</b> To check the levels of platform and track base concrete at the time of taking over from Contractor-B and ensure that the heights and clearances from rail level / centre of track are with unacceptable limits as per the approved S.O.D.</p>		<p><b>TK/UG-06:</b> Shall provide the required openings in the structures to lower the track materials/plants/equipment including rails for track construction and provide storage space for Track materials in consultation with Track contractor (Contractor-A) and shall permit Access to Track contractor for construction of Track as per agreed Schedule of Access Periods.</p> <p><b>TK/UG-07:</b> Shall provide Temporary water supplies for construction of Track. Shall design &amp; construct the water supply scheme in consultation with Track Contractor.</p> <p><b>TK/UG-08:</b> Shall ensure that levels of Platform and Track Base Concrete in Station Boxes conform to the Design Levels and Tolerances. Shall furnish completed levels, curvature &amp; cant, if any, to Track Contractor (Contractor-A) for any adjustment in rail level/alignment while laying Track.</p>	
Contract A(TRACK)	TEST & COMMISSIONING STAGE	Contract B(UG-Station)	
<p><b>TK/UG-09:</b> Shall attend and assist in the joint check with concerned interface contractors to ensure that all permanent structures are clear of the structure gauge specified in the approved S.O.D</p>		<p><b>TK/UG-09:</b> Shall attend and assist in the joint check with concerned interface contractors to ensure that all permanent structures are clear of the structure gauge specified in the approved S.O.D</p>	
Contract A(TRACK)	MAINTENANCE STAGE	Contract B(UG-Station)	
NIL		NIL	

## 6. Track and UG Tunnel (UGC-02)

Contract A: Track (Interface Lead)		Contract B : UG Tunnels (UGC-02) (Interface follower)	Sheet # : 1/2
Contract A (TRACK)	DESIGN STAGE	Contract B (UG-TUNNEL)	
<b>TK/UG-01:</b> Shall provide for Track Drainage system design consistent with the general drainage arrangements in the Tunnel and agree & provide the Point of interface in the cross passage / track sump.		<b>TK/UG-01:</b> Shall design the general drainage system in the Tunnel taking into account Track Drainage and accept the Point of Interface in the cross passage/track sump.	
Contract A (TRACK)	CONSTRUCTION / INSTALLATION STAGE	Contract B (UG-TUNNEL)	
<b>TK/UG-02:</b> Shall arrange for taking over after joint verification with Contractor-B and take up construction of the 2nd Pour concrete in the track above the 1st pour concrete done utilising the provisions of keying / shear connectors done by the Tunnel contractor ( Contractor-B)		<b>TK/UG-02:</b> Shall complete construction of the 1st pour concrete over the sill of the Tunnel to specified levels (in consultation and coordination with Contractor-A) and within permitted tolerances and provide keying /shear connectors for the 2nd pour concrete	
<b>TK/UG-03:</b> Shall set the track to the 'monument plates' provided by the civil contractor (Contractor-B) which will be verified prior to laying / concreting the Track.		<b>TK/UG-03:</b> Shall provide to the Track contractor 'monument plates' for setting the permanent track to its correct position.	
<b>TK/UG-04:</b> Shall provide the track Drainage system in the 2nd pour concrete consistent with the General Drainage arrangements constructed by the Tunnel Contractor (Contractor-B).		<b>TK/UG-04:</b> Shall furnish levels/details of the Drainage system in the Tunnel to Track contractor (Contractor-A) duly ensuring that Track Drainage is compatible with the General Drainage system (overall drainage scheme).	
<b>TK/UG-05:</b> To decide openings/way, storage spaces and schedule Access Periods jointly with Tunnel contractor (Contractor-B) and ensure implementation based on Track construction program.		<b>TK/UG-05:</b> Shall provide the required openings/way to take the track materials/plant/equipment underground for track laying and provide storage space for Track materials in consultation with track contractor and to permit access to track contractor for construction of Track as per agreed schedule of Access Periods.	
<b>TK/UG-06:</b> To furnish details of requirement of services to Tunnel Contractor (Contractor-B).		<b>TK/UG-06:</b> Shall provide services (water, power, and light) for construction of track. To Design and construct water supply schemes for Tunnel Work in consultation with Track Contractor.	

Contract A: Track (Interface Lead)		Contract B : UG Tunnels (UGC-02) (Interface follower)		Sheet # : 2/2	
Contract A (TRACK)		TEST & COMMISSIONING STAGE		Contract B (UG-TUNNEL)	
TK/UG-07: Shall attend and assist in the joint check with concerned interface contractors to ensure that all permanent structures are clear of the structure gauge specified in the S.O.D		TK/UG-07: Shall attend and assist in the joint check with concerned interface contractors to ensure that all permanent structures are clear of the structure gauge specified in the approved S.O.D			
Contract A (TRACK)		MAINTENANCE STAGE		Contract B (UG-TUNNEL)	
NIL				NIL	

## 7. Power Supply System (Power Supply and Traction; PST) and UG Stations and Tunnel (UGC-02)

Contract A: Power Supply System (PST ) (Interface Lead)		Contract B : UG Tunnels (UGC-02) (Interface follower)	Sheet # : 1/5
Contract A(Power supply system)	DESIGN STAGE	Contract B(UG Station & Tunnel)	
<u>Tunnel:</u>  <b>PS/UG-01:</b> Contractor-A shall specify the cable routing and section needed at the interface between Tunnel and station.  <b>PS/UG-02:</b> Contractor-A shall specify Size and space in the Tunnel for the <u>PST</u> and <u>PS SCADA</u> cable containments/ <u>brackets</u> /trunking/trench  <b>PS/UG-03:</b> Contractor-A shall give the cable installation/Laying program Including starting and finishing chainage.  <b>PS/UG-04:</b> Shall study and agree Structural gauge clearance.  <u>UG Stations:</u>  <b>PS/UG-05:</b> Contractor-A shall request the structural openings for cable entries/exit in regard of the chainage and agree jointly. <b>PS/UG-06:</b> Contractor-A shall request cable containments/trunking /brackets for <u>PST</u> cable routing. <b>PS/UG-07:</b> Shall provide inputs to combined services drawings (CSD) for detailed cable (for duct bank/cable trays/Cable troughs/Cable shafts and etc.) layout/routing/Laying [HV and LV cables crossing to be avoided] within the Station and cable crossing at stations. <b>PS/UG-08:</b> Contractor-A shall request the total power load in the underground Station (including tunnels and subways etc.) from Contractor 'B' and accordingly design the transformer capacity.		<u>Tunnel:</u>  <b>PS/UG-01:</b> Shall design the section accordingly in the Tunnel.  <b>PS/UG-02:</b> Contractor-B shall study the alignment with chainage and space availability in the Tunnel and design <u>PST</u> and <u>PS SCADA</u> cable containments/ <u>brackets</u> /trunking/trench in tunnel.  <b>PS/UG-03:</b> Shall plan accordingly to meet the requirement.  <b>PS/UG-04:</b> Shall provide the Structural gauge clearance. <u>UG Stations:</u>  <b>PS/UG-05:</b> Shall design the structural openings and provide the combined service drawings and agree jointly. <b>PS/UG-06:</b> Contractor-B shall install cable <u>Containment/brackets</u> /trays/trunking required for all cable routings <b>PS/UG-07:</b> Shall prepare the combined services drawings (CSD) in time required for the cable layout/routing/Laying within the Station and cable crossing at stations. <b>PS/UG-08:</b> Contractor-B shall give the details of total power load of the Station (including tunnels and subways etc.) by collecting the load requirements from all other sub-contractors (interfacing and project Contractors) to the TVS/ECS Contractor and TVS.ECS Contractor shall submit to Contractor 'A'	

Contract A: Power Supply System (PST ) (Interface Lead)		Contract B : UG Tunnels (UGC-02) (Interface follower)	Sheet # : 2/5
<p><b>PS/UG-09:</b> Contractor-A shall design the technical room layout including builders works requirement in accordance with the finalized space provision. Contractor-A shall furnish room layout with equipment foot prints and equipment static and dynamic load and shall co-operate and co-ordinate with contractor-B.</p> <p><b>PS/UG-10:</b> Contractor-A shall specify the operating temperature (ventilation), illumination parameters affiliated to electrical technical rooms</p> <p><b>PS/UG-11:</b> Contractor-A shall request for signage boards for all HV equipment and technical rooms</p> <p><b>PS/UG-12:</b> Contractor-A shall co-ordinate with 'Contractor B' to design best access for lifting facilities for electrical machineries/plants/equipment for installation and easy maintenance wherever required.</p> <p><b>PS/UG-13:</b> Shall Design the earthing for HV and LV power supply systems including building structures and request for appropriate earth bus routing in the technical/plant rooms.</p> <p><b>PS/UG-14:</b> Contractor-A shall be in the up-stream and request the type of tripping and protections required for the station equipment and design the equipment accordingly to meet the requirements.</p>		<p><b>PS/UG-09:</b> Shall incorporate 'Contractor A' requirements in UG station design and shall co-operate and co-ordinate with contractor-A.</p> <p><b>PS/UG-10:</b> Contractor-B shall design illumination (lux level) according to electrical technical rooms specification requirements</p> <p><b>PS/UG-11:</b> Contractor-B shall design the signage as per requirement of contractor-A</p> <p><b>PS/UG-12:</b> Contractor-B shall consider in the station design the requirements pertaining to access for lifting facilities and easy maintenance for Electrical equipment in close Co-ordination with 'Contractor A'.</p> <p><b>PS/UG-13:</b> Contractor-B Shall co-ordinate with the 'Contractor A' and design the station earthing pits and earthing bus in the technical/plant rooms.</p> <p><b>PS/UG-14:</b> Contractor-B shall co-ordinate with all other contractors (Interfacing/Project Contractors) and collect the data of type of tripping and protection they have in their equipment and handing over to TVS/ECS Contractor and by TVS/ECS Contractor to Contractor-A.</p>	
Contract A(Power supply system )	CONSTRUCTION / INSTALLATION STAGE	Contract B(UG Station & Tunnel)	
<p><u>Tunnel:</u> <b>PS/UG-15:</b> Shall check the PST cable <u>routing/ cable containment/brackets/</u> trunking provided by contractor-B.</p>		<p><b>PS/UG-15:</b> Shall provide the quality tunnel lining and co-ordinate with Contractor-A.</p>	

Contract A: Power Supply System (PST ) (Interface Lead)	Contract B : UG Tunnels (UGC-02) (Interface follower)	Sheet # : 3/5
<p><b>PS/UG-16:</b> Shall check the cable laying works requirements like routing, Sections, cross passages and confirm.</p> <p><b>PS/UG-17:</b> Shall check the total space in the tunnel for cable laying works and confirm.</p> <p><b>PS/UG-18:</b> Shall check the structural openings for cable entries/exit in regard of the chainage.</p> <p><b>PS/UG-19:</b> Shall provide the cable laying works program and schedule.</p> <p><b>PS/UG-20:</b> Space should be free of obstacles at the time of cable laying Works.</p> <p><u>UG Stations:</u></p> <p><b>PS/UG-21:</b> Contractor-A Shall install the rated capacity Transformer</p> <p><b>PS/UG-22:</b> Shall jointly check the technical rooms made ready by 'Contractor B' and the same shall be confirmed.</p> <p><b>PS/UG-23:</b> Shall jointly check the arrangements made ready for cable routing/Laying [HV and LV cables crossing to be avoided] within the Station and cable crossing at stations and to be confirmed.</p> <p><b>PS/UG-24:</b> Shall jointly check the arrangements made ready for ventilation, Air conditioning and illumination within the Station rooms and to be confirmed.</p> <p><b>PS/UG-25:</b> Shall jointly check the signage provided for all the technical rooms and to be confirmed.</p>	<p><b>PS/UG-16:</b> Shall co-ordinate with contractor-A.</p> <p><b>PS/UG-17:</b> Shall co-ordinate with contractor-A.</p> <p><b>PS/UG-18:</b> Shall co-ordinate with contractor-A.</p> <p><b>PS/UG-19:</b> Shall co-operate and agree with contractor-A.</p> <p><b>PS/UG-20:</b> Site will be cleared free from obstacles and handed over for cable laying works.</p> <p><b>PS/UG-21:</b> Shall construct the suitable solid foundation/Platform sufficiently at "out of reach of flood", and co-ordinate accordingly for civil and structural works.</p> <p><b>PS/UG-22:</b> Technical rooms shall be made ready with lighting, small power, fire Detection and Fire Fighting systems, Cable Trays/ Supports/trenches/ Troughs Etc. and Shall be co-operated/co-ordinated with 'Contractor A'.</p> <p><b>PS/UG-23:</b> All the necessary arrangements shall be made ready for the cable routing/Laying and shall be co-operated/coordinated with 'Contractor A'.</p> <p><b>PS/UG-24:</b> Rooms should be ready with the requirements of ventilation, Air conditioning and illumination (lux level) and shall be co-operated/coordinated with 'Contractor A'.</p> <p><b>PS/UG-25:</b> Signage for all technical rooms should be made ready and shall be Co-operated/co-ordinated with 'Contractor A'.</p>	

Contract A: Power Supply System (PST ) (Interface Lead)		Contract B : UG Tunnels (UGC-02) (Interface follower)	Sheet # : 4/5
<p><b>PS/UG-26:</b> Shall jointly check the access provided for lifting facilities for electrical machineries for installation and easy maintenance and to be confirmed.</p> <p><b>PS/UG-27:</b> Shall jointly check the earthing works and earth bus in the Technical rooms required for High Voltage and Low Voltage power supply systems including the building structures and to be confirmed.</p> <p><b>PS/UG-28:</b> Shall jointly check the arrangements for cable crossing at station and to be confirmed.</p> <p><b>PS/UG-29:</b> Contractor-A shall incorporate in his systems the requirements of tripping and protection and the same shall be confirmed.</p> <p><b>PS/UG-30:</b> Shall Request the Temporary power requirement.</p> <p><b>PS/UG-31:</b> Shall request the temporary storage area in the station building</p>		<p><b>PS/UG-26:</b> Access for lifting facilities and easy maintenance for Electrical equipment shall be made ready as per the requirements and shall be co-operated/co-ordinated with 'Contractor A'.</p> <p><b>PS/UG-27:</b> All the earthing works shall be made ready and handed over to Contractor-A.</p> <p><b>PS/UG-28:</b> Requirements for cable crossing shall be made ready and shall be Co-operated/co-ordinated with 'Contractor-A'.</p> <p><b>PS/UG-29:</b> Contractor-B shall hand over all the protection and tripping systems of all other Contractors (Project contractors) in the station to 'Contractor- A' through TVS/ECS Contractor and shall Co-operate/co-ordinate.</p> <p><b>PS/UG-30:</b> Shall provide the temporary power requirement at one place</p> <p><b>PS/UG-31:</b> Shall study the space availability in the station and provide accordingly</p>	
Contract A(Power supply system)	TEST & COMMISSIONING STAGE	Contract B(UG Station & Tunnel)	
<p><u>Tunnel:</u></p> <p><b>PS/UG-32:</b> Space should be free from man and material.</p> <p><u>UG Stations:</u></p> <p><b>PS/UG-33:</b> Shall jointly check the parameters of ventilation and Air conditioning within the Station rooms and to be confirmed.</p> <p><b>PS/UG-34:</b> Shall jointly check the resistance of all earthing works at station required for High Voltage and Low Voltage power supply systems including the building structures and to be confirmed.</p> <p><b>PS/UG-35:</b> Shall request Space free from human interference and materials.</p> <p><b>PS/UG-36:</b> Prepare joint maintenance procedures in consultation with contractor-B and Shall jointly agree and accept.</p>		<p><b>PS/UG-32:</b> As per the requirement shall agree and do the needful.</p> <p><b>PS/UG-33:</b> Shall jointly co-ordinate to check the parameters of ventilation and Air conditioning with 'Contractor A'.</p> <p><b>PS/UG-34:</b> Shall jointly check the resistance of all earthing works made at station and shall be co-operated/co-ordinated with 'Contractor A'.</p> <p><b>PS/UG-35:</b> Shall arrange Space free from human interference and materials.</p> <p><b>PS/UG-36:</b> Validate and accept joint Maintenance procedure with contractor-A</p>	

## 8. OHE (PST) and UG Tunnel (UGC-02)

Contract A: OHE (Interface Lead)		Contract B : UG Tunnels (UGC-02) (Interface follower)	Sheet # : 1/3
Contract A(OHE)	DESIGN STAGE	Contract B(UG Tunnel)	
<b><u>Rigid catenary system for tunnel</u></b>			
<b>OH/UG-01:</b> Shall design all the required fixings to support rigid overhead contact system according to Contractor-B constraints.		<b>OH/UG-01:</b> Shall provide segment & tunnel lining details and limit of fixing penetrations.	
<b>OH/UG-02:</b> Shall transmit his fixing design details to the Contractor-B and the Engineer for notice of no objection.		<b>OH/UG-02:</b> Shall provide notice of no objection once the fixing details are agreed.	
<b>OH/UG-03:</b> Shall furnish the details of height of contact wire and the minimum electrical clearances needed.		<b>OH/UG-03:</b> Shall design the structures accordingly.	
<b>OH/UG-04:</b> Shall design the OHE according to the gradients and curves.		<b>OH/UG-04:</b> Shall furnish the gradients and curve details.	
<b>OH/UG-05:</b> Neutral section to be located on straight track and having negligible gradient. <u>Shall provide the requirements/details and location of the Neutral Section to Contractor B.</u>		<b>OH/UG-05:</b> Shall provide the gradient chart and curve details. <u>Shall adjust/modify the vertical alignment of the tunnels at the Neutral Section location as may be required to suit the requirements of Contractor B for installation of Neutral Section.</u>	
<b>OH/UG-06:</b> Shall design and fix all required fixings of the beam to support rigid overhead contact system for tunnel launching area (TBM launching area) according to Contractor-B constraints. Shall transmit his fixing design details to the Contractor-B and the Engineer for notice of no objection.		<b>OH/UG-06:</b> Shall provide segment, RCC structure & tunnel lining details and limit of fixing penetrations. Shall provide notice of no objection once fixing details are agreed.	
<b><u>Drop arm and its base fixing arrangement in tunnel.</u></b>			
<b>OH/UG-07:</b> Shall design the type of drop arm and shall fix in accordance with the agreed fixing details.		<b>OH/UG-07:</b> Shall provide notice of no objection to Contractor-A, once fixing details are agreed.	
<b>OH/UG-08:</b> Shall design and furnish the span of drop arms of OHE.		<b>OH/UG-08:</b> Shall furnish the details of curves/alignment.	

Contract A: OHE (Interface Lead)		Contract B : UG Tunnels (UGC-02) (Interface follower)	Sheet # : 2/3
<p><b>OH/UG-09:</b> Obligatory drop arm to be furnished (if any).</p> <p><b>OH/UG-10:</b> Loading on drop arm to be provided.</p> <p><b>OH/UG-11:</b> KM no / Drop arm no of drop arm location to be prepared.</p> <p><b><u>Earthing of OHE in underground tunnel.</u></b></p> <p><b>OH/UG-12:</b> Shall design and provide necessary details of earthing (Buried Earth conductor and Overhead protection cable).</p> <p><b>OH/UG-13:</b> Shall provide the drawing of conduit carrying the buried earth conductor.</p> <p><b>OH/UG-14:</b> Shall provide the details of structure bonds including locations.</p>		<p><b>OH/UG-09:</b> Shall provide the details of the location of points and crossings,</p> <p><b>OH/UG-10:</b> Collect the details of drop arm loading.</p> <p><b>OH/UG-11:</b> Shall furnish the KM details of tunnel.</p> <p><b>OH/UG-12:</b> Shall coordinate and fulfil the requirements of provision in civil works for earthing as per the design provided by Contractor-A.</p> <p><b>OH/UG-13:</b> Shall coordinate and fulfil the requirements for carrying the buried earth conductor.</p> <p><b>OH/UG-14:</b> Shall coordinate and fulfil the requirements.</p>	
Contract A(OHE)	CONSTRUCTION / INSTALLATION STAGE	Contract B(UG Tunnel)	
<p><b>OH/UG-15:</b> Shall cross check the programme/planning of implementation.</p> <p><b>OH/UG-16:</b> Shall cross check and keep records (jointly signed) of all Requirements as the Work progresses.</p> <p><b>OH/UG-17:</b> Shall tackle the notified changes if any.</p>		<p><b>OH/UG-15:</b> Shall coordinate</p> <p><b>OH/UG-16:</b> Shall report progress of construction at mutually agreed intervals.</p> <p><b>OH/UG-17:</b> Shall furnish the changes in design/plan if any.</p>	
Contract A(OHE)	TEST & COMMISSIONING STAGE	Contract B(UG Tunnel)	
<p><b>OH/UG-19:</b> Shall Test the brackets.</p>		<p><b>OH/UG-19:</b> Shall agree and accept the bracket testing.</p>	

Contract A: OHE (Interface Lead)		Contract B : UG Tunnels (UGC-02) (Interface follower)	Sheet # : 3/3
<p><b>OH/UG-20:</b> Shall provide testing procedure.</p> <p><b>OH/UG-21:</b> Shall measure the earth resistance values of all locations and display and keep the records.</p>		<p><b>OH/UG-20:</b> Shall agree and accept.</p> <p><b>OH/UG-21:</b> Shall co-operate.</p>	
Contract A(OHE)	MAINTENANCE STAGE	Contract B(UG Tunnel)	
<p><b>OH/UG-22:</b> Shall agree and accept.</p> <p><b>OH/UG-23:</b> Shall measure and record earth resistance values jointly at suitable interval</p>		<p><b>OH/UG-22:</b> Shall stop water leakage and maintain water tight tunnels to the Contract Specifications.</p> <p><b>OH/UG-23:</b> Shall co-operate.</p>	

## 9. OHE (PST) and UG Stations (UGC-02)

Contract A: OHE (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 1/2
Contract A(OHE)	DESIGN STAGE	Contract B(UG-Station)	
<b><u>Rigid catenary system and its insulators.</u></b>			
<b>OH/UG-01:</b> Shall design Rigid catenary system and furnish details including locations, Loads etc.,		<b>OH/UG-01:</b> Shall design and construct the base support fixtures on soffit of Concourse level (or as required) to support the rigid catenary system.	
<b>OH/UG-02:</b> Shall furnish the details of height of contact wire and the minimum electrical clearances needed.		<b>OH/UG-02:</b> Shall design the soffit of Concourse structures accordingly.	
<b>OH/UG-03:</b> Shall furnish the space requirement of traction cabin for provision of equipment of sub-sectioning and paralleling post, sectioning post, sub- sectioning post if needed and 25 kV cable route from rigid OHE to these rooms..		<b>OH/UG-03:</b> Shall provide size of cabin and brackets/cable trays for supporting 25 kV cable as required by Contractor-A.	
<b>OH/UG-04:</b> Shall provide drawings showing the locations, Cable ducts and sizes of Openings for passage of cables including routing including Emergency Trip Switch of traction system to be installed at stations platforms and Station Control room.		<b>OH/UG-04:</b> Shall provide combined builders drawings/CSDs and agree jointly and provide cable route openings as per drawing including Emergency Trip Switch of traction system.	
<b>OH/UG-05:</b> Shall design obligatory catenary/OCS location.		<b>OH/UG-05:</b> Provide the details of crossovers, turnout etc. if any.	
<b><u>Earthing of OHE in underground station.</u></b>			
<b>OH/UG-06:</b> Shall design and provide necessary details of earthing (Buried Earth Conductor and Overhead Protection Cable).Shall furnish the drawings		<b>OH/UG-06:</b> Shall coordinate and implement the earthing system of building structures, platform, over/under pass/shelters etc. to be ultimately connected to buried earth conductor and Arial earth cable	
Contract A(OHE)	CONSTRUCTION / INSTALLATION STAGE	Contract B(UG-Station)	
<b>OH/UG-08:</b> Shall check the load of supporting fixtures of catenary/OCS system.		<b>OH/UG-08:</b> To assist and cross check the load requirements.	
<b>OH/UG-09:</b> Shall review the progress at suitable interval.		<b>OH/UG-09:</b> Shall report progress of construction at mutually agreed intervals.	

Contract A: OHE (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)		Sheet # : 2/2
<b>OH/UG-10:</b> Shall seek access to work.		<b>OH/UG-10:</b> Shall provide the access to work area in underground stations		
Contract A(OHE)	TEST & COMMISSIONING STAGE		Contract B(UG-Station)	
<b>OH/UG-11:</b> Cross check the loading by OHE and agree.		<b>OH/UG-11:</b> Test the base supporting fixture load carrying capacity jointly.		
<b>OH/UG-12:</b> Measure the earth resistance values of all locations and display and keep the records (i.e., Combined Earth resistance value: 0.5 ohms, Individual Earth resistance value: 10 ohms)		<b>OH/UG-12:</b> Shall coordinate and put joint efforts to bring earth values to below maximum prescribed/required values.		
Contract A(OHE)	MAINTENANCE STAGE		Contract B(UG-Station)	
<b>OH/UG-13:</b> Measure and record earth resistance values jointly at suitable interval.		<b>OH/UG-13:</b> Shall co-operate.		

## 10. Telecommunication and UG Stations (UGC-02)

Contract A:Telecommunication (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 1/7
Contract A(Telecom)	DESIGN STAGE	Contract B(UG-Station)	
<b>TEL/US-01:</b> Shall furnish the space and mechanical load requirements of the Signal Equipment Room (SER), Communication Equipment Room (CER), Station Control Room (SCR), Telecom closets and lighting, flooring, false flooring, cable duct and vertical cable risers in the above mentioned rooms.		<b>TEL/US-01:</b> a) Shall provide TELation layout and drawings showing the rooms and vertical cable risers etc. b) Shall Update the TELation drawings to accommodate the requirements of Contractor- A. c) Shall collect the data & integrate with other users and provide it to all the Interfacing/Project Contractors.	
<b>TEL/US-02:</b> Shall furnish the sizes of S & T equipment to be installed in SER, CER, SCR and Telecom Closets.		<b>TEL/US-02:</b> All corridors and doors shall be sized to enable equipment to be delivered to SER, CER, SCR and Telecom Closets for installation and replacements.	
<b>TEL/US-03:</b> Shall furnish the detailed drawings of line side equipment to be installed like signals, point machines, signal post telephones, ATP ATO equipment, Train stoppage beacons, antennas, impedance bonds (where applicable) and location boxes etc.,		<b>TEL/US-03:</b> Shall suitably incorporate the detailed drawings/requirements prepared by Contractor-A.	
<b>TEL/US-3A:</b> a) Shall furnish the routing of the cables for S&T equipment in whole Station. B)Shall validate the synthesis cable routing layout proposed by Contractor-B		<b>TEL/US-3A:</b> Shall establish the synthesis layout for cable routing according to all the Sub-systems layouts	

Contract A:Telecommunication (Interface Lead)	Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 2/6
<p><b>TEL/US-04:</b> a) Shall furnish the detailed drawings of main cable routing arrangements in respect of S &amp; T cables in the station (including requirements of minimum 1 meter separation between S &amp; T cables and HV cables). Shall furnish the details of Signal &amp; Telecommunication cables like dimensions, weight, minimum bending radius and supporting &amp; mounting details.</p> <p>b) Shall provide detailed drawings with the locations of all equipment and cables to be installed on the track.</p> <p>c) Shall provide detailed drawings of locations, loads, type of fixing/mounting arrangements for signalling and Telecommunication equipment to be installed on the platform, Mezzanine( where applicable), concourse and entrance levels like PA system, PID's, CCTV cameras, clocks, CCTV monitors, emergency stop plungers and staff protection keys etc.</p>	<p><b>TEL/US-04:</b> a) &amp; b) Shall design the cable routing and cable containments in the station.</p> <p>c) For heavy equipment like CCTV monitors, display boards, analogue clocks etc., to be mounted on walls / suspended from the roof, Contractor-B shall integrate the fixing arrangements with the structural design.</p>	
<p><b>TEL/US-05:</b> Shall furnish the locations and space requirements of passenger emergency communication and help point equipment to be installed.</p>	<p><b>TEL/US-05:</b> Shall validate the locations of passenger emergency communication system and help point system.</p>	
<p><b>TEL/US-06:</b> Shall furnish the locations and details of access control system and Intrusion detection system.</p>	<p><b>TEL/US-06:</b> Shall validate the locations of access control system and intrusion detection system.</p>	
<p><b>TEL/US-07:</b> Shall furnish the requirements of earthing arrangement including earth impedance value for different S &amp; T systems to be installed in SER, CER, Telecom closets and SCR and line side equipment</p>	<p><b>TEL/US-07:</b> Shall provide the earthing arrangement for different systems and extend it up to SER, CER and SCR and Telecom Closets accordingly; Shall also extend the earth for earthing of line side equipment, if required.</p>	

Contract A:Telecommunication (Interface Lead)	Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 3/6
<p><b>TEL/US-08:</b> a) Shall design the M &amp; E SCADA system to suit the requirements of controlled / monitored Non-traction SCADA systems to be installed by Contractor-B.</p> <p>b) Shall validate the interface design. Design the connectivity requirements from the interface devices up to the CER and to the SCR / OCC.</p> <p>c) Shall design the HMI of M&amp;E SCADA at the SCR and OCC to meet the control and monitoring requirements of equipment installed by Contractor- B.</p>	<p><b>TEL/US-08:</b> a) Contractor-B shall define the control / monitoring requirements and parameter measurement requirements (zone/ group). Contractor- B shall install the local control panel (LCP) and wire it to control all controlled devices. Contractor-B shall provide the interface devices with M &amp; E SCADA.</p> <p>b) Shall design the interface device for each monitored / controlled equipment, Local control panel (where applicable) for the station M &amp; E equipment, LV power distribution , UPS, DG , lighting systems and building management systems installed under the Contract B.</p> <p>c) Shall advise the locations and connectivity requirements of interface devices associated with M &amp; E equipment to be monitored / controlled by non- traction SCADA.</p>	
<p><b>TEL/US-09:</b> Shall furnish the requirements of signs and labels except for equipment installed by Contractor- B.</p>	<p><b>TEL/US-09:</b> Shall design all the statutory signs and labels except for S &amp; T equipment.</p>	
<p><b>TEL/US-10:</b> Shall furnish the EMI / EMC levels of S &amp; T equipment to be installed in stations.</p>	<p><b>TEL/US-10:</b> Shall incorporate in station design and prepare a common EMI / EMC plan.</p>	
<p><b>TEL/US-11:</b> Shall furnish the acoustic intelligibility and lighting visibility criteria to ensure that the performance of PA and PID systems are as per laid down standards.</p>	<p><b>TEL/US-11:</b> Shall accommodate the requirements of Contractor- A and furnish the architectural design details of the stations.</p>	
<p><b>TEL/US-12:</b> Shall furnish the requirements of temporary power supply for preliminary testing of S &amp; T equipment installed in stations.</p>	<p><b>TEL/US-12:</b> Shall plan the power supply system accordingly.</p>	

Contract A:Telecommunication (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 4/6
<b>TEL/US-13:</b> Shall validate the interface document and relevant portion of technical specifications of fire protection system.		<b>TEL/US-13:</b> Shall design the interfacing of fire system with PA system etc. and provide the relevant technical specifications of fire protection system.	
<b>TEL/US-14:</b> a) Shall furnish the detailed load requirement of various S & T equipment for the UPS (240V) power supply. b) Shall design the power cable requirement from distribution panel in UPS room to SER / CER / Telecom closets.		<b>TEL/US-14:</b> Shall design the UPS with Suitable protection devices at the output accordingly.	
<b>TEL/US-15:</b> Prepare joint maintenance plan involving M & E SCADA of S & T and station M & E equipment / power supply systems / UPS /DG/ Lighting system / building management functions.		<b>TEL/US-15:</b> Validate the joint maintenance plan.	
Contract A(Telecom)	CONSTRUCTION / INSTALLATION STAGE	Contract B(UG-Station)	
<b>TEL/US-16:</b> Shall verify that the requirements of lighting, false flooring (for prescribed load levels) and vertical cable risers in SER, CER, Telecom Closets and SCR are as per the requirement.		<b>TEL/US-16:</b> Shall provide the lighting, false flooring (for prescribed load levels) and vertical cable risers in SER, CER, Telecom Closets and SCR.	
<b>TEL/US-17:</b> Shall install all signalling and communication cables and provide the connections to individual devices.		<b>TEL/US-17:</b> Shall ensure provision of cable ducts, main cable crossing arrangements, including openings required for entry / exit arrangements for main S & T cables in the station.	
<b>TEL/US-18:</b> Shall install the line side S & T equipment like signals, ATP/ATO equipment, antennas, train stoppage beacons, location boxes, signal post telephones and impedance bonds etc.		<b>TEL/US-18:</b> Shall provide the necessary arrangements to install line side S & T equipment like signals, ATP / ATO equipment, antennas, train stoppage beacons, location boxes, signal post telephones and Impedance	
<b>TEL/US-19:</b> Shall install the emergency communication and help point equipment.		<b>TEL/US-19:</b> Shall provide necessary arrangements to install emergency communication and help point equipment.	

Contract A:Telecommunication (Interface Lead)	Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 5/6
<b>TEL/US-20:</b> a) Shall arrange the mounting and fixing accessories to station Contractor (Contractor-B) Shall install the equipment at stations like staff protection keys, Emergency stop plungers, PIDs, PA system, clocks, CCTV cameras and Television system equipment etc.,	<b>TEL/US-20:</b> Shall install the mounting and fixing arrangements for heavy equipment like CCTV monitors, display boards, analogue clocks etc., during the construction as per the S & T requirements.	
<b>TEL/US-21:</b> Shall install the access control system and intrusion detection system.	<b>TEL/US-21:</b> Shall provide necessary arrangements to install access control and intrusion detection systems.	
<b>TEL/US-22:</b> Shall verify that the requirements of earthing system are met.	<b>TEL/US-22:</b> Shall install earths and earth bars for S & T equipment for various systems and terminate inside the main equipment rooms, SCR and telecom closets and on the tunnel side (if required) for earthing of line side signalling and Telecommunication systems (if required).	
<b>TEL/US-23:</b> Shall install the M & E SCADA system at the OCC & SCR and provide LAN connectivity up to interface device for all controlled / monitored systems installed by Contractor- B.	<b>TEL/US-23:</b> Shall provide, wire and connect the interface devices upto the station LAN port provided by Contractor-A for various equipment, local control panels (where applicable) for M & E equipment, LV power distribution system, UPS system, DG, lighting system and building management system etc., forming part of Contract- B.	
<b>TEL/US-24:</b> Shall verify the requirements of statutory signs and labels.	<b>TEL/US-24:</b> Shall install all the statutory signs and labels except those relating to S & T equipment.	
<b>TEL/US-25:</b> Shall bring the power supply from distribution panel to SER /CER.	<b>TEL/US-25:</b> Shall provide the temporary power supply with suitable protection arrangements.	
<b>TEL/US-26:</b> Shall verify the interfacing of fire system with PA system.	<b>TEL/US-26:</b> Shall install the fire alarm and control system and provide the necessary interfaces with PA system.	
<b>TEL/US-27:</b> Shall install the power cables from the distribution panel in UPS room to SER / CER and extend it to the SCR, Telecom Closets etc.,	<b>TEL/US-27:</b> Shall install the UPS and suitable protection devices at the output.	
<b>TEL/US-27A:</b> Shall run the LAN cable from station to all cross passage and permanent access egress location	<b>TEL/US-27A:</b> Shall provide the cable tray/ladders for LAN cable routing	

Contract A:Telecommunication (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 6/6
Contract A(Telecom)	TEST & COMMISSIONING STAGE	Contract B(UG-Station)	
<b>TEL/US-28:</b> Shall conduct a joint test with Civil (Underground stations) Contractor for testing of earth impedance of all earths provided for tunnels & A stations.		<b>TEL/US-28:</b> Shall attend the joint testing of earth impedance with Contractor-	
<b>TEL/US-29:</b> Shall conduct joint testing on the networking, monitoring & control (where applicable) of M & E, LV distribution, UPS, DG, lighting system and building management systems etc., (provided under the Station Contract—Contract-B) through the M & E SCADA from OCC and SCR as per jointly agreed control logic and display formats.		<b>TEL/US-29:</b> Shall attend the joint testing and validate the test results.	
<b>TEL/US-30:</b> Shall conduct the joint testing and confirm that there are no EMI / EMC impacts on S & T equipment installed in stations.		<b>TEL/US-30:</b> Shall attend the joint testing with S & T, RS and OHE contractors.	
<b>TEL/US-31:</b> Shall conduct joint testing on the functioning of fire and PA system inter connection.		<b>TEL/US-31:</b> Shall attend the joint testing and validate the results.	
<b>TEL/US-32:</b> Shall conduct joint load test with suitable loads for temporary power supply.		<b>TEL/US-32:</b> Shall attend the joint tests with Contractor- A.	
<b>TEL/US-33:</b> Shall conduct joint load test with suitable loads for UPS supply.		<b>TEL/US-33:</b> Shall attend the joint testing and validate the results.	
Contract A(Telecom)	MAINTENANCE STAGE	Contract B(UG-Station)	
<b>TEL/US-34: Finalise the joint maintenance procedures and periodicity of joint inspection</b>		<b>TEL/US-34:</b> Validate the joint maintenance procedures and test plans prepared by Contractor-A	
a). Between S & T and station maintenance for testing of various S&T earths. b). Between M & E SCADA and station M & E equipment / power supply system / lighting system etc., which are parts of building management functions. c). Joint maintenance procedures and include the same in the S & T maintenance manual.			

## 11. Signalling & Train Control and UG Tunnel (UGC-02)

Contract A: Signalling & Train Control (Interface Lead)		Contract B : UG Tunnel (UGC-02) (Interface follower)	Sheet # : 1/6
Contract	DESIGN STAGE	Contract-B (UG-Tunnel)	
<b>SIG/US-01:</b> Shall furnish the space and mechanical load requirements of the Signal Equipment Room (SER), Communication Equipment Room (CER), Station Control Room (SCR), Telecom closets and lighting, flooring, false flooring, cable duct and vertical cable risers in the above mentioned rooms.		<b>SIG/US-01:</b> a) Shall provide station layout and drawings showing the rooms and vertical cable risers etc. b) Shall Update the Station drawings to accommodate the requirements of Contractor- A. c) Shall collect the data & integrate with other users and provide it to all the Interfacing/Project Contractors.	
<b>SIG/US-02:</b> Shall furnish the sizes of S & T equipment to be installed in SER, CER, SCR and Telecom Closets.		<b>SIG/US-02:</b> All corridors and doors shall be sized to enable equipment to be delivered to SER, CER, SCR and Telecom Closets for installation and replacements.	
<b>SIG/US-03:</b> Shall furnish the detailed drawings of line side equipment to be installed like signals, point machines, signal post telephones, ATP ATO equipment, Train stoppage beacons, antennas, impedance bonds (where applicable) and location boxes etc.,		<b>SIG/US-03:</b> Shall suitably incorporate the detailed drawings/requirements prepared by Contractor-A.	
<b>SIG/US-3A:</b> a) Shall furnish the routing of the cables for S&T equipment in whole Station. B) Shall validate the synthesis cable routing layout proposed by Contractor-B		<b>SIG/US-3A:</b> Shall establish the synthesis layout for cable routing according to all the Sub-systems layouts	

Contract A: Signalling & Train Control (Interface Lead)	Contract B : UG Tunnel (UGC-02) (Interface follower)	Sheet # : 2/6
<p><b>SIG/US-04:</b> a) Shall furnish the detailed drawings of main cable routing arrangements in respect of S &amp; T cables in the station (including requirements of minimum 1 meter separation between S &amp; T cables and HV cables). Shall furnish the details of Signal &amp; Telecommunication cables like dimensions, weight, minimum bending radius and supporting &amp; mounting details.</p> <p>b) Shall provide detailed drawings with the locations of all equipment and cables to be installed on the track.</p> <p>c) Shall provide detailed drawings of locations, loads, type of fixing/mounting arrangements for signalling and Telecommunication equipment to be installed on the platform, Mezzanine( where applicable), concourse and entrance levels like PA system, PID's, CCTV cameras, clocks, CCTV monitors, emergency stop plungers and staff protection keys etc.</p>	<p><b>SIG/US-04:</b> a) &amp; b) Shall design the cable routing and cable containments in the station.</p> <p>c) For heavy equipment like CCTV monitors, display boards, analogue clocks etc., to be mounted on walls / suspended from the roof, Contractor-B shall integrate the fixing arrangements with the structural design.</p>	
<p><b>SIG/US-05:</b> Shall furnish the locations and space requirements of passenger emergency communication and help point equipment to be installed.</p>	<p><b>SIG/US-05:</b> Shall validate the locations of passenger emergency communication system and help point system.</p>	
<p><b>STIGUS-06:</b> Shall furnish the locations and details of access control system and Intrusion detection system.</p>	<p><b>SIG/US-06:</b> Shall validate the locations of access control system and intrusion detection system.</p>	
<p><b>SIG/US-07:</b> Shall furnish the requirements of earthing arrangement including earth impedance value for different S &amp; T systems to be installed in SER, CER, Telecom closets and SCR and line side equipment</p>	<p><b>SIG/US-07:</b> Shall provide the earthing arrangement for different systems and extend it up to SER, CER and SCR and Telecom Closets accordingly; Shall also extend the earth for earthing of line side equipment, if required.</p>	

Contract A: Signalling & Train Control (Interface Lead)	Contract B : UG Tunnel (UGC-02) (Interface follower)	Sheet # : 3/6
<p><b>SIG/US-08:</b> a) Shall design the M &amp; E SCADA system to suit the requirements of controlled / monitored Non-traction SCADA systems to be installed by Contractor-B.</p> <p>b) Shall validate the interface design. Design the connectivity requirements from the interface devices up to the CER and to the SCR / OCC.</p> <p>c) Shall design the HMI of M&amp;E SCADA at the SCR and OCC to meet the control and monitoring requirements of equipment installed by Contractor- B.</p>	<p><b>SIG/US-08:</b> a) Contractor-B shall define the control / monitoring requirements and parameter measurement requirements (zone/ group). Contractor- B shall install the local control panel (LCP) and wire it to control all controlled devices. Contractor-B shall provide the interface devices with M &amp; E SCADA.</p> <p>b) Shall design the interface device for each monitored / controlled equipment, Local control panel (where applicable) for the station M &amp; E equipment, LV power distribution , UPS, DG , lighting systems and building management systems installed under the Contract B.</p> <p>c) Shall advise the locations and connectivity requirements of interface devices associated with M &amp; E equipment to be monitored / controlled by non- traction SCADA.</p>	
<p><b>SIG/US-09:</b> Shall furnish the requirements of signs and labels except for equipment installed by Contractor- B.</p>	<p><b>SIG/US-09:</b> Shall design all the statutory signs and labels except for S &amp; T equipment.</p>	
<p><b>SIG/US-10:</b> Shall furnish the EMI / EMC levels of S &amp; T equipment to be installed in stations.</p>	<p><b>SIG/US-10:</b> Shall incorporate in station design and prepare a common EMI / EMC plan.</p>	
<p><b>SIG/US-11:</b> Shall furnish the acoustic intelligibility and lighting visibility criteria to ensure that the performance of PA and PID systems are as per laid down standards.</p>	<p><b>SIG/US-11:</b> Shall accommodate the requirements of Contractor- A and furnish the architectural design details of the stations.</p>	
<p><b>SIG/US-12:</b> Shall furnish the requirements of temporary power supply for preliminary testing of S &amp; T equipment installed in stations.</p>	<p><b>SIG/US-12:</b> Shall plan the power supply system accordingly.</p>	
<p><b>ST/US-13:</b> Shall validate the interface document and relevant portion of technical specifications of fire protection system.</p>	<p><b>ST/US-13:</b> Shall design the interfacing of fire system with PA system etc. and provide the relevant technical specifications of fire protection system.</p>	
<p><b>SIG/US-14:</b> a) Shall furnish the detailed load requirement of various S &amp; T equipment for the UPS (240V) power supply.</p> <p>b) Shall design the power cable requirement from distribution panel in UPS room to SER / CER / Telecom closets.</p>	<p><b>SIG/US-14:</b> Shall design the UPS with Suitable protection devices at the output accordingly.</p>	

Contract A: Signalling & Train Control (Interface Lead)		Contract B : UG Tunnel (UGC-02) (Interface follower)	Sheet # : 4/6
<b>SIG/US-15:</b> Prepare joint maintenance plan involving M & E SCADA of S & T and station M & E equipment / power supply systems / UPS /DG/ Lighting system / building management functions.		<b>SIG/US-15:</b> Validate the joint maintenance plan.	
Contract A(Signalling)	CONSTRUCTION / INSTALLATION STAGE	Contract-B (UG-Tunnel)	
<b>SIG/US-16:</b> Shall verify that the requirements of lighting, false flooring (for prescribed load levels) and vertical cable risers in SER, CER, Telecom Closets and SCR are as per the requirement.		<b>SIG/US-16:</b> Shall provide the lighting, false flooring (for prescribed load levels) and vertical cable risers in SER, CER, Telecom Closets and SCR.	
<b>SIG/US-17:</b> Shall install all signalling and communication cables and provide the connections to individual devices.		<b>SIG/US-17:</b> Shall ensure provision of cable ducts, main cable crossing arrangements, including openings required for entry / exit arrangements for main S & T cables in the station.	
<b>SIG/US-18:</b> Shall install the line side S & T equipment like signals, ATP/ATO equipment, antennas, train stoppage beacons, location boxes, signal post telephones and impedance bonds etc.		<b>SIG/US-18:</b> Shall provide the necessary arrangements to install line side S & T equipment like signals, ATP / ATO equipment, antennas, train stoppage beacons, location boxes, signal post telephones and Impedance	
<b>SIG/US-19:</b> Shall install the emergency communication and help point equipment.		<b>SIG/US-19:</b> Shall provide necessary arrangements to install emergency communication and help point equipment.	
<b>SIG/US-20:</b> a) Shall arrange the mounting and fixing accessories to station Contractor (Contractor-B). Shall install the equipment at stations like staff protection keys, Emergency stop plungers, PIDs, PA system, clocks, CCTV cameras and Television system equipment etc.,		<b>SIG/US-20:</b> Shall install the mounting and fixing arrangements for heavy equipment like CCTV monitors, display boards, analogue clocks etc., during the construction as per the S & T requirements.	
<b>SIG/US-21:</b> Shall install the access control system and intrusion detection system.		<b>SIG/US-21:</b> Shall provide necessary arrangements to install access control and intrusion detection systems.	
<b>SIG/US-22:</b> Shall verify that the requirements of earthing system are met.		<b>SIG/US-22:</b> Shall install earths and earth bars for S & T equipment for various systems and terminate inside the main equipment rooms, SCR and telecom closets and on the tunnel side (if required) for earthing of line side signalling and Telecommunication systems (if required).	

Contract A: Signalling & Train Control (Interface Lead)		Contract B : UG Tunnel (UGC-02) (Interface follower)	Sheet # : 5/6
<b>SIG/US-23:</b> Shall install the M & E SCADA system at the OCC & SCR and provide LAN connectivity up to interface device for all controlled / monitored systems installed by Contractor- B.		<b>SIG/US-23:</b> Shall provide, wire and connect the interface devices upto the station LAN port provided by Contractor-A for various equipment, local control panels (where applicable) for M & E equipment, LV power distribution system, UPS system, DG, lighting system and building management system etc., forming part of Contract- B.	
<b>SIG/US-24:</b> Shall verify the requirements of statutory signs and labels.		<b>SIG/US-24:</b> Shall install all the statutory signs and labels except those relating to S & T equipment.	
<b>SIG/US-25:</b> Shall bring the power supply from distribution panel to SER /CER.		<b>SIG/US-25:</b> Shall provide the temporary power supply with suitable protection arrangements.	
<b>SIG/US-26:</b> Shall verify the interfacing of fire system with PA system.		<b>SIG/US-26:</b> Shall install the fire alarm and control system and provide the necessary interfaces with PA system.	
<b>SIG/US-27:</b> Shall install the power cables from the distribution panel in UPS room to SER / CER and extend it to the SCR, Telecom Closets etc.,		<b>SIG/US-27:</b> Shall install the UPS and suitable protection devices at the output.	
<b>SIG/US-27A:</b> Shall run the LAN cable from station to all cross passage and permanent access egress location		<b>SIG/US-27A:</b> Shall provide the cable tray/ladders for LAN cable routing	
Contract A(Signalling)	TEST & COMMISSIONING STAGE		Contract-B (UG-Tunnel)
<b>SIG/US-28:</b> Shall conduct a joint test with Civil (Underground stations) Contractor for testing of earth impedance of all earths provided for tunnels & stations.	<b>SIG/US-28:</b> Shall attend the joint testing of earth impedance with Contractor- A		
<b>SIG/US-29:</b> Shall conduct joint testing on the networking, monitoring & control (where applicable) of M & E, LV distribution, UPS, DG, lighting system and building management systems etc., (provided under the Station Contract—Contract-B) through the M & E SCADA from OCC and SCR as per jointly agreed control logic and display formats.	<b>SIG/US-29:</b> Shall attend the joint testing and validate the test results.		

Contract A: Signalling & Train Control (Interface Lead)	Contract B : UG Tunnel (UGC-02) (Interface follower)	Sheet # : 6/6
<b>SIG/US-30:</b> Shall conduct the joint testing and confirm that there are no EMI / EMC impacts on S & T equipment installed in stations.	<b>SIG/US-30:</b> Shall attend the joint testing with S & T, RS and OHE contractors.	
<b>SIG/US-31:</b> Shall conduct joint testing on the functioning of fire and PA system inter connection.	<b>SIG/US-31:</b> Shall attend the joint testing and validate the results.	
<b>SIG/US-32:</b> Shall conduct joint load test with suitable loads for temporary power supply.	<b>SIG/US-32:</b> Shall attend the joint tests with Contractor- A.	
<b>SIG/US-33:</b> Shall conduct joint load test with suitable loads for UPS supply.	<b>SIG/US-33:</b> Shall attend the joint testing and validate the results.	

## 12. PSD and UG Stations (UGC-02)

Contract A: PSD (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 1/2
Contract A(PSD)	DESIGN STAGE	Contract B(UG-Station)	
<p><b>ST/US-01: (a)</b> Shall furnish the specification of Platform Screen Doors (PSD) like dimensions, weight and supporting &amp; mounting details throughout stations.</p> <p><b>(b)</b> Shall furnish the maximum load of PSD on platform edge</p> <p><b>ST/US-02:</b> Shall furnish the requirements of passenger emergency escape doors and track access doors.</p> <p><b>ST/US-03:</b> Shall furnish the installation location and method of Platform Screen Doors Local Control Panel on platform level.</p> <p><b>ST/US-04:</b> Shall furnish the requirement of earthing system including earth impedance value and earth bars for the PSD equipment.</p> <p><b>ST/US-05:</b> Shall furnish the EMI / EMC levels of PSD equipment to be installed in stations.</p> <p><b>ST/US-06:</b> Shall furnish the details of DG power supply requirement for PSD Operation</p> <p><b>ST/US-07:</b> Shall furnish the interfacing details with fire detection and firefighting systems</p> <p><b>ST/US-08:</b> Shall furnish the cable routing plan to Contractor-B</p>		<p><b>ST/US-01: (a)</b> Shall validate and find the locations of Platform Screen Doors (PSD) and design space, hanger walls / beams &amp; necessary supports, structural and platform slab by considering the Dimensions, weight and mounting details of PSD.</p> <p><b>(b)</b> Shall collect details from Contractor-A and design the platform to accommodate PSD load requirement.</p> <p><b>ST/US-02:</b> Shall validate and find the locations of passenger emergency escape doors and track access doors.</p> <p><b>ST/US-03:</b> Shall validate and find the locations of Platform screen doors local control panel.</p> <p><b>ST/US-04:</b> Shall fulfil the requirements of earthing and earth bars.</p> <p><b>ST/US-05:</b> Shall incorporate in station design and prepare a common EMI / EMC plan.</p> <p><b>ST/US-06:</b> Shall design the DG catering the load requirement for PSD Operation</p> <p><b>ST/US-07:</b> Shall plan and take signal from PSD and integrate with fire detection and firefighting systems</p> <p><b>ST/US-08:</b> Shall design cable duct/containment for PSD cable routing</p>	
Contract A(PSD)	CONSTRUCTION / INSTALLATION STAGE	Contract B(UG-Station)	
<p><b>ST/US-09:</b> Shall install the Platform Screen Doors, Emergency Escape Doors, Track access doors and Platform screen doors local control panels.</p>		<p><b>ST/US-09:</b> Shall provide necessary supports to install the platform screen doors and local control panels.</p>	

Contract A: PSD (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 2/2
<b>ST/US-10:</b> Shall verify the requirements of earths and earth bars.		<b>ST/US-10:</b> Shall install earths and earth bars for Platform screen doors and its equipment to be installed in Stations.	
<b>ST/US-11:</b> Shall install control panel, power and control cable according to plan layout		<b>ST/US-11:</b> Shall install cable containment/ducts to install control panel, power and control cable according to plan layout	
Contract A(PSD)	TEST & COMMISSIONING STAGE	Contract B(UG-Station)	
<b>ST/US-12:</b> Shall conduct a joint test with Civil Contractor (Contractor-B) for testing of earth impedance of all earths provided for the PSD Equipment.		<b>ST/US-12:</b> Shall attend the joint testing of earth impedance with Contractor-A.	
<b>ST/US-13:</b> Shall conduct the joint testing and confirm that there are no EMI / EMC impacts on PSD equipment installed in stations.		<b>ST/US-13:</b> Shall attend the joint testing with S&T (PSD) and OHE contractors.	
Contract A(PSD-S&T)	MAINTENANCE STAGE	Contract B(UG-Station)	
<b>ST/US-14:</b> Shall conduct the joint testing and confirm that there are no EMI / EMC impacts on PSD equipment installed in stations.		<b>ST/US-14:</b> Shall attend the joint testing with S & T (PSD) and OHE contractors.	

### 13. AFC and UG Stations (UGC-02)

Contract A: AFC (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 1/4
Contract A(AFC)		DESIGN STAGE	Contract B(UG-Station)
<b>1. Provision of Rooms and Areas for Equipment Lay-out</b> <b>AF/US-01:</b> Shall finalise the room schedule and lay-out for AFC at stations		<b>AF/US-01:</b> Shall incorporate the space and room requirements in the station Design	
<b>2. Mechanical and Structural Interfaces</b> <b>AF/US-02:</b> Shall provide details of AFC equipment with specific requirements for installation. <ol style="list-style-type: none"> <li>Granite Counters for TO</li> <li>Cable routing and Fixing arrangements for Cable Trays</li> <li>Gate array cable trench and raise way/raceway</li> <li>Passenger Windows at TO and EFO</li> <li>Wall Opening for TVM at SS</li> </ol>		<b>AF/US-02:</b> Shall incorporate the requirements in the station design for <ol style="list-style-type: none"> <li>Granite counter for TO</li> <li>Provision for Cable routing</li> <li>Gate array cable trench and raise way/raceway</li> <li>Passenger Windows at TO and EFO</li> <li>Wall Opening for TVM at SS</li> </ol>	
<b>3. Earthing</b> <b>AF/US-03:</b> Shall provide design details of earthing requirements		<b>AF/US-03:</b> Shall Incorporate the earthing scheme for AFC system as per requirement	
<b>4. Power supplies</b> <b>AF/US-04:</b> Provide the DG and UPS Power estimate in the station for AFC equipment		<b>AF/US-04:</b> Shall design the DG and UPS power supply with suitable protection devices for AFC equipment in station	
<b>5. Cable Routing, Penetration Installation &amp; Cable containment</b> <b>AF/US-05:</b> Shall provide the cabling scheme for AFC system and cable routing requirement for Power and Data including under floor cable raceways in Public areas.		<b>AF/US-05:</b> Shall space proof the cable routing requirement of AFC for Power and Data in the station design. Shall provide cable Containment and shall provide space and level for fixing cable raceways below floor finish stone in AFC gate area.	
<b>6. Furniture</b> <b>AF/US-06:</b> Shall provide the details of Granite Counter for TIW at Ticket Office		<b>AF/US-06:</b> Shall incorporate Granite Counter for TIW at Ticket office in the design.	
<b>7. Labelling and Statutory Signs</b> <b>AF/US-07:</b> Equipment related labelling and signage on AFC equipment and cables shall be designed by AFC contractor.		<b>AF/US-07:</b> All other signage at stations shall be designed by Station Contractor	

Contract A: AFC (Interface Lead)	Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 2/4
<p><b>8. EMC site Certification</b> <b>AF/US-08:</b> Shall provide the EMC requirements of AFC</p> <p><b>9. Review of documents &amp; Drawings</b> <b>AF/US-09:</b> Shall review the drawings and documents for AFC requirements. e.g. :  <ol style="list-style-type: none"> <li>1. Room Schedule</li> <li>2. Station layout</li> <li>3. Cable routing</li> <li>4. Gate array etc.</li> </ol>           (Not limited to the above drawings and documents)</p> <p><b>10. Utilities Required for Site works</b> <b>AF/US-10:</b> Shall specify the requirement of utilities for site Works  <ol style="list-style-type: none"> <li>1. Temporary power</li> <li>2. Lighting</li> <li>3. Airconditioning at TO and SCR</li> </ol></p> <p><b>11. Storage at Site</b> <b>AF/US-11:</b> Shall specify the temporary storage requirement for AFC equipment at the stations during installation</p> <p><b>12. Fire alarm interface</b> <b>AF/US-11A:</b>            (a) Shall design the AFC system to interface with fire alarm system. Shall also specify the details like type of signal, communication protocol etc.            (b) Shall Design the software according to functional requirements in emergency condition</p>	<p><b>AF/US-08:</b> To incorporate the AFC requirement in the design</p> <p><b>AF/US-09:</b> Shall incorporate the review comments in the drawings and documents and finalise the station documentation.</p> <p><b>AF/US-10:</b> Shall accommodate the requirements in his design.</p> <p><b>AF/US-11:</b> Shall make provision for temporary space at concourse level to store AFC equipment on temporary basis during installation</p> <p><b>AF/US-11A:</b>            (a) Shall design the Fire Alarm system to interface with AFC system. Shall verify and accept mutually the details like type of signal, communication protocol etc., operation in emergency condition            (b) Shall specify the functional requirements of AFC system</p>	


Contract A: AFC (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 3/4
Contract A(AFC)	CONSTRUCTION / INSTALLATION STAGE	Contract B(UG-Station)	
<b>1. Provision of Rooms and Areas for Equipment Layout</b> <b>AF/US-12:</b> 1. To confirm that the construction is as per the room schedule. 2. To request access from the station contractor (Contractor-B).  <b>2. Mechanical and Structural Interfaces</b> <b>AF/US-13:</b> 1.To check and confirm t h a t AFC specific requirements for installation are made available. 2.To install the electric cabinet and do the cable termination. 3.To install the switches and do the data cable termination. 4. To do the internal wiring at the AFC rooms. 5.To fix the AFC equipment at AFC rooms and complete the installation .  <b>3. Earthing</b> <b>AF/US-14:</b> To confirm that the earthing provided is as per the requirement and provide earthing for the equipment <b>4. Power supplies</b> <b>AF/US-15:</b> Install/Lay the Power cable from UPS panel to AFC room <b>5. Cable Routing and Penetration Installation</b> <b>AF/US-16:</b> To do the cable routing as per the cabling scheme for power & data. <b>6. Furniture</b> <b>AF/US-17:</b> To check the details of Granite counter for TIW provided by the station contractor (Contractor-B). To provide the other furniture as is in the scope of AFC Contractor. <b>7. Labelling and Statutory Signs</b> <b>AF/US-18:</b> To do the signage under the scope of AFC Contract., specific to AFC equipment and cabling.		<b>AF/US-12:</b> 1. To construct the room and gate area as per the AFC room Schedule 2. To provide access to AFC Contractor for the installation of equipment  <b>AF/US-13:</b> To construct and provide civil and structural facilities required for AFC installation          <b>AF/US-14:</b> To provide earthing as per AFC requirement    <b>AF/US-15:</b> Provide permanent power from UPS with suitable protection devices as per AFC requirement <b>AF/US-16:</b> Provide cable containment as per AFC Contractor's requirements   <b>AF/US-17:</b> To provide Granite Counter for TIW at Ticket office as per approved design.   <b>AF/US-18:</b> To provide the signage for operational requirements	

Contract A: AFC (Interface Lead)		Contract B : UG Stations (UGC-02) (Interface follower)	Sheet # : 4/4
<b>8. EMC site Certification</b> <b>AF/US-19:</b> To check and confirm that the EMC requirements of AFC are met		<b>AF/US-19:</b> To meet the EMC requirement of the AFC in the station.	
<b>9. Review of documents &amp; Drawings</b> <b>AF/US-20:</b> To review the as built drawings and documents as per the documentation plan.		<b>AF/US-20:</b> To provide the as built documents as per the documentation plan	
<b>10. Utilities Required for Site works</b> <b>AF/US-21:</b> To avail for installation of AFC equipment : <ol style="list-style-type: none"> <li>1. Temporary power</li> <li>2. Lighting</li> <li>3. Air-conditioning at TO and SCR</li> </ol>		<b>AF/US-21:</b> To provide the following utilities for installation of AFC equipment, <ol style="list-style-type: none"> <li>1. Temporary power</li> <li>2. Lighting</li> <li>3. Air-conditioning at TO and SCR</li> </ol>	
<b>11. Storage at Site</b> <b>AF/US-22:</b> To check the adequacy of the temporary storage space for AFC equipment at the concourse level and avail.		<b>AF/US-22:</b> To provide temporary storage space for the AFC equipment at concourse level.	
<b>12. Fire alarm interface</b> <b>AF/ES-22A:</b> Shall Install and connect the cable from AFC panel to Fire alarm control panel.		<b>AF/ES-22A:</b> Provide the interface terminal to AFC contractor.	
Contract A(AFC)	TEST & COMMISSIONING STAGE	Contract B(UG-Station)	
<b>AF/US-23:</b> Contractor-A shall jointly test the UPS systems		<b>AF/US-23:</b> Contractor-B shall jointly test the UPS systems with contractor-A	
Contract A(AFC)	MAINTENANCE STAGE	Contract B(UG-Station)	
NIL		NIL	

### Attachment E Indicative Master Interface Matrix

	UGC-01 (Tunnel & Stations) : UGC-01	UGC-02 (Tunnel & Stations) : UGC-02	Elevated Contract	Tunnel Ventilation and UG Station Air-Conditioning	Station Lifts and Escalators	Rolling Stock	Track Works	Power Supply System (PST)	OHE (PST)	Signalling and Train Control	Telecommunication System	Platform Screen Doors (PSD)	Automatic Fare Control System (AFC)
UGC-01 (Tunnel & Stations) : UGC-01													
UGC-02 (Tunnel & Stations) : UGC-02													

### Attachment F Part 1 – Interface Coordination Sheet Form

 <b>Interface Coordination Sheet: UGC-01/UGC-02</b> <div style="float: right;"> <div style="border: 1px solid black; padding: 5px; margin: 2px;">Contractor -1 Logo</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">Contractor -2 Logo</div> </div>						
INTERFACE PLAN					INTERFACE IMPLEMENTATION	
ICS No	Project Stage	Interface Plan Status	Interface Point Lead	Interface Plan Follower	Implementation Status	Action/Progress records & Follow-ups
A.1	Design	Completed	Contract-A shall design temporary and permanent drainage system in consultation with Contract-B	Contract-B shall plan drainage system with Contract-A	Note Ready	
A.2	Design	Completed	Contract-A shall design grounds treatment outside station wall for break-through	Contract-B shall Design station walls to accept break through by two TBMs (Tunnel boring machine)	Note Ready	

### Attachment F Part 2 - Interface Coordination sheet Format

The following table provides an example of the Interfacing Party Contract codes, which can be used when preparing / updating the Contractor's Interface Coordination Sheet, which should be prepared on the basis of a separate Excel spreadsheet for each Interfacing Party. These Interfacing Party Contract codes shall be finalised by the Engineer and made available to the Project Contractors.

Interface Party Codes	
CVT	Civil Tunnels
CSN	Civil Stations
CVD	Civil Depot
ARS	Architectural Stations
ARD	Architectural Depot
BSS	Building Service Stations
BSD	Building Service Depot
DEE	Depot Equipment
AFC	Automatic Fare Collection
SGC	Signalling and Communications
LEC	Lifts and Escalators
VAC	Ventilation & Air-Conditioning
TVS	Tunnel Ventilation System
PST	Traction Power (Includes OCS & SCADA)
RST	Rolling Stock
TWK	Track work

### Attachment F Part 3 - Interface Coordination Sheet Format

The following table describes the Interface Status with codes to be used in preparing / updating the Interface Coordination sheet.

Interface Status Codes & Meanings		
Interface Status	Code for Log	Description of Status
To be coordinated	TBC	Both Contractors have not agreed the conditions for this interface
Coordinated	COR	Both Contractors have agreed that the interface is valid
Not coordinated	NCOR	One Contractor does not agree the conditions for this interface
Received	REC	The Contractor responsible for the design/construction element has received the information/documents required
Provided	PRO	The Contractor responsible for providing the information/documents to progress the design/construction element has provided the documents to the Interfacing Party
Accepted	ACP	The Contractor has accepted the proposed Interface Design or Construction element
Not Accepted	NACP	Either of the Contractors have not accepted the proposed Design/Construction element
Propose closeout	PCO	Both Contractors have accepted the proposed Interface Design or Construction element and no other requirements are outstanding. Both Parties have agreed to sign the Confirmation of Coordination Form
Closed out	CO	The final Interface Documentation together with Confirmation of Coordination Form has been sent to the Interface Coordination Manager for closing the interface
Superseded	SUP	The Interface design or construction element has been superseded

### Attachment G – Confirmation of Coordination Form

<b>Pune Metro</b>					
<b>Ref No.</b>					
<b>CONFIRMATION OF COORDINATION</b>					
<b>CONTRACT:</b>				<b>TRANSMITTAL No.:</b>	
<b>TITLE:</b>					
<b>ACTIVITY NO.:</b>					
<b>GENERAL DESCRIPTION:</b>					
<b>SIGNATURE OF INTERFACING CONTRACTORS:</b>					
	<b>Interfacing Contractor</b>	<b>Authorized Name</b>	<b>Signature</b>	<b>Date Reviewed</b>	<b>Comment</b>
1					
2					
3					
4					
5					
<p>Signatures above confirm that this design document has been reviewed as part of the coordination process.</p>					
<p><b>NOTE:</b> Where Contractors are not in agreement with the details on this submission, they are to comment above and advise the interfacing party in question requesting accommodation of the requirement and advise the Engineer under separate cover and report progress in Monthly Report / Coordination Meetings.</p>					

## **Attachment H - Guidance Notes for the Preparation of Interface Management Programme**

1. The programme shall be prepared and submitted in bar chart format.
2. The bar chart shall be formed by activities grouped by major Zones of Interface.
3. The detail of each bar chart activity shall demonstrate the Contractor’s understanding of the scope of work of any Interfacing Contractor who is to supply input to the Contractor, in order for him to achieve an integrated coordinated design.
4. The bars shown on the bar chart shall be annotated with details of the information expected from the Interfacing Contractors, and highlight any target dates to receive or produce information.
5. Information relating to contractual milestone dates shall be shown on both the Contractor’s and Interfacing Contractors’ schedules.
6. The prime purpose of the document is to assist in ensuring that a coordinated design, construction, testing and commissioning is achieved. This document shall be forwarded to Interfacing Contractors for comment and agreement on a regular basis.
7. A complementary table of activities and dates should be prepared for ease of reference.

### **Attachment I - Guidance Notes for the Preparation of Interface Management Plan**

The purpose of this Plan is to demonstrate how the Contractor proposes to achieve a fully coordinated design, which is compatible with that design carried out by Interfacing Contractors.

This document shall describe each of the component parts, within Zones of Interface, of the design, which require input from Interfacing Contractors. The descriptions should include details relating to the inputs required from both the Contractor and Interfacing Contractor, to achieve a fully coordinated design. The document should also be complementary to the IMPG, which details the proposed schedule and timings of each of the interfacing activities.

This document shall also detail the proposed interfacing requirements to be met by all Interfacing Contractors. The Contractor shall ensure that this document is acceptable to the Interfacing Contractors and that they are able to comply with all of its requirements. This is to be achieved by document exchanges and discussions to achieve agreement of documents.

The Plan shall therefore:

- i) Detail each of the component parts of the Project, which require the input of Interfacing Contractors to achieve a coordinated design. It shall describe the various disciplines and detail the technical input from others that will be required to achieve a coordinated design.
- ii) Cover the whole duration of the Works and be complementary to the IMPG, which details the proposed/agreed schedule and timings.
- iii) Be given by the Contractor to other Interfacing Contractors for their information and agreement.
- iv) Be developed in association with the process of increasing knowledge of the design and shall reflect the agreements reached by the Contractor and the Interfacing Contractors as the Project progresses. The Plan shall be updated on a quarterly basis to reflect this developing status.

The Status of any interface at any point in time shall be identified by one of the following conditions;

- to be coordinated
- coordinated
- not coordinated
- received
- provided
- accepted
- not accepted
- propose close-out
- superseded
- closed out